M20 Junction 10a

TR010006

Environmental Statement

Chapter 5 Air Quality

APFP Regulation 5(2)(q)

Revision A

Planning Act 2008

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

Volume 6.1

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M20 Junction 10a

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Environmental Statement

Chapter 5 Air Quality

Volume 6.1

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Content

Chapter Title Page

5 Air Quality

5.1 Introduction

5.1.1 This chapter presents the assessment of the potential air quality effects of the Main Scheme and the Alternative Scheme. Both of these Schemes include the addition of a new junction located to the south of the existing junction 10 on the M20 and a new link road of approximately 800 metres connecting the proposed junction to the A2070. The only difference between the Main Scheme and the Alternative Scheme is the inclusion of an additional roundabout in the middle of the proposed new link road. This roundabout provides additional access to the Stour Park development to the south of the link road. The initial phase 1 of this development has been included in both the Main Scheme and Alternative Scheme assumptions. Potential changes in air quality as a result of additional traffic created by the full Phase 2 Stour Park development are assessed in Chapter 15 Consideration of Combined and Cumulative Effects, Volume 6.1. A description of the traffic data scenarios used in this chapter is contained within Chapter 4 EIA Methodology, Volume 6.1.

5.1.2 A full description of the Main Scheme and Alternative Scheme is described in Chapter 2 The Proposed Scheme, Volume 6.1 of this Environmental Statement. Potential changes in air quality at sensitive receptors affected by both the Main and Alternative Schemes are considered with reference to relevant policy and legislation, and in the context of existing air quality in the study area.

5.1.3 This chapter provides an assessment following the advice in the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3, Part 1 – Air Quality (HA207/07)[1] and Interim Advice Notes (IAN 170/12[2], IAN 174/13[3], IAN 175/13[4] and IAN185/15[5]).

[1] Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07, Air Quality.
[2] Highways Agency (2012) Interim Advice Note 170/12 v3: Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3 Part 1 'Air Quality' (HA207/07), available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170.pdf, accessed 18/04/16.
[3] Highways Agency (2013) Interim Advice Note 174/13. Update advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07), available online at http://www.standardsforhighways.co.uk/ians/pdfs/ian174.pdf, accessed 18/04/16.
[4] Highways Agency (2013) Interim Advice Note 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the projection of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07), available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf, last accessed 18/04/16.
[5] Highways Agency (2015) Interim Advice Note 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' (HA207/07), available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf, last accessed 18/04/16.

5.1.4 The Main and Alternative Schemes have the potential to cause air quality effects, both positive and negative, during the construction and operational phases. The air quality topic encompasses two sub-topics:

- Local air quality, which is concerned principally with emissions of pollutants that are of concern to human health and ecosystems, at a local level.
- Regional impacts, which is concerned with total emissions of pollutants that can disperse over longer distances, affecting both human health and ecosystems.

5.2 Legislative and Policy Framework

European Union

5.2.1 Directive 2008/50/EC[6] on ambient air quality and cleaner air for Europe was adopted in May 2008. This Directive defines limit values and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

5.2.2 Directive 2008/50/EC[7] sets out that the Limit Values apply everywhere with the exception of:

a) Any locations situated within areas where members of the public do not have access and there is no fixed habitation.

b) In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply.

c) On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access to the central reservation.

5.2.3 Defra assesses and reports on the compliance with the Air Quality Directive for each of the 43 zones and agglomeration across the UK.

England

Air Quality Legislation

5.2.4 The Air Quality Standards Regulations 2010[8] came into force in June 2010; they implement the EU's Directive 2008/50/EC on ambient air quality for the UK.

[6] European Union. (April 2008) Directive on Ambient Air Quality and cleaner Air for Europe, Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044.
[7] European Union. (April 2008) Directive on Ambient Air Quality and cleaner Air for Europe, Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044.
[8] Statutory Instrument (2010) The Air Quality Standard Regulations, No. 1001.

5.2.5 Part IV of the Environment Act 1995[9] requires that every local authority shall periodically carry out a review of air quality within its area, including likely future air quality. As part of this review, the local authority must assess whether air quality objectives are being achieved, or likely to be achieved within the relevant periods. Any parts of a local authority's area where the objectives are not being achieved, or are not likely to be achieved within the relevant period, must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

5.2.6 The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000[10] and the Air Quality (England) (Amendment) Regulations 2002[11].

5.2.7 The Air Quality Strategy establishes the UK framework for air quality improvements. The air quality objectives in the AQS are a statement of policy intentions and policy targets. As such, there is no legal requirement to meet these objectives, although local authorities are also required to work towards achieving the Air Quality Strategy's objectives.

5.2.8 The air quality objectives and limit values relevant to the assessment are summarised in Table 5.1.

Table 5.1 Air Quality Objectives and Limit Values

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date	
				Air Quality Objectives	EU Limit Values
Nitrogen dioxide (NO_2)	Annual	40 µg/m^3	-	31 December 2005[(a)]	1 January 2010[(c)]
	1 Hour	200 µg/m^3	18	31 December 2005[(a)]	1 January 2010[(c)]
Particulates (PM_{10})	Annual	40 µg/m^3	-	31 December 2004[(a)]	1 January 2005[(c)]
	24 Hour	50 µg/m^3	35	31 December 2004[(a)]	1 January 2005[(c)]
NO_x[(d)]	Annual	30µg/m^3	-	31 December 2000[(c)]	

Notes: [(a)] Air Quality (England) Regulations 2000 as amended in 2002

[(b)] Air Quality Strategy 2007

[(c)] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe and The Air Quality Standards Regulations 2010. Derogations (time extensions) have been agreed by the EU for meeting the NO_2 limit values in some zones/agglomerations

[(d)] Critical level for the protection of vegetation

5.2.9 The air quality objectives only apply in locations of relevant exposure. Table 5.2 provides details of where the respective objectives should and should not

[9] Defra (2003) Part IV of the Environment Act 1995 Local Air Quality Management.
[10] Statutory Instrument. (2000) Air Quality (England) Regulations, No. 928.
[11] Statutory Instrument. (2002) Air Quality (England) (Amendment) Regulations, No. 3043.

apply, and therefore the types of receptors that are relevant to the assessment of air quality.

Table 5.2 Locations where the air quality objectives should and should not apply

Averaging Period	Objectives should apply at:	Objectives should not apply at:
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24 Hour	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1 Hour	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend 1 hour or more. Any outdoor locations where members of the public might reasonably be expected to spend 1 hour or longer.	Kerbside sites where the public would not be expected to have regular access.

Notes: Defra (2016) Local Air Quality Management – Technical Guidance[12]

Construction Dust

5.2.10 Section 79(1)(d) of the Environmental Protection Act 1990[13] defines one type of 'statutory nuisance' as "*any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*". Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. However, it is a defence if an operator employs the best practicable means to prevent or to counteract the effects of the nuisance.

[12] Defra (2016) Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III: Local Air Quality Management – Technical Guidance LAQM.TG (16), available online at http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf, last accessed 19/04/16.

[13] Parliament of the United Kingdom (1990) Environmental Protection Act 1990.

Policy

National Policy Statement for National Networks

5.2.11 The National Policy Statement for National Networks (NPS NN) sets out the policy which the Scheme should comply with. Although it is also the basis for informing a judgement on the impacts of a scheme i.e. is the scheme consistent with the needs of the NPS NN.

5.2.12 The NPS NN notes that the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statements and that the Environmental Statement should describe:

- *Existing air quality levels.*
- *Forecasts of air quality at the time of opening, assuming that the scheme is not built (the future baseline) and taking account the impact of the scheme.*
- *Any significant air quality effects, their mitigation and any residual effects, distinguish between the construction and operation stages and taking account of the impact of road traffic generated by the project.*

5.2.13 Paragraphs 5.12 and 5.13 of the NPS NN provides advice for decision makers:

*"5.12 The Secretary of State must give air quality considerations **substantial weight** where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and / or where they lead to a deterioration in air quality in a zone / agglomeration."*

*"5.13 The Secretary of State should **refuse consent** where, after taking into account mitigation, the air quality impacts of the scheme will:*

- *Result in a zone / agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant.*
- *Affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision."*

5.2.14 Advice set out in Interim Advice Notes 174/13 and 175/13 ensures that an assessment to inform the reasonable and robust decision making on the judgements of significant air quality impacts (NPS NN para 5.12) and determining whether a scheme would affect the UK's reported ability to comply with the Air Quality Directive (NPS NN para 5.13) can be completed and evaluated in line with the requirements of the NPS NN.

National Planning Policy Framework

5.2.15 The National Planning Policy Framework (NPPF) sets out the government's planning policies for England. With regard to air quality the Policy states at paragraph 109 that:
"The planning system should contribute to and enhance the natural and local environment by:… preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability…"

5.2.16 And at paragraph 124 that:
"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative effects on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

5.2.17 Whilst the NPPF does not contain specific policies for nationally significant infrastructure projects, the policies in the NPPF and NPS NN are consistent.

Local Policy

5.2.18 Ashford Borough Council (ABC) adopted its Core Strategy on the 10th July 2008 which sets out objectives and policies for growth between 2006 and 2021. Policy CS1: Guiding principles sets out a number of key planning objectives including one related to air quality:

"Development that respects the environmental limits that protect the high quality built and natural environment of the Borough, minimises flood risk, provides for adequate water supply, and protects water and air quality standards"

5.2.19 ABC is currently preparing its Local Plan which will replace the Core Strategy up to 2030 and is expected to be published in draft in 2016.

5.3 Method of Assessment

Overview

5.3.1 Potential air quality effects have been assessed in accordance with the DMRB Volume 11 Section 3, Part 1 – Air Quality (HA207/07) and the following IANs:

- IAN 170/12[14].

[14] Highways Agency (2012) Interim Advice Note 170/12 v3: Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3 Part 1 'Air Quality' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170.pdf, accessed 18/04/16.

- IAN 174/13[15].
- IAN 175/13[16].
- IAN 185/15[17].

5.3.2 Although IAN 175/13[18] is currently withdrawn pending a new version, it has been used following advice received from Highways England as it is the only associated guidance available for assessing risk related to compliance with the EU Directive on ambient air quality.

Construction Phase

Study Area

5.3.3 During the construction phase, both the Main and Alternative Schemes would introduce new emission sources in the form of traffic and plant and involve potentially dust generating activities, such as earth moving and demolition. The distances from the emission source at which significant construction dust effects are likely to occur are dependent on the extent and nature of mitigation measures, the prevailing wind conditions, rainfall and the presence of screening etc. However, research indicates that effects from construction activities that generate dust are generally limited to within 150-200 metres of the construction site boundary[19].

5.3.4 Following the advice set out in paragraph 3.45 of DMRB Volume 11 Section 3, Part 1 – Air Quality (HA207/07), sensitive features within 200m of any construction activities and site compounds have been identified. The construction phase study area for both the Main and Alternative Schemes is presented within Figure 5.1, Volume 6.2. Additionally, traffic management will be in place on the A20, the M20 and the A2070. These have the potential to cause congestion and affect air quality within 200 metres of those locations. Table 5.3 provides the expected durations of the traffic management measures.

[15] Highways Agency (2013) Interim Advice Note 174/13. Update advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ians/pdfs/ian174.pdf, accessed 18/04/16.
[16] Highways Agency (2013) Interim Advice Note 175/13. Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the projection of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf, last accessed 18/04/16.
[17] Highways Agency (2015) Interim Advice Note 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' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf, last accessed 18/04/16.
[18] Highways Agency (2013) Interim Advice Note 175/13. Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the projection of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf, last accessed 18/04/16.
[19] Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07, Air Quality.

Scope

5.3.5 The construction phase could result in on-site dust emissions arising from construction activities and on-site vehicle movements. Dust can be mechanically transported either by wind or re-suspension by vehicles. It can also arise from wind erosion on material stock piles and earth moving activities. Combustion related emissions (such as NO_2, SO_2 and fine particulates) from on-site plant and vehicles would also occur during the construction phase and could affect local air quality. However, given the local and temporary nature of site plant and potential effects of emissions on local air quality, the assessment of construction plant emissions has not been considered further. Mitigation measures to reduce the effect of site plant on local air quality are nevertheless discussed in Section 5.7 of this chapter.

5.3.6 The construction of both the Main and Alternative Schemes would be undertaken in phases, the duration of which are dependent on the section of the works, and would be expected to last for approximately 24 months in total.

5.3.7 On the basis of the construction works to be undertaken, there would be an estimated 234 construction traffic movements per day (based on total movements and number of days required to build the Main Scheme and the Alternative Scheme). It is unlikely that the construction movements would be concentrated on 1 route due to the size of both the Main and Alternative Schemes and therefore impacts would be spread across a number of roads. At this stage the exact details regarding haul routes is uncertain, however, it is likely that approximately 50% of construction traffic would use the A2070 and the other 50% would use the A20. Different phases of the construction would require more construction movements than others and a total of 234 vehicles per day (117 per haul route) is an average flow across the construction period and is considered to be small compared to existing flows. However, as traffic movements will be spread across the road network the maximum flows are not expected to meet the criteria for assessment described in Section 5.3.13. Therefore, potential effects from both the Main and Alternative Schemes' construction traffic are considered to be not significant and have not been assessed further.

5.3.8 Traffic management is expected to be in force throughout the duration of the construction phase. The nature and duration of traffic management is dependent on the section of works being undertaken. The preferred proposed traffic management measures are presented in Table 5.3.

Table 5.3 Traffic Management Location and Duration

Location	Traffic Management	Expected Duration
M20	Narrow lanes, 50 miles per hour speed limit and night time contraflow	14 months
A20 Hythe Road	Temporary carriageway in use	12 months
Traffic lights at Swatfield Bridge	Traffic lights and single lane running across Swatfield Bridge	7 months

Location	Traffic Management	Expected Duration
Highfield Lane / Kingsford Street	Traffic lights and single lane running	4 months
A2070 / Barrey Road	Contraflow, single lane running	6 months

Source: Carillion (2016) 'M20 Junction 10a Buildability Report - Construction Phasing & Programme'

Methodology

5.3.9 Construction activities can result in temporary effects from dust. The word 'dust' usually refers to particulate matter in the size range 1-75 microns in diameter[20].

5.3.10 A qualitative assessment of potential dust effects has been undertaken, based on a review of likely dust raising activities and identification of sensitive receptors within 200m of these activities. Best practice mitigation measures have been proposed commensurate with the dust effects identified. These are presented in Section 5.7 and Appendix 17.1, Volume 6.3.

5.3.11 A qualitative assessment of emissions associated with traffic management has been undertaken based on preferred proposed traffic management measures presented in Table 5.3 of this chapter.

Operational Phase - Local Air Quality

Scope

5.3.12 During the operational phase, both the Main and Alternative Schemes would alter parts of the existing road network through the addition of junction 10A and its associated link road. This would move emission sources closer to some receptors in the vicinity of the proposed junction 10A. In addition, both the Main and Alternative Schemes would change the characteristics of traffic flows on the existing road network.

5.3.13 In accordance with the DMRB, the following criteria have been applied to the Main Scheme and Alternative Scheme Do-Minimum and Do-Something scenario traffic flows in order to identify which roads (within the area shown in Figure 5.2, Volume 6.2) are likely to be affected by both the Main and Alternative Schemes (referred to as 'affected roads') to the degree that they require consideration within the local air quality assessment. The criteria are:

- Road alignment will change by 5m or more.
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more.

[20] Building Research Establishment (2003) The Control of Dust from Construction and Demolition Activities, available online at https://www.rbkc.gov.uk/pdf/Document%2012%20-%20BRE%20-%20Control%20of%20Dust%20from%20Construction%20&%20Demolition%20Activities.pdf, last accessed 18/04/16.

- Heavy Duty Vehicle (HDV) flows will change by 200 Annual Average Daily Traffic (AADT) or more.
- Daily average speed will change by 10km/hr or more.
- Peak hour speed will change by 20km/hr or more.

5.3.14 The assessment has considered properties and designated sites for ecology within 200m of affected roads, as presented in Figure 5.4a and Figure 5.4b, Volume 6.2.

5.3.15 Ashford Borough Council (ABC) stopped monitoring for PM_{10} in 2011 as they concluded PM_{10} concentrations were below the air quality objectives within the whole borough. Data provided by Defra also show that background PM_{10} concentrations are significantly below the air quality objectives in the study area, as indicated in Section 5.6. Furthermore, vehicles emission factors for PM_{10} are relatively low and at least an order of magnitude lower than for NO_x. It is therefore considered unlikely that the Scheme impacts on PM_{10} would be sufficient to lead to exceedances of PM_{10} air quality objectives or limit values, and as such PM_{10} impacts have not been considered in as much detail as NO_2. Section 5.8 describes the predicted impacts at the worst affected receptors only.

5.3.16 The main criterion met above for both the main and alternative Schemes is the change in road alignment as the Schemes introduce a new junction and link road. In addition, both Schemes meet the criterion for changes in AADT. The M20 carriageway is likely to experience a range of increases between 1,000 and 6,000 AADT during operation. Figure 5.10a, Volume 6.2 and Appendix 5.3, Volume 6.3 presents the locations of these links and the traffic data. Increases of approximately 1,000 AADT are predicted on the M20 south of junction 10a for both Schemes and increases of approximately 6,000 AADT are predicted on the M20 north of junction 10a for both Schemes. These changes are primarily as a result of traffic rerouting from the existing Northbound on slip and the Southbound on slip. There are no changes that meet the criteria on the M20 north of the existing junction 10.

5.3.17 The local road network is predicted to experience a maximum decrease of approximately 8,800 AADT for both the Main Scheme and Alternative Scheme along the A20 between junction 10 and the Street / A20 / Tesco Roundabout. These changes are predicted due to the rerouting of traffic away from the local road network and onto the M20 as a result of the new junction 10a and the closure of the southern slip roads on the existing junction 10.

5.3.18 There are few predicted changes in speed on the existing road network as a result of the Main and Alternative Schemes. The largest of these is an increase of approximately 10km/hr (as a daily average) on the A2070 between the roundabout with the proposed A2070 Link Road and Boulevard road and on the A20 between The Street and Junction 10A.

5.3.19 The DMRB screening criteria for local air quality has been applied to the Main Scheme and the Alternative Scheme Do-Minimum and Do-Something

scenario traffic flows in order to identify which roads are likely to be affected by both the Main and Alternative Schemes (referred to as 'affected roads').

5.3.20 A drawing showing the affected roads and other relevant features within the study area is presented in Figure 5.2, Volume 6.2. SATURN traffic model data for affected roads has been used for this assessment. A summary of this data has been provided in Appendix 5.3, Volume 6.3.

5.3.21 Additional road links with 200 metres of affected roads have been included within the dispersion modelling where their emissions contribute to total concentrations at identified receptors.

Methodology

Traffic Data

5.3.22 Outputs from the SATURN traffic model have been used for this assessment. Data on vehicle flows, speed and percent of Heavy Duty Vehicles (HDV) (HDVs are a sum of Heavy Good Vehicles and buses) are available for the following periods in the base, Do-Minimum and Do-Something scenarios for the Main Scheme and the Alternative Scheme:

- AM peak period (07:00 to 10:00).
- Inter-peak period (10:00 to 16:00).
- PM peak period (16:00 to 19:00).
- Off-peak period (19:00 to 07:00).

5.3.23 The diurnal traffic flow characteristics, and therefore emissions, are represented in the dispersion model using time varying emission factors. The same profile used for weekdays has been applied to the weekend.

5.3.24 Speed data have also been derived from the SATURN traffic model and has been Speed Banded following application of derived speed pivots in accordance with IAN 185/15[21] for use in this assessment. Appendix 5.3, Volume 6.3 provides a summary of traffic data for the study area.

Assessment Scenarios

5.3.25 This assessment has considered the following scenarios:

- Base Year 2014;
- Do-Minimum (DM) Scenario 2018 (opening year);
- Do-Something (DS) Scenario 2018 – Main Scheme; and,

[21] Highways Agency (2013) Interim Advice Note 175/13. Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the projection of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf, last accessed 18/04/16.

- Do-Something (DS) Scenario 2018 – Alternative Scheme.

5.3.26 The DS Scenario has been assessed using SATURN traffic model outputs for both the Main Scheme and the Alternative Scheme. The different traffic flow data between the Main Scheme and Alternative Scheme is only applicable to the DS Scenario.

5.3.27 Although traffic data for further future years of 2023 and 2033 are available, the assessment of the 2018 Opening Year is considered to allow the identification of the greatest potential effects of both the Main and Alternative Schemes due to the expected improvements in vehicle emission standards, and background pollutant concentrations, in future years. As a result, assessment of local air quality in a future year has not been undertaken. This is described further in the context of the assumptions used in the assessment in Section 5.3.45.

Model Selection

5.3.28 This assessment has used a dispersion model called 'ADMS-Roads' (version 4), a PC-based model of dispersion in the atmosphere of pollutants released from road traffic sources, produced and validated by Cambridge Environmental Research Consultants (CERC).

Vehicle Emission Factors

5.3.29 Road traffic emissions are provided within IAN 185/15, which are derived from Defra's published Vehicle Emission Toolkit. Although IAN 185/15 provides predictions of future emissions, there remains some uncertainty over this issue. This has been addressed through the use of IAN 170/12[22] which considers future NO_X and NO_2 projections. This is addressed further in Paragraph 5.3.38.

5.3.30 A time varying emission file has been used to represent vehicle emissions for each of the periods discussed in Paragraph 5.3.22.

Meteorological Data

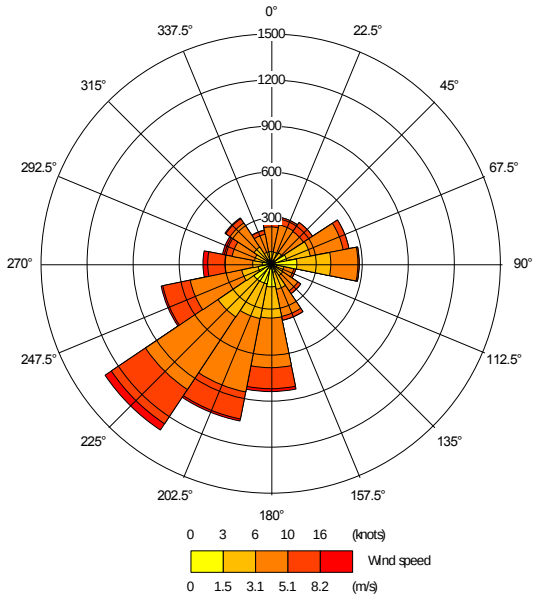
5.3.31 The most important meteorological parameters governing the atmospheric dispersion of emissions are wind direction, wind speed and atmospheric stability.

5.3.32 For meteorological data to be suitable for dispersion modelling purposes, a number of meteorological parameters need to be measured on an hourly basis. There are only a limited number of sites where the required meteorological measurements are made. Data from Gatwick Airport for 2014 were used within the assessment and is considered representative of the

[22] Highways Agency (2012) Interim Advice Note 170/12 v3: Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3 Part 1 'Air Quality' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170.pdf, accessed 18/04/16.

modelled area. A wind rose is presented in Figure 5.1 and highlights a predominant wind direction from the south-south-west and is associated with the highest wind speeds. There are very low occurrences of wind from other directions and tend to be associated with low wind speeds.

Figure 5.1 Windrose (2014)



NO_x to NO_2 Relationship

5.3.33 Emission rates used within dispersion modelling are based on NO_x to represent all nitrogen-oxygen species emitted in exhaust gases. The proportion of NO_2 is needed for comparison with the air quality objectives presented in Table 5.1. Research undertaken on behalf of Defra has provided a method to determine NO_2 concentrations[23] from NO_x. This method has been used within this assessment and its suitability assessed within the model verification process.

Background Concentrations

5.3.34 Only road traffic emission sources have been explicitly included within the dispersion model. Non-road traffic related emission sources, such as industrial and domestic emissions, have been accounted for within the assessment by assigning appropriate 'background' concentrations to modelled receptor locations. Further details on 'background' concentrations used within the assessment are provided in Section 5.6 of this chapter.

[23] Defra (2016) NO_x to NO_2 Calculator, Version 4.1, available at: http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc, last accessed 18/04/16.

Assessment of 1 Hour NO_2 and 24 Hour PM_{10} Concentrations

5.3.35 Defra's Technical Air Quality guidance (TG16)[24] advises that exceedances of the 1 hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60 µg/m^3 or above. Therefore exceedances of 60 µg/m^3 as an annual mean are used as an indicator of potential exceedences of the 1 hour mean NO_2 objective.

5.3.36 The prediction of daily mean concentrations of PM_{10} is available as an output option within the ADMS roads dispersion model for comparison against the short term air quality objective. However, as the model output for annual mean concentrations is considered more accurate than the modelling of the daily mean, an empirical relationship has been used to determine daily mean PM_{10} concentrations.

5.3.37 In accordance with TG16[25], the formula below has been used. This has been applied to the worst affected receptor only to demonstrate that the Main Scheme or Alternative Scheme do not have a significant impact on daily mean PM_{10} concentrations. This formula is equivalent to an annual mean of 32µg/m^3 equating to 35 days at or above the 24 hour average of 50µg/m^3:
'No. of 24-hour mean exceedences = -18.5 + 0.00145 x annual mean^3 + (206 / annual mean)'.

Assessment of Future NO_x and NO_2 Projections

5.3.38 The Defra background pollution maps and vehicle emission factors assume that air quality improves in future years, as older vehicles are replaced with modern cleaner vehicles (amongst others). However, generally, UK monitored roadside and background NO_2 concentrations have not declined as would be expected in recent years. This trend is thought to be related to the increased use of modern diesel vehicles, which emit more NO_x than expected under urban driving conditions and have higher primary NO_2 emissions than petrol vehicles[26]. The effect of this and how it has been dealt with is is discussed in following paragraphs. Monitoring data for this study area presented in Section 5.6 indicates that overall NO_2 concentrations have declined marginally since 2012.

5.3.39 Defra updated the air quality tools in 2014 (new vehicle emission factors, background pollution maps, and NO_x/NO_2 converter). However, it is still considered that future NO_2 concentrations are likely to be underestimated when using the updated tools.

[24] Defra (2016) Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III: Local Air Quality Management – Technical Guidance LAQM.TG (16), available online at http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf, last accessed 19/04/16.
[25] Defra (2016) Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III: Local Air Quality Management – Technical Guidance LAQM.TG (16), available online at http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf, last accessed 19/04/16.
[26] Defra 2016 Trends in NOx and NO2 emissions and ambient measurements in the UK, available online at https://uk-air.defra.gov.uk/assets/documents/reports/cat05/1108251149_110718_AQ0724_Final_report.pdf

5.3.40 IAN 170/12 (v3) provides advice on taking account of the effect of future alternative NO_2 projections. The IAN is in response to Defra's advice on long-term trends that there is a gap between current projected vehicle emission improvements and projections on the annual rate of improvements in ambient air quality as previously published in Defra's technical guidance.

5.3.41 The assessment of local air quality NO_2 effects has been undertaken in accordance with IAN 170/12. The IAN describes 3 potential approaches for future projections of NO_x and NO_2 and requires professional judgement to be used to determine the most appropriate approach. The 3 approaches described are:

- Defra's technical guidance[27].
- Interim alternative long term trend projections[28].
- Long term trend projections[29].

5.3.42 All 3 approaches assume an improvement in future vehicle emissions and background pollutant concentrations. In the order listed above, each represents increasingly smaller assumed reductions for future vehicle emissions and background concentrations; i.e. 'Defra's technical guidance' approach assumes the greatest reductions future years, the 'interim alternative long-term trend' approach assumes a smaller reduction in future years and the 'long-term trend projections' assumes the smallest reductions in future years.

5.3.43 Determining the most appropriate approach requires consideration of the following aspects:

- Trends in ambient background and roadside NO_2 concentrations in the study area in recent years.
- How far in the future the Opening Year of both the Main and Alternative Schemes are. This relates to the proportion of vehicles on the road network in the Opening Year which would be subject to more stringent Euro emission standards and the degree to which national reductions in emissions of NO_x (particularly from road transport) can be expected to reduce ambient NO_2 concentrations. The 'interim alternative long term trend projections' assumes there is a greater reduction in emissions compared to the 'long term trend projections' due to the expected benefit of Euro 6/VI vehicles entering the fleet.

[27] Defra (2016) Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III: Local Air Quality Management – Technical Guidance LAQM.TG (16), available online at http://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf, last accessed 19/04/16.
[28] Highways Agency (2012) Interim Advice Note 170/12 v3: Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3 Part 1 'Air Quality' (HA207/07), available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170.pdf, accessed 18/04/16.
[29] Highways Agency (2012) Interim Advice Note 170/12 v3: Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3 Part 1 'Air Quality' (HA207/07), available online at http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170.pdf, accessed 18/04/16.

5.3.44 The baseline air quality presented in Section 5.6 of this chapter demonstrates that monitored background concentrations have declined marginally since 2012. In addition, considering the Opening Year would be expected to be 2018, there would be limited uptake of new Euro VI/6 compliant vehicles in the period before this. Therefore, to undertake a conservative assessment, the Highways England's 'long term trend projections' has been used within the assessment and therefore the assessment assumes the smallest emission reduction in future years.

5.3.45 As described in Section 5.3.27, no assessment has been undertaken for future years where traffic data is available. In every additional year beyond 2018 (which has been assessed) there will be a greater proportion of vehicles on the road network meeting Euro 6/IV as these more stringent emission standards came into force in 2014. It is therefore considered that the Highways England's 'long-term trend projections' would be too conservative for use in an assessment year of 2023 for which traffic data is available and therefore Highways England's 'Interim alternative long-term trend projections' would be more appropriate to apply. As 2018 traffic flows have been assessed using the most conservative Highways England's 'long-term trend projections' the results presented in this assessment are considered to represent the worst case for the Scheme.

Human Health Receptors

5.3.46 The air quality objectives only apply in locations of relevant exposure and therefore receptors have been chosen following the advice set out in Table 5.2. The assessment has included all sensitive receptors within 200m of the affected road network where the air quality objectives apply following consultation comments from ABC which are presented in Section 5.4 and requested "effects on local air quality for residents is thoroughly assessed and includes locations within at least 200m of affected roads where people may experience a change in local air quality". Results have been presented in order to provide this information.

5.3.47 Additionally, the replacement open space land that both the Main and Alternative Schemes would provide adjacent to the A2070 and north of St Marys Church, has been included as a sensitive receptor. The suitability of the provision of this land has been assessed against the short-term 1 hour NO_2 air quality objective, as this is commensurate with the time period people are likely to use the space for.

5.3.48 Figure 5.4a and Figure 5.4b, Volume 6.2 present all sensitive receptors included in the assessment for both the Main and Alternative Schemes. Table 1.1 in Appendix 5.5, Volume 6.3 provides all receptor locations used within the modelling.

Assessment of Ecological Designated Sites

5.3.49 Elevated NO_x concentrations can adversely affect ecosystems, including at Special Areas of Conservation (SACs); Special Protected Areas (SPAs);

Special Sites of Special Scientific Interest (SSSI) and Ramsar sites (hereafter referred to as 'Designated Sites'). Assessment of exposure to NO_x has included the following key stages (following the DMRB methodology):

- Identification of all Designated Sites within 200m of roads 'affected' by both the Main and Alternative Schemes which have designated features sensitive to air pollutants directly or indirectly.
- Calculation of annual average NO_x concentrations at the Designated Sites with and without both the Main and Alternative Schemes.

5.3.50 IAN 174/13 requires that where changes in NO_x concentrations are greater than 0.4µg/m^3 then nutrient nitrogen deposition should also be calculated and used to determine the overall significance of a scheme's impacts.

5.3.51 Nitrogen deposition in the UK comes from the wet and dry deposition of NO_2 and ammonia. The contribution of road traffic emissions to this deposition is primarily via NO_x emissions resulting in higher ambient NO_2 concentrations. When assessing the impact of a specific road on local nitrogen deposition, only the road contribution to dry deposition requires consideration as wet deposition occurs over much greater distances.

5.3.52 Assessment of nitrogen deposition has included the following key stages (following the DMRB methodology[30]):

- Identification of all Designated Sites within 200m of roads 'affected' by both the Main and Alternative Schemes which have designated features sensitive to nitrogen deposition.
- Obtaining total average nitrogen deposition for all 5km by 5km grid squares for the study area of interest from the APIS[31].
- Obtaining background NO_x and NO_2 concentrations for the study area.
- Calculation of annual average NO_2 concentrations at the Designated Sites with and without both the Main and Alternative Schemes.
- Estimation of the dry deposition of NO_2 at the Designated Sites with and without the proposals and the dry deposition of NO_2 in the 5km by 5km APIS square.
- Determination of the road contribution to NO_2 dry deposition, and total nitrogen deposition.
- Comparison with the relevant critical load.

5.3.53 Discrete receptors have been included within the dispersion modelling to predict potential effects at Designated Sites.

5.3.54 Hatch Park SSSI, designated as Broadleaved, Mixed and Yew Woodland and Acid Grassland habitats, is located within 200m of the affected road network

[30] Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07, Air Quality. Highways Agency 2007.
[31] Air Pollution Information System (APIS) Available online at www.apis.ac.uk, last accessed 18/04/16.

and runs along the northern edge of the A20 between Bockham Lane and Hatch Lodge and is presented in Figure 2.3, Volume 6.2.

5.3.55 Otterpool Quarry SSSI is located within 200m of the affected road network. It is not considered sensitive to air pollution as it is designated as a geological site that is not susceptible to changes in pollution levels and therefore, Otterpool Quarry SSSI has not been considered further in this assessment.

Table 5.4 Modelled Discrete Ecological Receptors

Designated Site	Distance from 'Affected' road (m)	Coordinates	
		X	Y
Hatch Park SSSI	30[(a)]	605091	140754
	50	605107	140766
	105	605150	140801
	180	605209	140849

Notes: (a) Represents closest point of the designated site adjacent to the road

Compliance with the EU Directive on Ambient Air Quality

5.3.56 IAN 175/13 provides guidance in relation to the assessment of the risk of both the Main and Alternative Schemes affecting reported compliance with the air quality Directive. The compliance risk assessment is undertaken using the model results obtained from the local air quality assessment. To undertake the compliance risk assessment the following information is required:

- Local Air Quality Modelled Results.
- Defra's Pollution Climate Mapping (PCM) model outputs for the compliance road network.
- Defra's zones and agglomeration maps.

5.3.57 Defra uses the PCM model to report compliance with the air quality Directive. The PCM model provides NO_2 concentrations for a number of roads across the UK for a number of future years. The PCM model data, released by Defra in 2015, has modelled concentrations incorporating the Defra action plan measures for 2013 (reference year), 2020 and 2025, with projected concentrations decreasing year on year in response to anticipated improvements in vehicle emissions. PCM data for the year 2014 and previous years can also be obtained from the Defra website.

5.3.58 The Opening Year of the both the Main and Alterative Schemes would be 2018, which falls between 2 of the years modelled by Defra (2013 and 2020). An equivalent 2018 PCM concentration can be calculated assuming a linear decrease in NO_2 between 2013 and 2020.

5.3.59 To determine the study area for the compliance risk assessment, the local air quality study area is compared to the compliance risk road network in the PCM model. A compliance risk road network (CRRN) is then defined where

the 2 networks intersect, which then forms the basis for the assessment of compliance risk.

5.3.60 The effects of both the Main and Alternative Schemes (i.e. the change in concentrations at receptors) are added to the concentrations predicted by the Defra PCM model for the Opening Year where:

- The equivalent Opening Year PCM or the equivalent scheme PCM modelled total NO_2 concentration is greater than 40 µg/m³.
- The change in NO_2 concentrations at receptors is 0.4 µg/m³ or more.

5.3.61 The outcome of the above approach is used to determine the scheme's 'compliance risk rating'. The outcome of the compliance risk assessment is also used to inform the judgement on significance of effects (see 'Assessment Criteria', below).

Assessment Criteria - Human Health Receptors

5.3.62 IAN 174/13 provides advice for evaluating significant local air quality effects for public exposure and designated sites. Evaluation of the significance of local air quality effects has been undertaken in accordance with IAN 174/13, a summary of which is provided here.

5.3.63 The difference in pollutant concentration between the 2 scenarios is used to describe the 'magnitude' of change in accordance with Table 5.5**.**

Table 5.5 Magnitude of Change Criteria

Magnitude of Change in Concentration	Value of Change in Annual Average NO_2 and PM_{10}
Large (>4)	Greater than full MoU value of 10% of the air quality objective (4µg/m³).
Medium (>2 to 4)	Greater than half of the MoU (2 µg/m³), but less than the full MoU (4 µg/m³) of 10% of the air quality objective.
Small (>0.4 to 2)	More than 1% of objective (0.4 µg/m³) and less than half of the MoU i.e. 5% (2 µg/m³). The full MoU is 10% of the air quality objective (4 µg/m³).
Imperceptible (<= 0.4)	Less than or equal to 1% of objective (0.4 µg/m³).

Notes: MoU = Measure of Uncertainty (10% of the objective)

5.3.64 The number of receptors where changes are greater than imperceptible, and where concentrations exceed the air quality objectives in the Do-Minimum or Do-Something scenario have been compared to the guideline bands presented in Table 5.6.

Table 5.6 Guideline to Number of Properties Constituting a Significant Effect

Magnitude of Change in Concentration	Number of Receptors With:	
	Worsening of air quality objective already above objective or creation of a new exceedence	Improvement of an air quality objective already above objective or the removal of an existing exceedence
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

5.3.65 Table 5.6 presents the guideline bands, setting an upper level of likely non-significance and a lower level of likely significance for the number of receptors affected by the scheme. Between these 2 levels are the ranges where likely significance is more uncertain, therefore professional judgment would be required. If a scheme is above the lower level of likely significance, consideration should be given to all the evidence that may support or detract from the conclusion of a significant effect.

Assessment Criteria - Ecological Receptors

5.3.66 Increases in NO_x concentrations at Designated Sites as a result of both the Main and Alternative Schemes would be potentially significant if:

- The Main and Alternative Schemes are predicted to cause an increase in annual mean NOx concentrations of 0.4 µg/m^3.
- Predicted concentrations (including background) exceed the criterion.

5.3.67 In accordance with IAN 174/13[32] changes in NO_x concentrations and nutrient nitrogen deposition have been provided to the Project Ecologist to determine significance of effects based on professional judgement.

Overall Judgement of Significance

5.3.68 The information compiled to complete Table 5.6 has then been used along with the following key criteria to determine the overall evaluation of local air quality significance:

- 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?

[32] Highways Agency (2013) Interim Advice Note 174/13. Update advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07). Available online at http://www.standardsforhighways.co.uk/ians/pdfs/ian174.pdf, accessed 18/04/16.

- Will it be difficult to avoid, or reduce, or repair, or compensate for the effect?

Operational Phase - Regional Air Pollution

5.3.69 The assessment of changes in regional emissions includes all roads that meet the following criteria:

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

5.3.70 The study area for regional air pollution is presented in Figures 5.3a and 5.3b, Volume 6.2.

5.3.71 Quantification of changes in emissions of NO_x, PM_{10} and carbon (C) has been carried out for the Main Scheme and the Alternative Scheme using the following scenarios:

- Base Year 2014.
- DM 2018.
- DS 2018.
- DM 2033 (opening year plus 15 years).
- DS 2033.

5.3.72 Vehicle emission factors are not available beyond 2030 and consequently, emission factors for 2030 have been used for 2033.

5.4 Consultation

5.4.1 Table 5.7 provides a summary of how consultation responses have been addressed in this assessment.

Table 5.7 Scoping consultation responses

Organisation	Summary of response	How the response has been addressed
Planning Inspectorate	The Secretary of State notes the methodology identified within the Scoping Report (Mott MacDonald, 2015) and the use of the DMRB and relevant IANs as guidance for the assessment. The Secretary of State notes that a further IAN has recently been published, IAN 185/15[33], which is of relevance to this topic area. The	All the relevant IANs have been accounted for within the assessment including IAN 185/15. The assessment methodology has followed all relevant guidance and taken account of consultation responses from ABC.

[33] Highways Agency (2015) Interim Advice Note 185/15: Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB, Volume 11, Section 3, Part 1 Air Quality and Volume 11, Section 3 Part 7 Noise. Available online at: http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian185.pdf, last accessed 18/04/16.

Organisation	Summary of response	How the response has been addressed
	Secretary of State encourages the applicant to refine the methodology applied to the specific nature of the proposals, taking into account consultation with ABC and other relevant authorities.	
Planning Inspectorate	It is noted that it is intended to undertake a Simple Assessment in relation to regional effects, and a Detailed Assessment of local effects. It will be important in the ES to clearly justify and explain the approach taken to the assessment.	Section 5.3 provides details of the assessment methodology used for the assessment. Paragraphs 5.3.1 to 5.3.72 present the details for all elements of the assessment in accordance with DMRB.
Planning Inspectorate	It is noted from the Scoping Report (Mott MacDonald, 2015) that no Air Quality Management Areas (AQMA) have been designated by ABC. However, the Secretary of State considers that impacts to air quality should be assessed in relation to all relevant sensitive receptors in the area, including residential receptors and ecological receptors, and welcomes the approach outlined in Section 6.5 of the Scoping Report (Mott MacDonald, 2015). Receptors considered in the assessment should be clearly identified and should be agreed with ABC and other relevant authorities.	The air quality assessment undertaken for this scheme and the consequent evaluation of the scheme's impacts have been completed to meet the air quality policy requirement set out in the NPS NN. The assessment considers relevant receptors (human and ecological) that have the potential to be affected by the scheme. Details of all receptors assessed are provided in sections 5.3.48, 5.3.54 and 5.3.55.
Planning Inspectorate	The Secretary of State recommends that the air quality assessment ensures that the 'worst-case' scenario is assessed during both construction and operation and its significance is clearly evaluated. Any air quality modelling scenarios should be carried out on this basis and take into account peak emission rates during construction and during operation.	In line with the requirements of the EIA Directive the most likely impacts have been assessed and evaluated. However, the use of the advice set out in IAN 170/12 on future NOx and NO_2 projections ensures that uncertainty associated with future NO_2 projections is articulated and in a precautionary approach has been adopted with respect to evaluating the scheme's air quality impacts.
Planning Inspectorate	As well as the emissions related to vehicular movements associated with the proposal, the assessment should take account of effects due to an increase in airborne pollution including fugitive dust especially during site preparation, demolition and construction.	Impacts associated with site preparation, construction and demolition have been addressed. Paragraphs 5.3.3, 5.3.5 and 5.3.10 provide detail on the approach taken.

Organisation	Summary of response	How the response has been addressed
Planning Inspectorate	Consideration should be given to appropriate avoidance and mitigation measures, including appropriate actions to address dust complaints, and where measures are proposed their likely effectiveness must be assessed.	Suggestions for possible approaches to manage and mitigate dust from the construction are provided in Section 5.7.1 In respect of the need for operational mitigation for local air quality justification as to the proposed approach is provided in Section 5.7.2.
Ashford Borough Council	It will be important that the effects on local air quality for residents is thoroughly assessed and includes locations within at least 200m of affected roads where people may experience a change in local air quality.	This has been accounted for in the assessment and the approach taken is described in Paragraph 5.3.46.

5.5 Assumptions and Limitations

5.5.1 The air quality modelling predictions for both the Main Scheme and the Alternative Scheme assessment are based on the most reasonable, robust and representative methodologies, however, associated with these there is an inherent level of uncertainty, primarily as a result of:

- Uncertainties with model input parameters such as surface roughness length (defined by land use) and minimum Monin-Obukhov length (used to calculate stability in the atmosphere).
- Uncertainties with traffic forecasts.
- Uncertainties with vehicle emission predictions.
- Uncertainties with background air quality data.
- Uncertainties with recorded meteorological data.
- Simplifications made in the model algorithms or post processing of the data that represent atmospheric dispersion or chemical reactions.

5.5.2 In order to best manage these uncertainties the air quality model has been evaluated using air quality measurements to verify model outputs. This model verification process has been undertaken in line with Defra (2016) guidance in order to manage the uncertainties referred to above. It does this by comparing modelled and monitored pollutant concentrations and if necessary adjusting the model output to account for systematic bias. In addition IAN 170/12 addresses uncertainty in future NO_x and NO_2 projections.

5.5.3 Following the verification process for this Scheme an overall Root Mean Square Error value of less than 10% is achieved. On this basis the modelled results are considered appropriate to allow a robust professional judgement of significance to be determined. The model verification for this Scheme is presented in Appendix 5.1, Volume 6.3.

5.5.4 The assessment has been undertaken based on traffic data for an opening year of 2018. Based on the conservative approach undertaken for future NO_x to NO_2 projections in these assessments as described in Section 5.3.38 this is a worst-case approach as emission factors are predicted to improve in subsequent years due to increased uptake of Euro IV vehicles. In addition background concentrations are expected to decrease and therefore the risk of the Scheme causing air quality changes at receptors above the objective or causing an exceedence of the objectives is reduced. As described in paragraph 5.3.45 for the assessment of future years beyond 2018 it would be more appropriate to assume less conservative NO_x to NO_2 projections which would have the effect of reducing predicted NO_2 concentrations in the study area.

5.6 Baseline Information

5.6.1 Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites, known as the Automatic Urban and Rural Network (AURN) and other published sources. This section provides a review of information available on baseline pollutant concentrations relevant to the study area. This includes information available from ABC and scheme-specific NO_2 diffusion tube monitoring survey. It also presents background pollutant concentrations available from Defra's background pollutant maps.

Local Authority Review and Assessment

5.6.2 In 2009 the Updating and Screening Assessment (USA) concluded that the annual mean NO_2 objective was being exceeded at 2 locations close to the M20 junction 10; Canterbury Road and Lees Road, the latter of which is within 200m of the affected roads. Further modelling showed NO_2 concentrations to be close to, but not exceeding, the annual mean NO_2 objective and no AQMA declaration was necessary.

5.6.3 ABC's latest USA from April 2015 concluded that all air quality objectives were being met for all pollutants across the Borough. Although this assessment identifies annual average NO_2 concentration above 40µg/m³ at properties close to junction 10. Highways England are engaging with ABC to discuss the outcomes of the assessment in light of their latest reported findings of no exceedances in their borough.

Local Authority Automatic Monitoring

5.6.4 ABC currently undertakes no automatic air quality monitoring. Automatic monitoring for NO_2 and PM_{10} was operational until April 2011 with the last full year of monitoring taking place in 2010. This data has not been presented as it is considered too old to be representative of existing baseline concentrations.

Local Authority Passive Diffusion Tube Monitoring

5.6.5 ABC undertakes NO_2 diffusion tube monitoring at 16 current sites within the Borough. Table 5.8 presents the latest results for these sites and Figure 5.5, Volume 6.2 presents their location. It also provides historical data for sites which are no longer operational. The data illustrates NO_2 concentrations at all monitoring locations are below the annual mean objective. Monitored concentrations at the 3 background locations (locations not affected directly affected by emission sources such as roads and industry) are all below 20µg/m^3 in 2014, which is well below the annual mean NO_2 objective.

Table 5.8 ABC NO_2 Diffusion Tube Data for 2012 - 2014

Site ID	Site classification	Coordinates		Approximate Distance from Proposed Scheme (km)	Annual Mean[(a)] Concentration µg/m^3		
		X	Y		2012	2013	2014
AS03	Roadside	600976	142547	3.3	20.0	20.7	19.2
AS04	Background	601021	142754	3.3	18.8	18.0	17.0
AS06	Roadside	603153	141990	1.1	31.1	33.3	29.3
AS07	Roadside	587945	133079	17.1	24.6	26.2	25.1
AS14	Roadside	601460	143509	3.4	25.9	27.3	22.8
AS15[(b)]	Roadside	603401	142081	1.0	38.6	32.5	37.1
AS18[(b)]	Roadside	601309	143569	3.5	29.2	31.7	29.3
AS21	Roadside	600734	142717	3.5	23.2	24.3	20.7
AS22	Roadside	601218	143491	3.5	32.3	31.6	30.7
AS23	Background	601431	142735	2.9	19.3	19.9	18.3
AS24	Roadside	600778	142915	3.6	23.2	22.3	21.1
AS25	Roadside	601805	143007	3.4	22.2[(b)]	20.8	-
AS26	Roadside	601249	142975	3.2	30.5	33.0	29.4
AS27	Roadside	600794	142320	3.3	21.3	21.2	19.7
AS28	Kerbside	597558	140734	6.4	13.8	14.6	-
AS29	Kerbside	598803	140799	5.2	16.4	17.4	-
AS30	Background	599433	142371	4.7	-	-	18.1[(c)]
AS31	Roadside	601828	141461	2.1	-	-	19.8
AS32	Kerbside	600973	143027	3.5	-	-	20.6

Source: Ashford Borough Council

Notes: '-' indicates monitoring not undertaken in this year, data capture above 83% for 2012, 2013 and 2014 at all sites with the exception of (b) (see below)

2015 monitoring data is not yet fully ratified or bias adjusted. It has therefore not been included above.

(a) – All results are bias adjusted

(b) – Site AS15 and AS18 are triplicate sites: concentrations represent the average

(c) – Data capture < = 75%

Scheme Specific Diffusion Tube Monitoring

5.6.6 A Scheme specific NO_2 diffusion tube monitoring survey commenced in September 2013 and was decommissioned in August 2014. Monitoring has been carried out and reported for 18 locations including properties near the M20 and Figure 5.6, Volume 6.2 presents their location. Table 5.9 presents bias adjusted results and annualised data for 2014 (based on 8 months of data from January 2014 to August 2014). Further details relating to the annualised data are provided in Appendix 5.2, Volume 6.3.

Table 5.9 Scheme Specific Monitoring Results

Figure ID	Site Name	Classification	8 Month Average (µg/m³) (Bias Adjusted)	Equivalent Annual Mean (µg/m³)
1	M20J10A_001	Roadside	18.0	19.8
2	M20J10A_002	Roadside	17.9	19.7
3	M20J10A_003	Roadside	36.8	**40.5**
4	M20J10A_004	Roadside	23.1	25.4
5	M20J10A_005	Roadside	24.7	27.2
6	M20J10A_006	Roadside	38.3	**42.2**
7	M20J10A_007	Roadside	26.9	29.6
8	M20J10A_008	Roadside	24.8	27.3
9	M20J10A_009	Roadside	24.0	26.5
10	M20J10A_010	Roadside	23.4	25.8
11	M20J10A_011	Roadside	24.5	27.0
12	M20J10A_012	Roadside	31.4	34.6
13	M20J10A_013	Roadside	21.9	24.1
14	M20J10A_014	Roadside	20.7	22.8
15	M20J10A_015	Roadside	21.2	23.3
16	M20J10A_016	Background	10.7	11.8
17	M20J10A_017	Background	17.9	19.6
18	M20J10A_018	Roadside	35.6	39.1

Notes: **bold** highlighted concentrations indicate exceedances of the annual mean NO_2 objective of 40ug/m3

5.6.7 In May 2014, 5 additional diffusion tube sites were established in order to provide higher resolution of data in areas where concentrations were elevated and receptors are close to the M20 carriageway. This data is presented in Table 5.10 and has been bias adjusted based on the national bias adjustment factor for 2014.

Table 5.10 Additional Scheme Specific Monitoring Results

Figure ID	Site Name	Classification	4 month Period Mean (µg/m³)
19	M20J10A_019	Roadside	36.0
20	M20J10A_020	Roadside	39.6[(a)]
21	M20J10A_021	Roadside	37.4[(a)]
22	M20J10A_022	Roadside	32.1[(a)]
23	M20J10A_023	Roadside	26.8[(a)]

Notes: "(a)" = Based on 3 months of monitoring data only.

5.6.8 The scheme monitoring data shows that concentrations meet the NO_2 annual mean objectives of 40µg/m³ at all monitoring sites other than at M20J10A_003 and M20J10A_006.

5.6.9 Monitored annual mean concentrations at sites 'M20J10A_003' and 'M20J10A_006' are both above the NO_2 annual mean objective. Concentrations at site M20J10A_003 appear to be primarily contributed to by emissions from the A20 (Hythe Road) and is located approximately 130m from the M20. M20J10A_006 appears to be affected primarily by the A2070 (Kennington Road) and is located 150m from the M20. It should be noted that these monitoring locations are not located where there is relevant long term exposure i.e. not in close proximity to residential properties.

5.6.10 The monitored annual mean concentrations at site 'M20J10A_018' is just below the NO_2 annual mean objective. Concentrations appear to contributed to emissions from both the A20 (Hythe Road) and the M20, both of which are located approximately 20m from the monitoring site location. It should be noted that the monitoring location is not representative of long term exposure.

5.6.11 Monitored annual mean NO_2 concentration at site 'M20J10A_020' is just below the annual mean NO_2 objective. Monitoring results from this site is based on 3 months of data only. Site 'M20J10A_019' has recorded annual mean NO_2 concentrations almost 4µg/m^3 lower than M20J10A_020 and is in a similar location. As there is only 4 months of monitoring for site M20J10A_019 and 3 months for sites M20J10A_020 to M20J10A_023, the data capture is too low to draw robust conclusions on baseline conditions at these sites.

Defra Projected Background Concentrations

5.6.12 Defra provides estimates of background pollution concentrations for NO_X, NO_2 and PM_{10} across the UK for each 1km grid square, for every year from 2011 to 2030. Future year projections have been developed on the base year for the background maps, which is currently 2011. The maps include a breakdown of background concentrations by emission source, including road and industrial sources which have been calibrated against 2011 UK monitoring data. This data can be used to provide specific background pollutant concentrations at receptors included within the assessment and to supplement local monitoring data. A comparison of the grid square where ABC background monitoring is

undertaken demonstrates that values are consistent and that the use of the background maps is appropriate for this assessment.

Table 5.11 Defra Projected Background Concentrations of NO_2 verses Background Monitoring 2014 ($\mu g/m^3$)

Diffusion Tube	Background Square	Monitored Concentration	Defra Background
AS04	601500, 142500	17	18.4
AS23	601500, 142500	18.3	18.4
AS30	599500, 142500	18.1	16

5.6.13 Table 5.12 presents grid square background pollutant concentrations applied to discrete receptors included within the assessment. To avoid double counting within the assessment the background concentrations presented below have had relevant road contributions removed. This includes contributions to background concentrations from the M20, trunk roads, primary roads and minor roads where these are included within the model.

Table 5.12 Defra Projected Background Concentrations of NO_x, NO_2 and PM_{10} at Proposed Scheme ($\mu g/m^3$)

Grid Square Location (OS Grid Reference)		2014			2018		
X	Y	NO_x	NO_2	PM_{10}	NO_x	NO_2	PM_{10}
602500	140500	16.5	12.6	17.7	14.1	11.0	17.3
602500	141500	16.9	12.9	16.1	14.7	11.4	17.3
602500	142500	19.8	14.9	18.1	17.4	13.3	15.6
603500	140500	15.5	11.9	17.8	13.4	10.5	15.6
603500	141500	17.4	13.3	18.1	15.2	11.7	17.3
603500	142500	17.1	13.1	17.8	14.8	11.5	18.8
604500	140500	15.0	11.6	18.4	12.9	10.1	19.0
604500	141500	16.5	12.7	18.7	14.1	11.0	17.9
605500	140500	14.5	11.2	18.9	12.4	9.8	17.9
606500	139500	13.6	10.7	19.1	11.7	9.3	17.6
607500	139500	14.9	11.6	18.0	12.7	10.0	17.3
608500	138500	13.8	10.9	19.3	11.9	9.5	18.8
609500	138500	14.5	11.4	17.3	12.4	9.8	19.0
610500	136500	13.8	10.8	16.4	12.0	9.5	19.0
610500	137500	14.1	11.1	19.5	12.2	9.7	19.0
610500	138500	15.3	11.9	17.5	13.0	10.2	16.9
611500	136500	15.1	11.8	16.1	13.1	10.3	15.9
612500	137500	14.8	11.6	17.8	12.8	10.1	18.6

Source: Defra: Air Information Resource (AIR)

Pollution Climate Mapping (PCM) Model

5.6.14 The PCM model is used to determine compliance in the UK with the EU limits values. A review of the 2013 base year action plan model for the proposed Main and Alternative Schemes illustrates that NO_2 and PM_{10} concentrations are below the EU limit value[34]. The highest 2013 base year concentration that overlaps with both the Schemes affected roads are 39µg/m^3 and 20µg/m^3 for NO_2 and PM_{10} respectively. In 2018, the NO_2 concentrations are predicted to reduce to 28.3 µg/m^3 and therefore are below the limit value of 40µg/m^3.

Summary

5.6.15 Monitoring data and assessment results from ABC in 2014 showed no exceedences of the NO_2 air quality objectives. Table 5.8 shows monitored annual mean NO_2 concentrations at the majority of sites have generally remained consistent or slightly decreased from 2012. Monitored background concentrations at the 3 sites operated by ABC are consistent with those presented within Defra background maps.

5.6.16 No monitoring for PM_{10} is undertaken by ABC, but it is concluded that concentrations of PM_{10} are well below the relevant air quality objectives in the study area, based on previous work completed by ABC, the Defra background data and Defra PCM model data.

5.6.17 Scheme specific monitoring data undertaken by Highways England illustrates that NO_2 annual mean concentrations are above the air quality objectives at 2 locations and within 4µg/m^3 at 3 other locations within the study area of the Main and Alternative Schemes, although it should be noted that these locations do not represent relevant long term exposure.

5.7 Mitigation and compensation measures

Construction

5.7.1 No Contractor has currently been appointed, however it is expected that construction works would be carried out in accordance with the Best Practicable Means, as described in Section 79 (9) of the Environmental Protection Act (EPA) 1990, to reduce fumes or emissions which may impact upon air quality. For both the Main Scheme and the Alternative Schemes, this could include but not be limited to the following mitigation measures that will be included within the Construction Environmental Management Plan (CEMP) (see Appendix 17.1, Volume 6.3):

- Avoid double handling of materials.
- Minimise height of stockpiles and profile to minimise wind-blown dust emissions and risk of pile collapse.

[34] Defra (2016) Pollution Climate Mapping (PCM). Available online at http://uk-air.defra.gov.uk/research/air-quality-modelling?view=modelling, last accessed 18/04/16.

- Locate stockpiles out of the wind (or cover, seed or fence) to minimise the potential for dust generation.
- Ensure that all vehicles with open loads of potential dusty materials are securely sheeted or enclosed.
- Provide a means of removing mud and other debris from wheels and chassis of vehicles leaving the site. This may involve a simple coarse gravel running surface or jet wash, or in the case of a heavily used exit point, wheel washers.
- Maintain a low speed limit on site to prevent the generation of dust by fast moving vehicles.
- Damp down surfaces in dry conditions.
- Water should be sprayed during cutting / grinding operations (i.e. cutting curb slabs).
- All vehicle engines and plant motors shall be switched off when not in use.

Operation

5.7.2 Paragraphs 5.14 and 5.15 of the NPS NN provide the policy advice on mitigation:

"5.14 The Secretary of State should consider whether mitigation measures put forward by the applicant are acceptable. A management plan may help codify mitigation at this stage. The proposed mitigation measures should ensure that the net impact of a project does not delay the point at which a zone will meet compliance timescales."

"5.15 Mitigation measures may affect the project design, layout, construction, operation and/or may comprise measures to improve air quality in pollution hotspots beyond the immediate locality of the scheme. Measures could include, but are not limited to, changes to the route of the new scheme, changes to the proximity of vehicles to local receptors in the existing route, physical means including barriers to trap or better disperse emissions, and speed control. The implementation of mitigation measures may require working with partners to support their delivery."

5.7.3 The results of the air quality assessment completed for this scheme (presented in Section 5.8) demonstrates that it does not have a significant air quality impact and nor does it affect reported compliance with the Air Quality Directive and therefore mitigation is not required.

5.7.4 This is consistent with judgements that the Planning Inspectorate have made for other recent roads schemes including the A160, A30 Temple to Higher Carblake Improvements and Norwich Northern Distributor Road. These schemes can be distinguished from those where mitigation is applied by Highways England, which demonstrates that judgement is properly applied in determining the approach on a case-by-case basis.

5.7.5 Where Highways England identifies a significant impact and / or affects the UK's reported ability to comply with the Air Quality Directive, it has applied air quality mitigation e.g. A556 Bypass Scheme.

5.8 Predicted Air Quality Effects

Main Scheme – Construction

5.8.1 Mitigation measures would minimise construction dust effects so that they are unlikely to result in nuisance from activities associated with the Main Scheme.

5.8.2 Air quality assessment for the construction traffic has not been undertaken for the following reasons:

- The proposed traffic management is likely to result in vehicles travelling at a constant free flow speed of 50 miles per hour with fewer speed variations compared to normal operation. The free flow speed coupled with a reduction in speed limit from 70 miles per hour to 50 miles per hour is likely to cause a reduction in vehicle emissions which would benefit air quality.

- Temporary traffic lights would be installed on the A20 across the Swatfield Bridge for approximately 7 months. Traffic lights may cause queuing, especially during peak periods, on the A20 which has the potential to increase emissions. However, any increase in emissions from queuing would be temporary and for less than a year, are therefore not considered to have any long-term adverse effects.

- An additional temporary carriageway would be added to the A20. The nearest sensitive receptor is located approximately 200m from the temporary carriageway. As pollutant contributions from road sources return to background concentrations beyond this distance the impacts are concluded to be not significant.

- The proposed traffic management on the A2070 would move vehicles, and therefore emissions, closer to sensitive receptors for approximately 2 months whilst the southbound traffic uses the northbound lanes under contraflow. The contraflow would then switch and the northbound vehicles would use the southbound lane for 3 months. Due to the temporary nature of the contraflow the change in pollutant concentrations are considered to be not significant.

Main Scheme – Operation

Local Air Quality

NO_2 Results

5.8.3 The Main Scheme is predicted to cause both increases and decreases in NO_2 concentrations at modelled receptors due to changes in traffic characteristics

on the affected road network. The majority of changes in traffic flows are generated by traffic rerouting due to the new junction 10a.

5.8.4 There are 5 modelled receptors with predicted annual mean NO_2 concentrations above the relevant air quality objectives in the Opening Year Do-Minimum and Do-Something scenario. These receptors are located between the southbound M20 carriageway and Lees Road or adjacent to the southbound M20 carriageway and Silver Hill Road, approximately 600m north of junction 10a. The locations of these are presented in Figure 5.9, Volume 6.2. The individual results for each of these receptors are presented in Table 5.13**.** 4 of these receptors (1 Winslade Terrace, 2 Winslade Terrace, 1 Winslade Way and 2 Winslade Way) are predicted to either have no change or an increase in concentrations of less than 0.4µg/m^3. 1 receptor ('Bracken Hill', Lees Road) is predicted to have a decrease of 0.1µg/m^3.

5.8.5 The 4 receptors (1 Winslade Terrace, 2 Winslade Terrace, 1 Winslade Way and 2 Winslade Way) with either no change or a predicted increases in annual mean NO_2 concentrations are located approximately 10m from the M20 carriageway. The changes in pollutant concentrations are due to the changes in traffic flows on the M20, the existing junction 10 northbound on slip road and Silver Hill Road. Traffic flows on the M20 are predicted to increase by approximately 3,400 AADT movements while traffic flows on Silver Hill Road are predicted to decrease by 300 AADT movements. The changes in flows on the M20 are due to traffic accessing the M20 via the new proposed junction 10a on slip road rather than the existing junction 10 on slip road. This reduces flows on the existing junction 10 slip road by approximately 2,800 AADT. These changes in flows have the effect of moving emissions 10m closer to the affected receptors which causes the changes in pollutant concentrations that are predicted.

5.8.6 There is 1 receptor ('Bracken Hill', Lees Road) with a decrease in annual mean NO_2 concentration located 35m from the M20 and 60m from Silver Hill Road. This receptor is located further from the existing junction 10 on slip road and therefore effect of traffic rerouting to the access the M20 from te new junction 10a junction is less pronounced and therefore the effect of traffic being moved closer to the receptor does not increase pollutant concentrations. Therefore the decrease in flows of approximately 300 AADT on Silver Hill contributes to the reduction in pollutant concentrations at this receptor.

5.8.7 As all the changes in NO_2 concentrations between the Do-Minimum and Do-Something scenarios are below 0.4µg/m^3 at the 5 modelled receptors with predicted annual mean NO_2 concentrations above the objective they are considered imperceptible (see the magnitude of change criteria in Table 5.5) and therefore not considered further within the assessment.

5.8.8 The modelled annual mean NO_2 concentrations at all other receptors are below 40µg/m^3 in both the Do-Minimum and Do-Something scenarios and in line with the advice set out in IAN 174/13 are not considered in the judgement of significance.

5.8.9 All predicted annual mean concentrations are well below 60µg/m^3 and therefore no exceedences of the 1 hour NO_2 objective are predicted. This includes at the proposed replacement open space land that the scheme will provide where the existing A2070 is to be realigned.

5.8.10 Other notable results of the Main Scheme are described below. These are presented to provide further context for locations within at 200m of affected roads where people may experience a change in local air quality, following the introduction of the Main Scheme.

5.8.11 Model results for all receptors with a change greater than 0.4µg/m^3 in annual mean NO_2 have been presented in Figures 5.7a and 5.7b, Volume 6.2 and Table 1.1 of Appendix 5.4, Volume 6.3.

5.8.12 There are 7 modelled receptors that are predicted to experience an increase in NO_2 concentrations greater that 0.4µg/m^3. The names and modelled results for these receptors have been presented in Table 5.13 and there locations are presented in Figure 5.9, Volume 6.2. Six of these are located at the Highfield Lane / Kingsford Street Junction and experience the change as result of the new junction 10a. The new Northbound off slip road associated with junction 10a creates a new road which allows traffic to exit the M20. Approximately 7,800 AADT will use this new road which is approximately 30 metres closer to these receptors than the existing M20. The new A2070 link road which is connected to the proposed junction 10a also contributes to concentrations at these receptors as it has a flow of approximately 18,000 AADT. The receptor at Court Lodge Farm experiences the predicted change due to increased traffic flows on the existing A2070 following the redistribution of traffic on the local network as a result of the Scheme. The existing A2070 is predicted to experience an increase in flows of approximately 4,600 AADT.

5.8.13 There are 5 modelled receptors that are predicted to experience decreases of greater than 4µg/m^3 in NO_2 concentrations. This is as a result of a decrease in approximately 9,000 AADT movements on the A20 (Hythe Road) due to the closure of the M20 junction 10 off slip road. The modelled results for these receptors have been presented in Table 5.13 and there locations are presented in Figure 5.7a and 5.7b, Volume 6.2.

5.8.14 There are an additional 33 modelled receptors that are predicted to experience a decrease in NO_2 concentrations between 2 and 4µg/m^3 and are presented in Figures 5.7a and 5.7b, Volume 6.2. Of these, 28 are located to the north east of junction 10 and along the A20. The improvements are due to traffic reductions greater than 7,000 AADT on these roads and a reduction of 9,000 AADT on the A20 resulting from the junction 10 off slip closure and the introduction of the new junction 10a. Three of these receptors are located towards the south west corner of junction 10 and they experience the improvements primarily due to a reduction of traffic on the existing junction 10 roundabout which, on the closest link to these receptors, has a reduction in flows of approximately 9,500 AADT. One receptor is located on the A2070 where the new roundabout connecting the new A2070 link road with the existing A2070 would move traffic away from this receptor. The final receptor

is located on Church Road, Sevington and experiences a reduction in traffic along Church Road off approximately 2,200 AADT as a result of the proposed junction 10A.

5.8.15 Table 5.13 presents the modelled annual mean NO_2 results for these results discussed above and includes receptors exceeding the annual mean NO_2 objective and those with the greatest increases and decreases.

Table 5.13 Annual mean NO_2 results at receptors above the air quality objective and those with the greatest increases and decreases

Receptor	Address	NO_2 Annual Mean Concentration (µg/m^3)			
		2014 Base	2018 DM	2018 DS	Change
198	2 Winslade Terrace[a]	39.8	**41.3**	**41.5**	0.2
454	'Bracken Hill', Lees Road[b]	38.9	**41.0**	**40.9**	-0.1
619	1 Winslade Terrace[a]	**41.7**	**43.5**	**43.5**	0.0
818	2 Winslade Way[a]	**41.3**	**42.7**	**42.8**	0.1
1373	1 Winslade Way[a]	**44.9**	**46.3**	**46.6**	0.3
419	Kenistone, Kingsford Street[b]	21.0	20.7	21.5	0.8
461	Highfield Bungalow, Highfield Lane[b]	18.8	19.9	21.0	1.1
1280	Court Lodge Farm, Church Road[b]	20.1	19.5	20.5	1.0
171	Lagonda Lodge, Kingsford Street[b]	18.7	18.9	19.7	0.8
366	Copperfield, Kingsford Street[b]	18.8	18.7	19.3	0.6
421	Caloundra, Kingsford Street[b]	21.2	20.9	21.6	0.7
422	The Annexe Kenistone, Kingsford Street[b]	21.0	20.7	21.5	0.8
374	154 The Street[b]	28.8	28.4	23.3	-5.1
408	129 The Street[b]	28.6	28.3	23.7	-4.6
411	133 The Street[b]	34.9	34.7	27.1	-7.6
464	131 The Street[b]	35.2	35.1	27.6	-7.5
466	8 Lacton Oast[b]	29.5	29.3	24.6	-4.7

Note: DM – Do Minimum
DS – Do Something
(a) 1.9 adjustment factor applied (See Appendix 5.1, Volume 6.3)
(b) 2.4 adjustment factor applied (See Appendix 5.1, Volume 6.3)

PM_{10} Results

5.8.16 Annual mean PM_{10} concentrations are predicted to be well below the objective in the Do-Minimum and Do-Something scenarios at all of the modelled receptors. The receptor with the highest predicted PM_{10} concentrations is receptor 345 (white lodge) and is located on Harringe Lane, Sellinge and is adjacent to the M20, approximately 5.9km south east of junction 10a. The highest predicted PM_{10} concentrations are at this location as a result of background concentrations assumed in the assessment. Given the annual mean concentrations are well below the objective there is no risk of exceeding the 24 hour mean.

5.8.17 All predicted changes at all modelled receptors are less than 0.4µg/m^3 and therefore it is considered that the Main Scheme will not result in significant PM_{10}.impacts.

Compliance Risk Assessment

5.8.18 Figure 5.11, Volume 6.2 presents the PCM links and the affected road network for the study area; together these represent the CRRN. There is a single PCM link within the CRRN where concentrations of NO_2 at the worst affected receptor increase by more than 0.4µg/m^3. The PCM link where this occurs is located between junction 10 and the Highfield Lane flyover. The equivalent Opening Year annual mean roadside NO_2 concentration on this PCM link is 28.3µg/m^3. As a result of the Scheme, the concentrations at the worst affected receptor are predicted to increase by 1.1µg/m^3. The resultant equivalent PCM NO_2 concentrations is therefore 29.4µg/m^3 as shown in Table 5.14. The changes in concentration at this receptor are due to the introduction of the new junction 10a and A2070 link road (the changes in concentrations at this receptor are described in full in Paragraph 5.8.12). All of the other links in the CRRN are predicted to experience a decrease in NO_2 concentrations or no changes greater than 0.4µg/m^3 at the worst affected receptors. On all of these PCM links the equivalent NO_2 concentrations are below 30µg/m^3 and therefore these are not discussed further within this compliance assessment.

5.8.19 Table 5.14 presents the compliance risk analysis for the one PCM link in the CRRN where pollutant concentrations at the worst affected receptor are predicted to increase by more than 0.4µg/m^3. There is a low risk of the Main Scheme affecting the UK's reported ability to comply with the Air Quality Directive.

Table 5.14 Compliance Risk Analysis for the Main Scheme

Inputs				Defra PCM Model and Compliance Information					HE Receptor Results			
HA Receptor ID	Defra Link Census ID	Zone / Agglomeration	Is it a Compliant Zone?	Proceeding Year: Total NO2 2013	Following Year: Total NO2 2020	Equivalent Opening Year: Total NO2 2018	Maximum Modelled Conc in Zone 2013	Projected Compliance Year	Annual Mean DM NO2 (µg/m³)	Annual Mean DS NO2 (ud/m³)	Change in Annual Mean (µg/m³) (DS-DM)	Equivalent PCM DS (µg/m³)
461	37955	31	No	39	24	28.3	59	2020	19.9	21	1.1	29.4

Designated Sites – Atmospheric NO_x Concentrations

5.8.20 Table 5.15 presents the change in annual mean NO_x concentrations, as a result of changes in traffic characteristics. The results show that locations within 105m of the road are likely to have a change in annual mean NO_x greater than 0.4µg/m^3. At these distances Do-Minimum and Do-Something annual mean NO_x concentrations are likely to be above the objective of 30µg/m³.

Table 5.15 Annual mean NO_x concentrations at designated sites for ecology

Designated Site	Distance to 'Affected' Road	NO_x Annual Mean Concentration ($\mu g/m^3$)			
		2014 Base	2018 DM	2018 DS	Change
Hatch Park SSSI	30[(a)]	49.1	45.4	46.6	1.2
	50	40.7	37.7	38.5	0.8
	105	31.2	28.9	29.3	0.4
	181	25.9	24.0	24.2	0.2

Note: [(a)] indicates the closest point to the affected road

Designated Sites - Nitrogen deposition

5.8.21 Following discussions with the Project Ecologist, the habitat classifications which are applicable to the designated sites are presented in Table 5.16. APIS total average existing nitrogen deposition rates and critical loads for these classifications (at the respective locations) are presented in Table 5.16. As APIS critical load values are more conservative than the DMRB critical loads, results have been presented against the APIS critical loads.

Table 5.16 APIS total nitrogen deposition (background)

Designated Site	APIS Habitat Classification	DMRB Habitat Classification	Total Background Nitrogen Deposition[(1)] (kg N (ha/yr)	APIS Critical Load Range [(a)] (kg N ha/yr)	DMRB Critical Load Range [(b)] (kg N ha/yr)
Hatch Park SSSI	Broadleaved, Mixed and Yew Woodland	Temperate Deciduous forests	29.0	10-15	15-20
	Acid Grassland	Grassland and tall forb habitats	16.5	10-15	10-20

Notes: (1) Based on a 2% reduction per year from 2013

(2) Air Pollution Information System (APIS). Available at www.apis.ac.uk, last accessed 18/04/16.

(3) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07, Air Quality. Highways Agency 2007.

5.8.22 Based on the detailed dispersion modelling carried out, concentrations of NO_2 have been determined at discrete receptor transects within the Hatch Park SSSI. DMRB guidance requires that dry NO_2 deposition, which is a component of total nitrogen deposition, is calculated for each of the receptor points assessed.

5.8.23 In accordance with DMRB guidance, the road contribution to dry NO_2 deposition has been determined by subtracting the dry NO_2 deposition rate for the APIS square from the receptor dry NO_2 deposition rate. This provides the road contribution to dry NO_2 deposition and is presented in Table 5.17.

Table 5.17 Modelled road contribution to NO_2 dry deposition

Designated Site	Distance to 'Affected' Road	Modelled Road Contribution to NO_2 Dry Deposition (kg N ha/yr)			
		2014 Base	2018 DM	2018 DS	Change
Hatch Park SSSI	30[a]	1.68	1.77	1.82	0.05
	50	1.30	1.40	1.44	0.04
	105	0.85	0.95	0.97	0.02
	181	0.59	0.69	0.70	0.01

Note: [a] indicates the closest point to the affected road
Deposition levels presented to two decimal places to indicate change; not an indication of model accuracy.

5.8.24 The modelled road contribution to NO_2 dry deposition has been added to the APIS average total background nitrogen deposition to give the total nitrogen deposition rate at each receptor within the Designated Sites. This is presented in Table 5.18.

Table 5.18 Total N deposition

Designated Site	APIS Habitat Classification	Distance to 'Affected' Road	Total N Deposition 2019 (kg N ha/yr)			APIS Critical Load Range
			2014 Base	2018 DM	2018 DS	(kg N ha/yr)
Hatch Park SSSI	Broadleaved, Mixed and Yew Woodland	30[a]	33.10	30.75	30.80	10-15
		50	32.72	30.38	30.42	
		105	32.27	29.93	29.95	
		181	32.01	29.67	29.68	
	Acid Grassland	30[a]	19.52	18.22	18.27	10-15
		50	19.14	17.85	17.89	
		105	18.68	17.40	17.42	
		181	18.42	17.14	17.15	

Note: [a] indicates the closest point to the affected road
Deposition levels presented to two decimal places to indicate change; not an indication of model accuracy.

Table 5.19 Percentage Change in Total N deposition in 2018

Designated Site	APIS Habitat Classification	Distance to 'Affected' Road	Total N Deposition 2018 (DS-DM) (kg N ha/yr)	Change as % DM
Hatch Park SSSI	Broadleaved, Mixed and Yew Woodland	30[a]	0.05	0.2
		50	0.04	0.1
		105	0.02	0.1
		181	0.01	0.0
	Acid Grassland	30[a]	0.05	0.3
		50	0.04	0.2
		105	0.02	0.1

Designated Site	APIS Habitat Classification	Distance to 'Affected' Road	Total N Deposition 2018 (DS-DM) (kg N ha/yr)	Change as % DM
		181	0.01	0.1

Note: [(a)] indicates the closest point to the affected road
Deposition levels presented to two decimal places to indicate change; not an indication of model accuracy.

5.8.25 Results indicate the nitrogen deposition contribution from the proposed scheme is less than 1%.

5.8.26 Following consultation with Project Ecologist impacts from NO_x concentrations and nitrogen deposition on designated sites are not considered to be significant based on the magnitude of increase and the conservation value of the ecological site as they are unlikely to change the functionality of the acidic grassland and woodland for which the designation has been made. A description of the designation site and judgement on significance is provided in Table 8.6 and Section 8.8.27 of Chapter 8 Nature Conservation, Volume 6.1.

Alternative Scheme – Construction

5.8.27 Effects of the Alternative Scheme during construction would be as for the Main Scheme assessed above. There would be no additional effects from the Alternative Scheme and none of the effects identified above for the Main Scheme would be absent for the Alternative Scheme during construction.

Alternative Scheme – Operation

Local Air Quality

NO_2 Results

5.8.28 The impacts of the Alternative Scheme are predicted to be similar to the Main Scheme. The inclusion of the additional roundabout in the centre of the the prosed new link road has an effect on the redistribution of traffic around Sevington in the Alternative Scheme compared to the Main Scheme. The additional roundabout provides an additional access point to the Stour Park phase 1 development and therefore the majority of vehicles are predicted to access/exit this development via the additional roundabout and spur road rather than via Church Road (as they do in the Main Scheme). There are no differences in the assumed size and subsequent traffic impacts of the Stour Park development between the Main Scheme and the Alternative Scheme and the resulting redistribution of traffic is the primary reason for the differences in results between the Main Scheme and the Alternative Scheme.

5.8.29 There are 5 modelled receptors (1 Winslade Terrace, 2 Winslade Terrace, 1 Winslade Way, 2 Winslade Way and 'Bracken Hill', Lees Road) with predicted annual mean NO_2 concentrations above the annual mean objective in the Opening Year Do-Minimum and Do-Something scenario. Results for these are presented in Table 5.20 and their locations are presented in Figure 5.9,

Volume 6.2. These receptors are either located between the southbound M20 carriageway and Lees Road or adjacent to the southbound M20 carriageway and Silver Hill Road, approximately 600m north of junction 10. Of these 5 receptors, 2 receptors are predicted to have no change in concentrations of annual mean NO_2 and 3 receptors are predicted to have an increase of between 0.1 to 0.3µg/m^3.

5.8.30 The traffic characteristics causing these effects are similar to those presented in the Main Scheme and are due to the redistribution of traffic. Traffic flows on the M20 are predicted to increase by approximately 3,700 AADT movements while traffic flows on Silver Hill Road are predicted to decrease by 300 AADT movements. The changes in flows on the M20 are due to traffic accessing the M20 from the proposed junction 10a on slip road rather than the existing junction 10 on slip road. Therefore the existing slip road is predicted to experience a reduction in approximately 3,100 AADT. This has the effect of moving emissions approximately 10m closer to the affected receptors which causes the changes in pollutant concentrations that are predicted.

5.8.31 As all the changes in NO_2 concentrations between the Do-Minimum and Do-Something scenarios are below 0.4µg/m^3 they are considered imperceptible (see the magnitude of change criteria in Table 5.5) and therefore not considered further within the assessment.

5.8.32 The modelled annual mean NO_2 concentrations at all other receptors are below 40µg/m^3 in both the Do-Minimum and Do-Something scenarios and in line with the advice set out in IAN 174/13 are not considered in the judgement of significance.

5.8.33 All predicted annual mean concentrations are well below 60µg/m^3 and therefore no exceedences of the 1 hour NO_2 objective are predicted. This includes at the proposed replacement open space land that the Alternative Scheme will provide where the existing A2070 is to be realigned.

5.8.34 Other notable impacts of the Alternative Scheme are described below. These are presented to provide further context for locations within at 200m of affected roads where people may experience a change in local air quality, following the introduction the Alternative Scheme.

5.8.35 Model results for receptors with a change greater than 0.4µg/m^3 in annual mean NO_2 have been presented in Figures 5.8a and 5.8b, Volume 6.2 and Table 1.1 of Appendix 5.4, Volume 6.3.

5.8.36 There are 11 modelled receptors that are predicted to experience an increase above 0.4µg/m^3 in NO_2 concentrations. These are presented in Table 5.20 and their locations are presented in Figure 5.9, Volume 6.2. 7 of these receptors are the same as those presented in the Main Scheme assessment and the changes in the Alternative Scheme are as a result of similar changes described in paragraph 5.8.12). The additional receptors experiencing an increase in the Alternative Scheme are located at Somerfield Barn Court,

adjacent to the M20, south of Sellindge these are due to increases in flows along the M20 at this location of approximately 1,200 AADT.

5.8.37 There are 5 modelled receptors that are predicted to experience a decrease in NO_2 concentrations greater than 4µg/m^3, all of which are the same receptors as those identified for the Main Scheme. These are presented in Table 5.20 and their locations are presented in Figure 5.9, Volume 6.2. These improvements are as a result of a decrease of approximately 9,000 AADT movements on the A20 (Hythe Road) due to the closure of the M20 junction 10 off slip road.

5.8.38 There are 36 modelled receptors that are predicted to experience a reduction between 2 and 4µg/m^3 in NO_2 concentrations across the study area. The locations of these are presented in Figures 5.8a and 5.8b, Volume 6.2. Of these, 25 are located to the north east of junction 10 and along the A20. The improvements would be expected due to traffic reductions greater than approximately 6,800 AADT on these roads as a result of the junction 10 off slip closure. 5 receptors are located towards the south west corner of junction 10 and due to traffic reductions at the closest affected link on the junction 10 roundabout of approximately 9,600 AADT. 5 receptors are adjacent to the A2070 where the new roundabout linking the proposed A2070 link road to the existing A2070 moves traffic away from the façade. 1 other receptor is located on Church Road, Sevington and experiences a reduction in traffic along Church Road off approximately 2,500 AADT.

5.8.39 Table 5.20 presents the modelled annual mean NO_2 results for these results discussed above and includes receptors exceeding the annual mean NO_2 objective and those with the greatest increases and decreases.

Table 5.20 Annual mean NO_2 results at receptors above the air quality objective and those with the greatest increases and decreases

Receptor	Address	NO_2 Annual Mean Concentration (µg/m^3)			
		2014 Base	2018 DM	2018 DS	Change
198	2 Winslade Terrace[a]	39.8	**41.3**	**41.5**	0.2
454	'Bracken Hill', Lees Road[b]	38.9	**41.0**	**41.0**	0.0
619	1 Winslade Terrace[a]	**41.7**	**43.5**	**43.5**	0.0
818	2 Winslade Way[a]	**41.3**	**42.7**	**42.8**	0.1
1373	1 Winslade Way[a]	**44.9**	**46.3**	**46.6**	0.3
419	Kenistone, Kingsford Street[b]	21.0	20.7	21.5	0.8
461	Highfield Bungalow, Highfield Lane[b]	18.8	19.9	20.9	1.0
171	Lagonda Lodge, Kingsford Street[b]	18.7	18.9	19.7	0.8
204	12 Somerfield Barn Court, Main Road[b]	31.5	30.7	31.2	0.5
205	13 Somerfield Barn Court, Main Road[b]	31.5	30.7	31.2	0.5
329	14 Somerfield Barn Court, Main Road[b]	31.5	30.7	31.2	0.5
330	15 Somerfield Barn Court, Main Road[b]	31.5	30.7	31.2	0.5
366	Copperfield, Kingsford Street[b]	18.8	18.7	19.3	0.6
421	Caloundra, Kingsford Street[b]	21.2	20.9	21.6	0.7
422	The Annexe Kenistone, Kingsford Street[b]	21.0	20.7	21.5	0.8
1280	Court Lodge Farm, Church Road[b]	20.1	19.5	20.0	0.5
374	154 The Street[b]	28.8	28.4	23.4	-5.0

Receptor	Address	NO_2 Annual Mean Concentration (µg/m^3)			
		2014 Base	2018 DM	2018 DS	Change
408	129 The Street[(b)]	28.6	28.3	23.9	-4.4
411	133 The Street[(b)]	34.9	34.7	27.3	-7.4
464	131 The Street[(b)]	35.2	35.1	27.8	-7.3
466	8 Lacton Oast[(b)]	29.5	29.3	24.6	-4.7

Note: DM – Do Minimum
DS – Do Something
(a)1.9 adjustment factor applied (See Appendix 5.1, Volume 6.3)
(b) 2.4 adjustment factor applied (See Appendix 5.1, Volume 6.3)

PM_{10} Results

5.8.40 Annual mean PM_{10} concentrations are predicted to be well below the objective in the Do-Minimum and Do-Something scenarios at all of the modelled receptors. The receptor with the highest predicted PM_{10} concentrations is receptor 345 (white lodge) and is located on Harringe Lane, Sellinge and is adjacent to the M20 approximately 5.9km south east of junction 10a. The highest predicted PM_{10} concentrations are at this location as a result of background concentrations assumed in the assessment. Given the annual mean concentrations are well below the objective these is no risk of exceeding the 24 hour mean.

5.8.41 All predicted changes at all modelled receptors are less than 0.4µg/m^3 and therefore it is considered that the Main Scheme will not result in significant PM_{10}.impacts.

Compliance Risk Assessment

5.8.42 Figure 5.11, Volume 6.2 presents the PCM links and the affected road network for the study area; these represent the CRRN. There is a single PCM link within the CRRN where concentrations of NO_2 at the worst affected receptor increase by more than 0.4µg/m^3. The PCM link where this occurs is located between junction 10 and the Highfield Lane flyover. The equivalent Opening Year annual mean roadside NO_2 concentration on this PCM link is 28.3µg/m^3. As a result of the Scheme, the concentrations at the worst affected receptor are predicted to increase by 1.0µg/m^3. The resultant equivalent PCM NO_2 concentrations is therefore 29.3µg/m^3 as shown in Table 5.21. The changes in concentration at this receptor are due to the introduction of the new junction 10a and A2070 link road (the changes in concentrations at this receptor are described in full in Paragraph 5.8.12). All of the other links in the CRRN are predicted to experience either a decrease in NO_2 concentrations increases that are below 0.4µg/m^3 at the worst affected receptors. The equivalent NO_2 concentrations predicted on these links are below 30µg/m^3 and therefore these are not discussed further.

5.8.43 Table 5.21 presents the compliance risk analysis for the one PCM link in the CRRN where pollutant concentrations are the worst affected receptor are predicted to increase above 0.4µg/m^3. There is a low risk of the Main Scheme affecting the UK's reported ability to comply with the Air Quality Directive.

Table 5.21 Compliance Risk Analysis for the Alternative Scheme

Inputs				Defra PCM Model and Compliance Information					HE Receptor Results			
HA Receptor ID	Defra Link Census ID	Zone / Agglomeration	Is it a Compliant Zone?	Proceeding Year: Total NO2 2013	Following Year: Total NO2 2020	Equivalent Opening Year: Total NO2 2018	Maximum Modelled Conc in Zone 2013	Projected Compliance Year	Annual Mean DM NO2 (µg/m³)	Annual Mean DS NO2 (uq/m³)	Change in Annual Mean (µg/m³) (DS-DM)	Equivalent PCM DS (µg/m³)
461	37955	31	No	39	24	28.3	59	2020	19.9	20.9	1.0	29.3

Designated Sites

5.8.44 Table 5.22 presents the change in annual mean NO_x concentrations, as a result of changes in traffic characteristics. The results show that distances within 105m of the road are likely to have a change in annual mean NO_x greater than 0.4µg/m^3. At these distances Do-Minimum and Do-Something annual mean NO_x concentrations are likely to be above the objective level.

Table 5.22 Annual mean NO_x concentrations at designated sites for ecology

Designated Site	Distance to 'Affected' Road	NO_x Annual Mean Concentration (µg/m^3)			
		2014 Base	2018 DM	2018 DS	Change
Hatch Park SSSI	30[(a)]	49.1	45.4	46.4	0.9
	50	40.7	37.7	38.4	0.7
	105	31.2	28.9	29.3	0.4
	181	25.9	24.0	24.2	0.2

Note: [(a)] indicates the closest point to the affected road

Designated Sites - Nitrogen deposition

5.8.45 Habitat classifications, background nitrogen deposition and critical loads are the same as those presented in the Main Scheme above.

5.8.46 Based on the detailed dispersion modelling carried out, concentrations of NO_2 have been determined at discrete receptor transects within the Hatch Park SSSI. DMRB guidance requires that dry NO_2 deposition, which is a component of total nitrogen deposition, is calculated for each of the receptor points assessed.

5.8.47 In accordance with DMRB guidance the road contribution to dry NO_2 deposition has been determined by subtracting the dry NO_2 deposition rate for the APIS square from the receptor dry NO_2 deposition rate. This provides the road contribution to dry NO_2 deposition and is presented in Table 5.23.

Table 5.23 Modelled road contribution to NO_2 dry deposition

Designated Site	Distance to 'Affected' Road	Modelled Road Contribution to NO_2 Dry Deposition (kg N ha/yr)			
		2014 Base	2018 DM	2018 DS	Change
Hatch Park SSSI	30[a]	1.68	1.77	1.79	0.02
	50	1.30	1.41	1.43	0.02
	105	0.85	0.95	0.96	0.01
	181	0.59	0.69	0.71	0.02

Note: [a] indicates the closest point to the affected road
Deposition levels presented to two decimal places to indicate change; not an indication of model accuracy.

5.8.48 The modelled road contribution to NO_2 dry deposition has been added to the APIS average total background nitrogen deposition to give the total nitrogen deposition rate at each receptor within the Designated Sites. This is presented in Table 5.24.

Table 5.24 Total N deposition

Designated Site	APIS Habitat Classification	Distance to 'Affected' Road	Total N Deposition 2019 (kg N ha/yr)			APIS Critical Load Range
			2014 Base	2018 DM	2018 DS	(kg N ha/yr)
Hatch Park SSSI	Broadleaved, Mixed and Yew Woodland	30[a]	33.10	30.75	30.77	10-15
		50	32.72	30.39	30.41	
		105	32.27	29.93	29.94	
		181	32.01	29.67	29.69	
	Acid Grassland	30[a]	19.52	18.22	18.24	10-15
		50	19.14	17.86	17.88	
		105	18.68	17.40	17.41	
		181	18.42	17.14	17.16	

Note: [a] indicates the closest point to the affected road
Deposition levels presented to two decimal places to indicate change; not an indication of model accuracy.

Table 5.25 Percentage Change in Total N deposition in 2018

Designated Site	APIS Habitat Classification	Distance to 'Affected' Road	Total N Deposition 2018 (DS-DM) (kg N ha/yr)	Change as % DM
Hatch Park SSSI	Broadleaved, Mixed and Yew Woodland	30[a]	0.02	0.1
		50	0.02	0.1
		105	0.01	0.0
		181	0.02	0.1
	Acid Grassland	30[a]	0.02	0.1
		50	0.02	0.1
		105	0.01	0.1

Designated Site	APIS Habitat Classification	Distance to 'Affected' Road	Total N Deposition 2018 (DS-DM) (kg N ha/yr)	Change as % DM
		181	0.02	0.1

Note: [(a)] indicates the closest point to the affected road
Deposition levels presented to two decimal places to indicate change; not an indication of model accuracy.

5.8.49 Results indicate the nitrogen deposition contribution from the proposed scheme is less than 1%.

5.8.50 Following consultation with Project Ecologist impacts from NO_x concentrations and nitrogen deposition on designated sites are not considered to be significant as they are unlikely to change the functionality of the acidic grassland and woodland for which the designation has been made. A description of the designation site and judgement on significance is provided in Table 8.6 and Section 8.8.27 of Chapter 8 Nature Conservation, Volume 6.1.

Assessment of Significance

5.8.51 Table 5.26 and Table 5.27 present the number of properties within each magnitude of change category for the Main Scheme and Alternative Scheme.

Table 5.26 Number of Properties Constituting a Significant Effect - Main Scheme

Magnitude of Change in Concentration	Number of Receptors With:	
	Worsening of air quality objective already above objective or creation of a new exceedence	Improvement of an air quality objective already above objective or the removal of an existing exceedence
Large (>4)	0	0
Medium (>2 to 4)	0	0
Small (>0.4 to 2)	0	0

Table 5.27 Number of Properties Constituting a Significant Effect - Alternative Scheme

Magnitude of Change in Concentration	Number of Receptors With:	
	Worsening of air quality objective already above objective or creation of a new exceedence	Improvement of an air quality objective already above objective or the removal of an existing exceedence
Large (>4)	0	0
Medium (>2 to 4)	0	0
Small (>0.4 to 2)	0	0

5.8.52 There is no predicted worsening or improvements of NO_2 or PM_{10} concentrations at receptors above the air quality objectives as a result of the Main Scheme or the Alternative Scheme.

5.8.53 There is no predicted creation of an NO_2 or PM_{10} exceedence and there are no removals of an existing exceedence for either the Main Scheme or the Alternative Scheme.

5.8.54 Table 5.28 presents the overall evaluation of local air quality significance for both the Main Scheme and the Alternative Scheme, and the basis of the conclusion that the scheme's local air quality effects are not significant.

Table 5.28 Overall Evaluation of Local Air Quality Significance

Key Criteria Questions	Yes / No
Is there a risk that environmental standards will be breached for either scheme?	No
Will there be a large change in environmental conditions for either scheme?	No
Will the effect continue for a long time for either scheme?	No
Will many people be affected by either scheme?	No
Is there a risk that designated sites, areas, or features will be affected by either scheme?	No
Will it be difficult to avoid, or reduce or repair or compensate for the effect of either scheme?	No
On balance is the Overall Effect significant for either scheme?	No
Evidence in support of professional judgement: - There are 5 receptors above the annual mean NO_2 objective in the opening year Do-Minimum scenario in both the Main and Alternative Schemes. The changes caused by the Main and Alternative Scheme are predicted to be imperceptible at these locations. - There are no new exceedences of the air quality objectives predicted at receptors as a result of the Main or Alternative Schemes. - PCM concentrations are below the limit value in the base year and there is 'low risk' of the Main and the Alternative Schemes causing non-compliance with the EU Directive on ambient air quality. - Impacts on ecological sites are not considered to be significant for both the Main and the Alternative Schemes.	

Regional Impacts

Main Scheme

5.8.55 Results of the Main Scheme regional impact assessment are presented in Table 5.29 and Table 5.30.

5.8.56 The Main Scheme is predicted to cause a decrease in emissions of NO_x, and CO_2 compared to the Do-Minimum scenario in 2018 and 2033. This is primarily due to a decrease in overall vehicle kilometres travelled in the Do-Something scenario.

5.8.57 Compared to the Base Year, emissions are predicted to decrease in 2018 and 2033 for all pollutants. A reduction in NO_x emissions is predicted in 2033 compared to the Base Year, primarily due to the expected introduction of more stringent Euro emission standards which offsets increases in vehicle numbers.

5.8.58 Although the Main Scheme causes a reduction in regional emissions for NO_x and PM_{10} pollutants, the change is less than 1% and is minor in comparison to the Do-Minimum regional emissions.

5.8.59 The Main Scheme is predicted to reduce CO_2 emissions, by 0.7% in the opening year and 0.6% in the future year.

5.8.60 The NPSNN acknowledges small increase in aggregate levels of emissions is likely as a result of road development but these should be seen in the context projected reductions as a result of current and future policies. As noted above the Main Scheme is expected to result in very small reductions and does not conflict with the NPSNN.

Table 5.29 Regional Impacts

Pollutant	2014 Base Year	2018 DM	2018 DS	2018 % Change	2033 DM	2033 DS	2033 % Change
NO_x (t/yr)	149.3	103.8	103.5	-0.3	57.0	56.7	-0.5
PM_{10} (t/yr)	11.6	9.9	9.9	0.0	11.93	11.86	-0.5
CO_2 (t/yr)	48828.8	50462	50125.3	-0.7	54271.2	53925.2	-0.6

Note: Emission factors are not available beyond 2030. 2030 emission factors assumed for 2033.

Table 5.30 Regional Impacts - Changes from Base Year Emissions

Pollutant	2018		2033	
	DM	DS	DM	DS
NO_x (%)	-43.8	-44.3	-161.8	-163.1
PM_{10} (%)	-17	-17	3.2	2.6
CO_2 (%)	3.2	2.6	10	9.5

Alternative Scheme

5.8.61 Results of the Alternative Scheme regional impact assessment are presented in Table 5.31 and Table 5.32.

5.8.62 The Alternative Scheme is predicted to cause a decrease in emissions of NO_x, PM_{10} and CO_2 compared to the Do-Minimum scenario in 2018 and 2033. This is primarily due to a decrease in overall vehicle kilometres travelled in the Do-Something scenario.

5.8.63 Compared to the Base Year, emissions are predicted to decrease in 2018 and 2033 for all pollutants. A reduction in NO_x emissions is predicted in 2033 compared to the Base Year, primarily due to the expected introduction of more stringent Euro emission standards which offsets increases in vehicle numbers.

5.8.64 Although the Alternative Scheme causes a reduction in regional emissions for all pollutants, the change is less than 2% and is minor in comparison to the Do-Minimum regional emissions.

5.8.65 The Alternative Scheme is predicted to reduce CO_2 emissions, by 1.7% in the opening year and 1.5% in the future year for their study areas.

5.8.66 The NPS NN acknowledges small increase in aggregate levels of emissions is likely as a result of road development but these should be seen in the context projected reductions as a result of current and future policies. As noted above the Alternative Scheme is expected to result in very small reductions and does not conflict with the NPS NN.

Table 5.31 Regional Impacts

Pollutant	2014 Base Year	2018 DM	2018 DS	% Change	2033 DM	2033 DS	% Change
NO_x (t/yr)	143.7	99.1	97.7	-1.4	53.9	53.2	-1.4
PM_{10} (t/yr)	11.1	9.4	9.3	-1	11.3	11.1	-1.5
CO_2 (t/yr)	46961	48228	47405.1	-1.7	51528	50737.7	-1.5

Table 5.32 Regional Impacts - Changes from Base Year Emissions

Pollutant	2018		2033	
	DM	DS	DM	DS
NO_x (%)	-44.9	-47.0	-166.4	-170.1
PM_{10} (%)	-18.2	-19.4	1.5	0
CO_2 (%)	2.6	0.9	8.9	7.4

5.9 Conclusions

5.9.1 This chapter provides an assessment of the potential air quality impacts of the Main and Alternative Schemes in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3, Part 1 – Air Quality (HA207/07) and relevant IANs. The assessment has considered impacts on both local and regional air quality.

5.9.2 The assessment takes account of the requirements of the Air Quality Directive, relevant legislation, national and local planning policy.

5.9.3 The assessment of air quality impacts has been undertaken for a Main and Alternative Scheme. The only difference between the Main and Alternative Scheme is the addition of the mid-link roundabout to provide an additional access point to the Stour Park phase 1. This results in changes in traffic flows between the two Schemes.

5.9.4 A qualitative assessment of potential dust effects for both Schemes has been undertaken, based on a review of likely dust raising activities and identification of sensitive receptors within 200m. Potential dust impacts would be suitably controlled using the best practice mitigation measures proposed and consequently are unlikely to cause nuisance.

5.9.5 There are 5 receptors with concentrations above the long term NO_2 objective, however, changes at these receptors are 'imperceptible' and neither the Main nor Alternative Scheme create a new exceedance of the air quality objectives. There are no small, medium or large changes in long-term NO_2 concentrations at receptors experiencing concentrations above the objectives.

5.9.6 The predicted effects of the operation both the Main and Alternative Schemes on local air quality are concluded to be not significant and no mitigation measures are proposed.

5.9.7 The assessment has concluded that there is low risk of the Main or Alternative Scheme causing non-compliance with the Air Quality Directive on ambient air quality.

5.9.8 The Main and Alternative Schemes are consistent with national and local planning policy with respect to air quality.

5.9.9 The Main and Alternative Schemes are predicted to cause a reduction in regional emissions of NO_x, PM_{10} and CO_2. The NPSNN acknowledges small increase in aggregate levels of emissions is likely as a result of road development but these should be seen in the context projected reductions as a result of current and future policies. Therefore it can be concluded that both Schemes do not conflict with the NPSNN.