8 Air quality

Introduction

8.1 This chapter assesses the impact of the proposed development on local air quality. In particular, it considers the potential air quality effects of the proposed development during the site preparation and construction and post-construction stages. For both stages the type, source and significance of potential impacts are identified and the measures that should be employed to minimise these effects are described.

8.2 The chapter will provide information on relevant legislation, policy and guidance; the methodology used in the preparation of the chapter; the baseline air quality in the vicinity of the proposed development site; an assessment of effect; and recommendation of mitigation measures to be implemented and residual effects.

8.3 A summary of the terms used in this chapter is provided in technical appendix E1.

Legislation and policy

National legislation

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007)

8.4 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007 (DERFA, 2007). The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

8.5 The AQS sets standards and objectives for nine main air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs).

8.6 The air quality standards are concentration limits that represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). Above these limits sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

8.7 The air quality objectives are medium term policy based targets set by the Government that take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedences of the standard over a given period.

8.8 For some pollutants (e.g. NO_2), there is both a long term (annual mean) standard and a short term standard. In the case of NO_2, the short term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road.

8.9 The AQS contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$', as there is increasing evidence that this size fraction of particles can be more closely associated with observed adverse health effects than PM_{10}. For $PM_{2.5}$ the objectives will take the form of a limit value ('backstop objective') and an 'exposure reduction' target. Although a target for $PM_{2.5}$ is included in the AQS, these objectives have not yet been incorporated into the Regulations. Consequently there is currently no requirement for local authorities to assess this pollutant as part of their statutory obligations.

Air Quality (England) Regulations 2000 (as amended)

8.10 Many of the objectives in the AQS have been made statutory in England with the *Air Quality (England) Regulations 2000* (Statutory Instrument, 2000) and *the Air Quality (England) (Amendment) Regulations 2002* (Statutory Instrument, 2002) for the purpose of Local Air Quality Management (LAQM). The standards and objectives for each pollutant in the AQS and the Air Quality Regulations are given in technical appendix E2.

The Environmental Protection Act 1990 (Control of Dust and Particulates associated with Construction)

8.11 Section 79 of the *Environmental Protection Act 1990* gives the following definitions of statutory nuisance relevant to dust and particles:

- "Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance"
- "Any accumulation or deposit which is prejudicial to health or a nuisance"

8.12 Following this, Section 80 states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and, if necessary, the local authority may abate the nuisance and recover expenses.

8.13 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change that has occurred.

Local Air Quality Management

8.14 Under *Part IV* of the *Environment Act 1995*, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives by the years defined in the Regulations. Where the objectives of the *Air Quality Regulations* are not likely to be achieved by the objective year, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.

8.15 The Department for Environment, Food and Rural Affairs (DEFRA) has published a technical guidance document for use by local authorities in their review and assessment work. This document, called *Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(09),* has been used where appropriate in the assessment presented herein.

Planning policy

National planning policy

PPS 23: Planning and Pollution Control (November 2004)

8.16 Policy guidance for local planning authorities (in England only) regarding local air quality and new development is provided in PPS23. PPS23 advises on the policies and practices that should be taken into account by those involved in the planning of any development that has the potential to cause pollution.

8.17 With regard to emissions to air, and specifically local air quality management, Appendix 1G of Annex 1 in PPS23 states that "any air quality consideration that relates to land use and its development is capable of being a material planning consideration". This is most likely to be the case in situations where the proposed development could produce an exceedence of the AQS objectives and result in an AQMA designation, or where development is proposed in an AQMA, or where a proposed development renders a local authority's AQAP unworkable. PPS23 also re-iterates that the presence of an AQMA should not result in the sterilisation of a site from development.

8.18 Paragraph 174 of the draft National Planning Policy Framework (July 2011) sets out emerging policy on air quality, including sustaining compliance with and contributing towards EU limit values or national objectives for pollutants.

Regional planning policy

8.19 The Localism Bill was enacted in November 2011, thereafter becoming the Localism Act. Different parts of the Act will, however, come into effect at different times over the coming months. The Act enables Regional Spatial Strategies, including the East of England Plan, to be abolished, but this will be undertaken by statutory order by the government in due course (it is currently understood that this will be around March / April 2012), subject to consultation. Whilst the East of England Plan remains part of the development plan until it is formally abolished, the government has advised that the proposed abolition of Regional Spatial Strategies should be regarded as a material consideration by local planning authorities when deciding planning applications. It should therefore be afforded limited weight in the determination of this planning application.

Local planning policy

Development Control Policies DPD (2007)

8.20 Part 1.l of Policy DP/1 Sustainable Development states:

1. Development will only be permitted where it is demonstrated that it is consistent with the principles of sustainable development, as appropriate to its location, scale and form. It should….
   l. Ensure no unacceptable adverse impact on land, air and water

8.21 Policy Natural Environment NE/16 Emissions states:

1. Development proposals will need to have regard to any emissions arising from the proposed use and seek to minimise those emissions to control any risks arising and prevent any detriment to the local amenity by locating such development appropriately.
2. Where significant increases in emissions covered by nationally prescribed air quality objectives are proposed, the applicant will need to assess the impact on local air quality by undertaking an appropriate modelling exercise to show that the national objectives will still be achieved. Development will not be permitted where it would adversely affect air quality in an Air Quality Management Area.

District Design Guide Supplementary Planning Document (March 2010)

8.22 In March 2010, SCDC adopted its *District Design Guide Supplementary Planning Document* (SPD) as part of the emerging Local Development Framework. This guide has been produced to supplement the above *Development Control Polices* DPD and provide guidance to ensure that all developments are sustainable and appropriately and sensitively designed. The guidance draws upon a number of technical areas that are integral to the quality of a development and provides specific advice on design principles that should be considered. One of these technical areas is air quality. Chapter 10 of the SPD highlights the importance that should be afforded to air quality

and the link between road transport and poor air quality. It also provides advice on when an air quality assessment will be required. However, appendix 4 provides specific advice on the options that should be considered to mitigate impacts (particularly of road traffic) on local air quality and design measures that will help to minimise the exposure of residential receptors to poor air quality within a development site.

Northstowe Area Action Plan (Adopted July 2007)

8.23 Policy D6/g sets out the requirement to link Northstowe to the main road network, whilst minimising the impact of traffic generation on surrounding communities.

8.24 Policy NS/24 requires the preparation of a comprehensive construction strategy, including measures to minimise dust from haul roads, storage compounds and construction activity to prevent adverse impacts on residents, businesses and public rights of way.

Methodology

Scope of the assessment

8.25 In July 2011, a formal scoping report was issued to SCDC; a copy of this report and the consultees' responses is provided in technical appendix A of this ES. The air quality section (chapter 8) identified the potential impacts that required further consideration in the ES and those impacts that will not. The scoping assessment identified that the proposed development site is located in an area where air quality is manly influenced by road traffic emissions. Indeed the proposed development site is located approximately 2.9 km from a designated AQMA, which covers a section of the A14 corridor.

Potentially significant effects

8.26 The ES will consider the impacts on local air quality that will occur during both the construction and operational phases of the proposed development. These impacts are summarised below:

- Generation of dust during on site construction activities
- Generation of PM_{10} during on site construction activities
- Emissions of NO_2 and PM_{10} arising from construction traffic and plant
- Emissions of NO_2 and PM_{10} arising from road traffic generated by the proposed development once it becomes operational

Insignificant effects

8.27 The proposed development includes the provision of a foul-water pumping station and a household waste recycling centre. Whilst there is the potential for odorous emissions to arise from such sources, these uses will be located in the east of the site away from sensitive receptors. The pumping station will

also be enclosed and will feature appropriate abatement technology and standard handling procedures relating to the handling and storage of waste will be implemented at the recycling centre. All of the above measures will help to minimise any associated odours. The impact of odour arising from these uses is therefore considered to be insignificant and will not be considered within the ES.

Extent of the study area

8.28 The air quality assessment considers the site of the proposed development and the immediate surrounding area (figure 8.1). For the purpose of the site preparation, earthworks and construction phase, the site and the area up to a distance of 200 m from the site boundary has been considered (figure 8.2).

8.29 For the purpose of the operational phase, total traffic flows have been provided for the surrounding road network (details of which are provided in technical appendix E3). These include those roads likely to have a significant impact on local air quality in the area of the site (i.e. the A14) and those roads likely to experience a significant change in traffic volume as a result of the proposed development. Sensitive receptors located in the immediate vicinity of the development and adjacent to each of the road links considered have also been included in this assessment.

References and guidance documents

8.30 In addition to the key legislative guidance discussed previously, a number of additional guidance documents and data sources have been used in the preparation of this chapter. These documents / sources are summarised in table 8.1.

Table 8.1: Summary of references and data sources used in the assessment		
PUBLICATIONS		
Title	**Author**	**Date**
Control of Dust from Construction and Demolition Activities	BRE	2003
Airborne Particulate Matter in the United Kingdom - Third Report	QUARG	1996
Controlling Particles, Vapour and Noise pollution from Construction Sites (Parts 1 - 5)	BRE	2003
The Environmental Effects of Dust from Surface Mineral Workings Volume 2	Arup Environmental and Ove Arup and Partners	1995
The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance	London Councils and Greater London Authority	2006
Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(03)	DEFRA	2003
Part IV of the Environment Act 1995 Environment (Northern Ireland) Order 2002 Part III Local Air Quality Management Technical Guidance LAQM.TG(09)	DEFRA	2009
Development Control: Planning for Air Quality (2010 Update)	EP UK	2010
Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites	Laxen, D. and Marner, B.	2003
Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedences of the 1-hour mean AQS Objective	A Cook	2008
WEB PAGES / ON-LINE RESOURCES		
Description	**Web Address**	
DEFRA's Local Air Quality Management Support Pages	http://laqm.defra.gov.uk/	
DEFRA's Automatic Air Quality Monitoring Data Archive	http://uk-air.defra.gov.uk/	
Environment Agency's Pollution Register ('What's in your backyard?')	http://maps.environment-agency.gov.uk/wiyby	
2010 Air Quality Progress Report for South Cambridgeshire District Council	http://www.scambs.gov.uk/documents/retrieve.htm?pk_document=909192	
2011 Air Quality Progress Report for South Cambridgeshire District Council	http://www.scambs.gov.uk/documents/retrieve.htm?pk_document=910388	
SCDC's Air Quality Web Pages (monitoring data)	http://scambs-airquality.aeat.co.uk/	

8.31 Further details on each of these documents are provided in technical appendix E2.

Baseline desk study

8.32 A desk study was undertaken to obtain baseline data to inform the assessment. This study incorporated the following:

- Review of the monitoring data and local air quality review and assessment reports available from SCDC
- Review of available air quality data for the area surrounding the site, including data from Defra's online Local Air Quality Management support pages and the Environment Agency's (EA) website

- A study of local mapping data available for the study area and the development parameter plans (figures 2.2a to 2.5) to identify local receptors that may be sensitive to a change in local air quality

Construction phase assessment methodology

Generation of dust during on site construction activities

8.33 During the construction phase, activities undertaken on the application site may cause dust and particulate matter to be emitted to the atmosphere. Dust comprises particles typically in the size range 1-75 micrometres (μm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust, therefore, is unlikely to cause long term or widespread changes to local air quality; however, its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

8.34 A qualitative assessment of the potential impacts due to the generation and dispersion of dust during the construction phase has been undertaken using information in guidance documents produced by the following organisations, full references for which are set out in table 8.1:

- Building Research Establishment (BRE)
- Quality of Urban Air Review Group (QUARG)
- Department of the Environment (DoE)

8.35 The Greater London Authority and London Councils have produced guidance for the London Boroughs (November 2006) that looks at best practicable means to control dust and emissions from construction sites. Whilst the guidance is intended for London Boroughs, much of the guidance is transferable to other sites.

8.36 The significance of effects associated with this phase has been determined qualitatively by:

- Identifying the activities associated with the site preparation, demolition, earthworks and remediation phase of the proposed development that could generate dust and their likely duration
- Identifying sensitive receptors (e.g. schools, residential properties) within 200 m of the site
- Considering the prevailing wind direction
- Considering the presence of significant vegetation within the vicinity of the site (which, if present, can act as a physical barrier)

Generation of PM_{10} during on site construction activities

8.37 The smaller particles of dust (typically less than 10 μm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released. As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area. PM_{10} is small enough to be drawn into the lungs during breathing, which in sensitive members of the public could cause an adverse reaction. As a result of this potential impact on health, standards and objectives for PM_{10} are defined in the AQS and Regulations.

8.38 A qualitative assessment of the potential impacts due to the generation and dispersion of PM_{10} during this phase has also been undertaken using the information summarised in paragraph 8.33 to 8.35 above.

Emissions of NO_2 and PM_{10} arising from construction traffic and plant

8.39 During the construction phase, materials will need to be delivered to and from the site, as well as being transported around the site itself. In addition, contractors and site operatives will also need to travel to and from the site each day. Construction vehicles will therefore contribute to existing traffic levels on the local road network and exhaust emissions associated with these vehicles will have an impact on local air quality both within the site and adjacent to the routes used by these vehicles to access the site.

8.40 At the time of writing, detailed information regarding the movement of construction traffic on the local road network was not available. Consequently, a qualitative assessment of the potential impacts has been carried out taking into account the following:

- The likely type and level of plant and traffic generated during the site preparation, earthworks, demolition and construction phase and the likely points of access and egress to the site
- The number, type and distance of sensitive receptors located in the vicinity of the site and adjacent to the likely haul routes to be used by construction vehicles
- The timing of vehicle movements on the local road network

Post-construction assessment methodology

Emissions of NO_2 and PM_{10} arising from road traffic generated by the proposed development

8.41 Once construction has been completed and the site becomes operational, traffic generated by the proposed development will have an effect on local pollution concentrations, both within and around the proposed development site. The main pollutants of concern for road traffic are generally considered to be NO_2, PM_{10}, CO and C_6H_6. Of these pollutants, emissions of NO_2 and

PM_{10} are most likely to result in exceedences of the relevant air quality standards or objectives, particularly in urban areas.

8.42 It is also generally considered that, where concentrations of NO_2 and PM_{10} meet their respective objectives, and there are no other local sources of air pollution, such as from industrial processes, objectives for the other pollutants included in the Regulations will also be achieved.

8.43 SCDC has undertaken an assessment of other pollutants included in the Regulations as part of their Review and Assessment process and has concluded that exceedences of their respective objectives are unlikely and further assessment is therefore unnecessary. Only NO_2 and PM_{10} have therefore been considered within the assessment.

8.44 In order to predict the impact on local air quality due to emissions arising from road traffic associated with the operational phase of the proposed development, the detailed air pollutant dispersion model ADMS-Roads (Version 3; build 2.3.7; release date 23 November 2010) has been used. This model uses information regarding traffic flows on the local road network and local meteorological conditions to predict pollutant concentrations at specific locations determined by the user.

8.45 Meteorological data, such as wind speed and direction, are used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model were obtained from the Met Office observing station at Mildenhall. This is the closest Meteorological station to the development site and is considered to provide data representative of the conditions at the site. The meteorological data used for this assessment were from 2009; a wind rose is provided in technical appendix E4.

8.46 For the assessment, six scenarios were modelled. These scenarios are as follows:

- 2009 – verification year
- 2011 – baseline year
- 2015 – without development (future baseline)
- 2015 – with development
- 2021 – without development (future baseline)
- 2021 – with development

8.47 2009 is the year in which appropriate monitoring data and traffic data are available to enable verification of the modelling results. 2011 is the current baseline year, 2015 represents the initial opening year of the development (i.e. first year of occupation) and 2021 is the proposed completion year for the development.

8.48 It should be noted that the traffic flows used for the 2015 ‘with development’ scenario assume that 500 residential units will have been constructed and occupied. However, this represents a reasonable worst-case scenario with a fast development build rate and has been adopted to simplify the traffic

modelling for the interim development years. It is anticipated that the actual build-out rate for the development may be somewhat slower and in practice it is expected that approximately 275 units will be constructed by 2015.

8.49 The '2015 with development' and the '2021 with development' scenarios also take into account the slight realignment / improvements to the B1050 that are proposed as part of the development.

8.50 The traffic flows for the future baseline scenarios include flows for committed developments in the locality of the proposed development site, but do not include any contribution to road traffic from the proposed development itself. The traffic flows for the 'with development' scenarios include flows for committed developments and contributions to road traffic from the proposed development. Committed developments include those incorporated within the Cambridge Sub-Regional Model used to model the traffic flows, including NIAB 1, Orchard Park and the University Site.

8.51 Recent observations in urban locations across the UK have found that there is little evidence to support the downward trend in NO_2 that is suggested by current emission factors and background concentrations provided on the DEFRA website. A sensitivity test was therefore completed using the emission factors for the year 2009 to predict concentrations for the final completion year of 2021. The results for this additional modelling are not discussed in the results section, but are provided in technical appendix E6 for comparison.

8.52 Modelled annual mean oxides of nitrogen (NO_x) concentrations were converted to annual mean NO_2 concentrations using the methodology given in LAQM.TG(09) and the NO_x:NO_2 calculator available from DEFRA's website. The calculator provides a method of calculating NO_2 from NO_x wherever NO_x emissions from road traffic are predicted using dispersion modelling.

8.53 For PM_{10}, the modelled annual mean concentrations were used to calculate the number of exceedences of the 24-hour mean objective for direct comparison with the relevant AQS objective, following the methodology given in LAQM.TG(09).

8.54 LAQM.TG(09) does not provide a method for the conversion of annual mean NO_2 concentrations to 1 hour mean NO_2 concentrations. However, research carried out in 2003 (Laxen and Marner, July 2003), determined that exceedences of the 1 hour mean objective were unlikely to occur where annual mean concentrations were below 60µg/m^3. Further research carried out in 2008 (Cook, 2008) generally supported this relationship and as a result this criterion has been adopted for the purposes of local air quality review and assessment.

8.55 Quantitative assessments of the impacts on local air quality from road traffic emissions associated with the operation of the proposed development have been completed against the current statutory standards and objectives for NO_2 and PM_{10} set out in technical appendix E2.

Model validation and verification

8.56 The ADMS Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose.

8.57 Model validation undertaken by the software developer will not have included validation in the vicinity of the proposed development considered in this assessment. To determine the performance of the model at a local level it is therefore advisable to perform a comparison of modelled results with local monitoring data at one or more relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

8.58 Suitable SCDC local monitoring data for the purpose of model verification are available for concentrations of NO_2 and PM_{10} at the locations shown in table 8.2.

Table 8.2: Local monitoring data suitable for model verification

Location and site classification	O.S. grid reference	Adjacent road links	2009 annual mean concentrations (µg/m^3)	
			NO_2	PM_{10}
Bar Hill continuous monitor (roadside)	538685,263760	A14	39	33
Crafts Way diffusion tube (roadside)	538472,263675	A14	25	n/a
Catchall Farm diffusion tube (roadside)	540509,262290	A14	28	n/a

8.59 Model verification has been undertaken following the methodology specified in Annex 3 of *LAQM.TG(09*). For NO_2, the NO_x:NO_2 calculator available from DEFRA's website has been used to calculate the roadside NO_x component of the annual mean NO_2 concentrations measured at the above monitoring locations. Details of the verification calculations are presented in technical appendix E5. A factor of 1.08 was obtained during the verification process and this factor has been applied to the modelled NO_x roads component before conversion to annual mean NO_2 concentrations.

8.60 For PM_{10}, a verification factor of 5.8 was obtained. This verification factor has been applied to the modelled road PM_{10} component before addition of the appropriate background PM_{10} concentrations and conversion to annual mean PM_{10} concentrations. Again, further details on the verification process are provided in technical appendix E5.

Effect significance

Construction

8.61 The significance of each effect identified during the construction phase has been assessed taking into account the anticipated magnitude of change at each receptor / receiving environment as a result of the activities undertaken and the sensitivity of the receptor / receiving environment to change. The assessment has been based largely on professional judgement and experience of working on similar schemes; it has also taken into consideration those factors identified in paragraph 8.36 above.

Post-construction

Emissions of NO_2 and PM_{10} arising from road traffic generated by the proposed development

8.62 The effects of the proposed development on local air quality once it becomes operational have been evaluated against the criteria summarised in tables 8.3 and 8.4. These criteria are based on those published by Environmental Protection UK in *Development Control: Planning for Air Quality (2010 Update)*.

Table 8.3: Assessment criteria for annual mean NO_2 and annual mean PM_{10}	
Degree of effect criteria	**Definition**
Neutral	The development causes no change in concentrations.
Negligible effect	The development gives rise to an **imperceptible** change in concentrations or; The development gives rise to a **small** change in concentrations and predicted concentrations are below 36 μg/m^3; or The development gives rise to a **medium** change in concentrations and predicted concentrations are below 30 μg/m^3.
Slight adverse effect	The development gives rise to a **small** increase in concentrations and predicted concentrations with the development in place are above 36 μg/m^3; or The development gives rise to a **medium** increase in concentrations and predicted concentrations with the development in place are between 30-36 μg/m^3; or The development gives rise to a **large** increase in concentrations and predicted concentrations with the development in place are less than 36 μg/m^3.
Moderate adverse effect	The development gives rise to a **medium** increase in concentrations and predicted concentrations with the development in place are above 36 μg/m^3; or The development gives rise to a **large** increase in concentrations and predicted concentrations with the development in place are between 36-40 μg/m^3.
Substantial adverse effect	The development gives rise to a **large** increase in concentrations and predicted concentrations with the development in place exceed the objective level of 40 μg/m^3.
Slight beneficial effect	The development gives rise to a **small** decrease in concentrations and predicted concentrations without the development in place are above 36 μg/m^3; or The development gives rise to a **medium** decrease in concentrations and predicted concentrations without the development in place are between 30-36 μg/m^3; or The development gives rise to a **large** decrease in concentrations and predicted concentrations without the development in place are less than 36 μg/m^3.
Moderate beneficial effect	The development gives rise to a **medium** decrease in concentrations and predicted concentrations without the development in place are above 36 μg/m^3; or The development gives rise to a **large** decrease in concentrations and predicted concentrations without the development in place are between 36-40 μg/m^3.
Substantial beneficial effect	The development gives rise to a **large** decrease in concentrations and predicted concentrations without the development in place exceed the objective level of 40 μg/m^3.
Where the magnitude of change in concentration for annual mean NO_2 and PM_{10} has been defined as follows: An imperceptible change is a change of <0.4 μg/m^3; A small change is a change of less than 0.4 – 2 μg/m^3; A medium change is a change of 2 – 4 μg/m^3; and A large change is a change of > 4 μg/m^3. An exceedance is defined as a concentration that is predicted to be above the standard (40 μg/m^3) in, or after the objective achievement year (2005 for NO_2 and 2004 for PM_{10}) at a location where members of the public are likely to be exposed over the averaging period (1 year).	

Table 8.4: Assessment significance criteria for daily mean (24-hourly) PM_{10} concentrations	
Degree of effect criteria	**Definition**
Neutral	The development causes no change in the number of days of exceedence.
Negligible effect	The development gives rise to an **imperceptible** change in the number of days of exceedence; or The development gives rise to a **small** change and the predicted number of days of exceedence is below 32 days; or The development gives rise to a **medium** change and the predicted number of days of exceedence is below 26 days.
Slight adverse effect	The development gives rise to a **small** increase and the predicted number of days of exceedence is above 32 days; or The development gives rise to a **medium** increase and the predicted number of days of exceedence is between 26 and 32 days; or The development gives rise to a **large** increase and the predicted number of days of exceedence is below 32 days.
Moderate adverse effect	The development gives rise to a **medium** increase and the predicted number of days of exceedence is above 32 days; or The development gives rise to a **large** increase and the predicted number of days of exceedence is between 32 and 35 days.
Substantial adverse effect	The development gives rise to a **large** increase and the number of days of exceedence with the development in place is above 35 days.
Slight beneficial effect	The development gives rise to a **small** decrease and the predicted number of days of exceedence without the development is above 32 days; or The development gives rise to a **medium** decrease and the predicted number of days of exceedence without the development is between 26 and 32 days; or The development gives rise to a **large** decrease and the predicted number of days of exceedence without the development is between 32 and 35 days.
Moderate beneficial effect	The development gives rise to a **medium** decrease and the predicted number of days of exceedence without the development is above 32 days; or The development gives rise to a **large** decrease and the predicted number of days of exceedence without the development is between 32 and 35 days.
Substantial beneficial effect	The development gives rise to a **large** decrease and the number of days of exceedence without the development in place is above 35 days.
Where the magnitude of change is defined as the number of days of exceedence of a daily mean PM_{10} concentration of 50 $\mu g/m^3$: An imperceptible change is a change of < 1 day; A small change is a change of 1- 2 days; A medium change is a change of 2 - 4 days; and A large change is a change of > 4 days. An exceedance is defined as predicted 24-hour mean concentrations in excess of 50 $\mu g/m^3$ for more than 35 days per year, in, or after the objective achievement year (2004) at a location where members of the public are likely to be exposed over the averaging period (24-hours).	

8.63 Effects that are moderate or above are considered to be significant.

8.64 In addition to these quantitative criteria, the Environmental Protection UK report outlines a method that uses textual descriptors to identify the differing levels of relative priority that should be afforded to the air quality

considerations of a development proposal in the planning process. A summary of the method is given in table 8.5.

Table 8.5: Summary of method for assessing the significance of air quality in the planning process

Effect of development	Outcome
Development would lead to a breach or significant(1) worsening of a breach of an EU limit value; cause a new breach to occur, or introduce of new exposure into an exceedence area.	Air quality an overriding consideration.
Lead to a breach or significant (1) worsening of a breach of an AQ Objective, or cause a new AQMA to be declared, or introduce new exposure into an area of exceedence (2).	Air quality a high priority consideration.
Development would interfere significantly with or prevent the implementation of actions within an AQ action plan	Air quality a high priority consideration.
Development would interfere significantly with the implementation of a local AQ strategy.	Air quality a medium priority consideration.
Development would lead to a significant increase in emissions, degradation in air quality or increase in exposure, below the level of a breach of an objective.	Air quality a medium priority consideration.
None of the above.	Air quality a low priority consideration.

(1) Where the term significant is used, it will be based on the professional judgement of the Local Authority officer.
(2) This could include the expansion of an existing AQMA or introduction of new exposure to cause a new AQMA to be declared. Where new exposures is introduced this should be with reference to the exceedence area, and not the AQMA boundary.

Baseline

SCDC's review and assessment of local air quality

8.23 The review and assessment work undertaken by SCDC confirms that the primary concern with regards to air quality within the district is road traffic and, more specifically, the high volume of traffic travelling along the A14. As part of its work, the council has identified that there is the potential for exceedences of the annual mean objective for NO_2 and the daily mean objective for PM_{10} to occur in some areas adjacent to the A14. Consequently, SCDC has declared an AQMA along the A14 between Bar Hill and Milton for both of these pollutants. In 2010, SCDC's local monitoring data further indicated that, whilst the objective for annual mean NO_2 was met at all monitoring locations, exceedences of the daily mean objective for PM_{10} were still being recorded. The results also indicated that the annual mean objective for PM_{10} was exceeded at one monitoring location (Impington); however, SCDC are currently seeking advice from DEFRA as to whether or not this exceedence should result in an amendment to the AQMA declaration, given all previous monitoring and modelling work has indicated that the annual mean objective for PM_{10} will be met.

8.24 The proposed development is located approximately 2.9 km north of the AQMA. SCDC will continue to monitor air quality within this area; however, there are currently no plans to revise the AQMA declaration at the current

time. SCDC's review and assessment work also concludes that the objectives for all other pollutants are likely to be met.

8.25 Following the declaration of the AQMA, SCDC, in partnership with Cambridge City Council and Huntington District Council, prepared a joint *Air Quality Action Plan (AQAP) for the Cambridgeshire Growth Areas* that summarises the key causes of air quality problems across the county and outlines the key solutions and actions for improving local air quality. As the common thread for air quality problems within each administrative area is road transport, many of the actions are transport related.

8.26 In June 2008, SCDC also developed an additional document entitled the *Local Air Quality Strategy 2008-2013*, which looks at air quality specifically within South Cambridge and aims to raise awareness of air quality problems within the district, to emphasise the role that SCDC has in tackling air quality, and provide a platform upon which to make air quality improvements.

Local emission sources

8.27 The proposed development site is located in an area where air quality is mainly influenced by background concentrations and emissions from road transport on the local road network. A number of local roads pass close to the development site (including the B1050 Station Road, High Street and Rampton Road). However, none of these represent a significant effect on air quality due to the relatively low traffic flows using them. Nevertheless the site is also located approximately 2.9 km north of the A14. The A14 is a very busy road connecting Cambridge, Huntingdon and St Ives, as well as offering a national link between the Midlands, London and the East. As a result the A14 carries the highest traffic flows in the county and will have a significant influence on local air quality in the surrounding area. Furthermore, the Cambridgeshire Guided Busway (CGB), which opened in August 2011, runs adjacent to the north eastern boundary of the site.

8.28 A review of the EA's website (http://maps.environment-agency.gov.uk/wiyby) and online pollution register (known as *'What's in your Backyard?'*) and consultation with SCDC indicates that there are no significant industrial emission sources within the immediate vicinity of the site that would impact on the local air quality at the site.

Local air quality monitoring data

8.29 In the UK, DEFRA co-ordinates a network of automatic air quality monitoring stations as part of its 'Automatic Urban and Rural Network' (AURN). However, at the current time DEFRA does not operate any AURN stations within the vicinity of the proposed development site from which relevant monitoring data can be obtained. However, SCDC itself does maintain a number of monitoring stations within the district. Information on each of the monitoring stations, including site details / description and recent and historic monitoring data is available to download from SCDC's website: http://scambs-airquality.aeat.co.uk/. SCDC's two most recent air quality

review and assessment reports (*2010 Air Quality Progress Report for South Cambridgeshire District Council (*April 2010*)* and *2011 Air Quality Progress Report for South Cambridgeshire District Council (*April 2011) have been used to inform the following baseline assessment.

8.30 SCDC currently operates three continuous monitoring stations: two roadside stations and one urban background station. None of these monitoring stations are located in the immediate vicinity of the proposed development and therefore will not be representative of pollutant concentrations within the site itself. However, they are located in close proximity to the A14, which is the main pollutant source in the district; data from these stations are therefore considered relevant to the assessment presented herein. All three sites are located within SCDC's AQMA. Recent monitoring results from each of these sites is summarised in table 8.6.

Table 8.6: SCDC's automatic / continuous monitoring data

Location and site description	O.S. grid reference and distance to site	Pollutant	Annual mean concentration (µg/m^3) / number of exceedences			
			2007	2008	2009	2010
Bar Hill Roadside (A14 west)	538685,263760 3.2 km SSW	Annual mean NO_2	34	42	39	30*[2]
		No. exceedences hourly mean (200 µg/m^3)	0	0	0	0
		Annual mean PM_{10}	36	36	33	33
		No. exceedences daily mean (50 µg/m^3)	49	52	48	37
Impington Roadside (A14 east)	543739,261625 6.2 km SSE	Annual mean NO_2	41	35	33	30
		No. exceedences hourly mean (200 µg/m^3)	0	0	0	0
		Annual mean PM_{10}	34	33	41	42
		No. exceedences daily mean (50 µg/m^3)	34	43	55	36
Orchard Park Urban Background	544558,261579 6.6 km SE	Annual mean NO_2	n/a	n/a	16*[1]	28
		No. exceedences hourly mean (200 µg/m^3)	n/a	n/a	0	0
		Annual mean PM_{10}	n/a	n/a	16*[1]	17
		No. exceedences daily mean (50 µg/m^3)	n/a	n/a	0	0

*[1] Adjusted annual means based on short term monitoring data
*[2] Poor level of data capture at Bar Hill in 2010 (72.2%). SCDC has calculated annual mean following guidance in LAQM.TG(09).

8.31 The monitoring results show that concentrations of NO_2 measured at the Bar Hill and Impington sites are generally close to or slightly in exceedence of the annual mean objective level of 40 µg/m^3. However, no exceedences of the hourly mean objective level were recorded at either station between 2007 and

2010. No exceedences of either objective level have been recorded at the Orchard Park since it was commissioned in April 2009.

8.32 With regards to PM_{10}, the monitoring results show that in 2009 and 2010 measured concentrations exceeded the annual mean objective level of 40 $\mu g/m^3$ at the Impington site; concentrations are generally below the objective level at the two remaining monitoring locations. However, the objective for daily (24-hourly) mean PM_{10} (a concentration of 50 $\mu g/m^3$ to be exceeded on no more than 35 days per year) is frequently exceeded at both the Bar Hill and Impington sites. No exceedences of the daily mean objective have been recorded at Orchard Park.

8.33 SCDC also undertakes NO_2 monitoring at 29 locations throughout the district using passive diffusion tubes. None of these diffusion tubes are located in the immediate vicinity of the proposed development site and, therefore, the results obtained from these diffusion tubes will not be representative of air quality at the site. However, they will provide an indication of NO_2 concentrations in the wider area.

8.34 The results for the last four years show that concentrations are below the annual mean objective level at all locations. The nearest diffusion tube to the proposed development is a roadside site located at Crafts Way, Bar Hill, approximately 3.4 km south-south west. Recent results (2008-2010) from this tube indicate that annual mean NO_2 concentrations are typically in the range of 24 $\mu g/m^3$ to 30 $\mu g/m^3$.

8.35 Of the remaining 28 diffusion tube sites, the majority are located within the villages of Histon and Impington and are located between 4 km and 6 km south-south east of the site. A small number of tubes are also located at Orchard Park and Sawston. Of these tubes, 17 are classified as roadside sites; in 2010 measured concentrations ranged from 14.5 $\mu g/m^3$ to 37.6 $\mu g/m^3$, with an average concentration of 27.46 $\mu g/m^3$. Twelve are classified as urban background sites and in 2010 concentrations ranged from 16.5 $\mu g/m^3$ to 32.9 $\mu g/m^3$, with an average concentration of 25.93 $\mu g/m^3$.

Background air quality data

8.36 Estimated background concentrations of those pollutants included in the AQS are available to download from Defra's website (http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html), where concentrations have been estimated for the whole of the UK at a grid resolution of 1x1 km. However, at the request of SCDC, background NO_2 concentrations obtained from Defra's rural monitoring station at Wicken Fen (which is located approximately 15 km east-north east of the site) were used in the air quality assessment. Data from this site are also available to download from http://uk-air.defra.gov.uk/data/.

8.37 Recent monitoring results from the Wicken Fen monitoring station are provided in table 8.7. The results clearly show that concentrations of NO_2 are well below the relevant statutory objective levels.

Table 8.7: Results from the Wicken Fen automatic monitoring station (µg/m^3)						
Site and description	**O.S. grid reference**	**Distance to site**	**Annual mean NO_2 concentration (µg/m^3)**			
			2007	**2008**	**2009**	**2010**
Wicken Fen (Rural)	556313,269184	15 km ENE	10.1	10.5	11.7	11.1

8.38 As monitored background concentrations have remained fairly constant over the last few years, the environmental health officer at SCDC advised that this should also be reflected in the assessment. Therefore, for the purposes of this assessment, the 2009 background NO_2 concentration has been used for all assessment scenarios (2009 concentrations were adopted to correspond with the chosen verification data).

8.39 As the Wicken Fen monitoring station does not measure concentrations of PM_{10}, suitable estimates for this pollutant have been taken from DEFRA's website as discussed above. Estimated concentrations are available for all years between 2008 and 2020. Due to the extent of the study area (which covers 46 of the 1x1 km grid squares), and the relatively small variation observed in the estimated values, it was considered appropriate to use an average background concentration for the purposes of the assessment. The concentration used in the assessment is presented in table 8.8.

8.40 It is important to note that the background maps present both the 'total' estimated background concentrations and the individual contributions from a range of emission sources (for example, motorways, aircraft, domestic heating etc). When detailed modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for 'double-counting'. For this assessment, the A14, which is the main trunk road in the area, has been included in the modelling. Therefore, contributions from this sector have been removed where appropriate. As for NO_2, the 2009 background PM_{10} concentrations have been used for all assessment years and scenarios (to be consistent with the chosen verification year).

Table 8.8: Background PM_{10} concentrations used in the assessment	
Pollutant	**2009 average annual mean concentration (µg/m^3)**
PM_{10}	18.2

Sensitive receptors

8.41 Sensitive locations are those where the public may be exposed to pollutants from the site. These will include locations sensitive to an increase in dust deposition as a result of on site construction activities, or exposure to gaseous pollutants from exhaust emissions from construction site traffic and traffic associated with the proposed development, once it becomes operational.

8.42 Typically, locations that would be considered as having a high sensitivity to dust generated by construction activities would include hospitals and clinics, hi-tech industries, painting and furnishing and food processing operations. Locations that would be considered as having a medium sensitivity would include schools, residential areas and food retailers. With regards to the proposed development, none of the receptors located within the study area are considered to be highly sensitive. The majority of receptors included within the assessment comprise residential properties and schools and are therefore classified as having a medium sensitivity.

8.43 In terms of locations that are sensitive to gaseous pollutants emitted from engine exhausts, these will include places where members of the public will be exposed to pollution over the period of time that they are present, and therefore the most suitable AQS averaging period of the pollutant needs to be used for assessment purposes.

8.44 For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short term standard (i.e. 15 minute mean or 1 hour mean) may be relevant. In a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long term standard (such as 24 hour mean or annual mean) may be more appropriate. In general terms, long term standards are lower than short term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

8.45 To complete the assessment of operational phase impacts, a number of ‘receptors’ were identified at which pollution concentrations were predicted. They include primarily existing locations adjacent or near to the routes that are likely to experience the greatest change in traffic volume as a result of the proposed development. The locations of the existing assessment receptors are shown on figure 8.1 (illustrated as numbered blue circles) and summarised in table 8.9.

Table 8.9: Summary of assessment receptors

Receptor number	Description	O.S. grid reference	
		X	Y
1	95 Rampton Rd, Willingham	540787	269486
2	55 High Street	542353	268125
3	The Old School, Church End	542852	267995
4	95 Rampton Rd, Cottenham	544318	267377
5	32 Oakington Rd, Cottenham	544420	267060
6	1 Westwick Cottages	542100	265244
7	91 Water Lane	541537	264709
8	Oakington C of E Primary School	541307	264513
9	6 Oakington Rd	541078	264265
10	19 Dry Drayton Rd	540986	264136
11	1 Poplar Villas	540217	263541
12	43 Longstanton Rd	540955	264484
13	20 St Michaels (Woodside)	540180	265925
14	The Old School, School Lane	539845	266355
15	Drakes Court, High Street	539584	266796
16	125 High Street	539505	267169
17	Southwell, Station Road	539857	267877
18	Redlands Lodge, Station Road	539847	268184
19	Hazelwell Cottage	538547	264596
20	1 Highfield Farm Cottages	537789	267332
21	6 Ramper Rd	536432	267810
22	26 Boxworth End	536332	267700
23	1 Hill Farm Cottages (A14)	536931	264954
24	Rhadegund Cottages (A14) (AQMA)	538759	263636
25	Hackers Fruit Farm (A14) (AQMA)	539840	262822

8.46 The sensitive receptors summarised above include predominantly residential locations where members of the public will be present for long periods of time. Both the long term (annual mean) and short term (24-hour and 1-hour mean) air quality objectives will therefore be relevant at these locations. However, to assess compliance with the short term objectives, pollutant concentrations have also been predicted at a number of locations where exposure of the public will be more limited (e.g. roadside sites / bus stops / public spaces etc). The locations of these receptors are also illustrated on figure 8.1 (illustrated as numbered green circles).

8.47 Due to its nature, the proposed development will introduce new sensitive receptors into the area. Pollutant concentrations have therefore been predicted at a number of locations within the site boundary to indicate the likely exposure of future occupants. These receptors are again illustrated on figure 8.1 and are identified as D1 to D8.

8.48 Finally, to specifically assess the impact of the development on the AQMA, concentrations have also been predicted at 20 m intervals along two transects north and south of the A14 (between the Bar Hill and Dry Drayton interchanges) up to a maximum distance of 300 m from the kerb.

Future baseline

8.49 Road traffic using the local road network will continue to contribute to local pollutant concentrations. The results of the dispersion modelling indicate that in the 2015 and 2021 future baseline scenarios concentrations of NO_2 and PM_{10} will be reduced from the 2011 baseline at all locations considered. Furthermore, concentrations are predicted to meet the relevant AQS objective levels at all applicable receptors considered in the assessment.

Effects during construction

Generation of dust during on site construction activities

8.50 The exact scope of works required during the construction phase and the precise timescales / phasing over which activities will take place is not yet known. Whilst a provisional phasing sequence has been prepared to indicate how preparation and development of the site is likely to be programmed (see below), the details will be confirmed prior to the commencement of works by the appointed contractor. However, it is anticipated that the main sources of dust during construction will include:

- Site clearance and preparation (including installation of site fencing, screening and scaffolding, site offices, construction compound etc) and demolition of existing buildings
- Significant earthworks and land forming (to raise the site levels to create a sufficient building platform so as to minimise the risk of flooding)
- Preparation and use of site access / egress and site haulage routes and the movement of vehicles and construction traffic / plant within the site (particularly when transporting the associated excavation and fill material around the primary development site and between the primary development site and the Hatton's Road attenuation ponds)
- Excavation of ground materials (to allow for construction of building foundations etc)
- Materials handling, storage, stockpiling, spillage and disposal (including re-suspension of dust during strong winds)
- On site material mixing / concrete batching (where required)
- Construction and fabrication processes (i.e. construction of proposed buildings, hardstanding surfaces, pedestrian footpaths, associated roads, infrastructure and utilities, including cutting, shaping and machining of materials)
- Internal and external finishing
- Site restoration and landscaping following completion

8.51 It is anticipated that the proposed residential units will be constructed over a period of eight years, with the anticipated build out rate as summarised in table 8.10.

Table 8.10: Project development build-out rate	
Year	**Number of units**
2014	100
2015	175
2016	275
2017	360
2018	350
2019	160
2020	60
2021	20

8.52 In order to achieve this build out rate, an estimated construction phasing programme has been prepared. A brief summary is provided in table 8.11. Further details are provided in chapter 2.

Table 8.11: Estimated phasing programme for Northstowe phase 1	
Phase / year	**Brief description of works**
Phase 1-1 (Year 1-3)	Main earthworks for the northern half of the site commence to form platform levels, attenuation pond and greenway. Archaeological investigations. Establishment of sports hub and allotment area. Provision of dedicated construction route through the site and a main construction compound in the northwest area. Commencement of on site infrastructure and utilities. Construction of first houses in western part of site.
Phase 1-2 (Year 2-4)	Continuation of earthworks for attenuation pond and main earthworks for southern half of the site commence to raise land platform. Strategic landscaping to a number of areas including the pond, greenways, sports hub and buffer on western edge of site. Continuing infrastructure and utilities works. Construction of school, sports hub building, local centre and community centre commence. Ongoing construction of initial residential parcels and commencement of construction of houses in south / south western part of site. Employment land released as required.
Phase 1-3 (Year 3-4)	Main earthworks complete. Ongoing strategic landscaping. Ongoing infrastructure and utilities works. Ongoing construction of houses, community / local centres and employment area. Construction of residential parcels in east / south east commences. Employment land released as required.
Phase 1-4 (Year 4-6)	Ongoing strategic landscaping to all areas. Ongoing construction of residential parcels and commencement of final houses in northern part of site. Ongoing infrastructure and utilities works. Employment land released as required.
Phase 1-5 (Year 5-8)	Construction of residential areas etc continuing as necessary. Ongoing infrastructure and utilities works. Employment land released as required, unless already completed.

8.53 The majority of the releases are likely to occur during the 'working-week'. Whilst the exact program for the construction phase has yet to be confirmed, the following working hours are anticipated for this phase of works:

- Monday to Friday 07:30 to 18:00
- Saturday 08:00 to 13:00

- No activities to take place on Sundays or Bank Holidays unless prior agreement is sought with the local planning authority

8.54 However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities), in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

8.55 Depending on wind speed and turbulence, it is likely that the majority of dust will be deposited in the area immediately surrounding the source. The effect on nearby sensitive receptors will therefore largely depend on their proximity to the source and the magnitude of change experienced. Properties / receptors most at risk from an increase in dust deposition will typically include receptors located within 200 m of the source (i.e. the dust generating activity); however, for the purposes of the assessment consideration has been given to an overall radius of 200 m from the site boundary.

8.56 A contour plot showing those receptors located within 200 m of the site (both the primary development site and the Hatton's Road attenuation ponds) is provided in figure 8.2.

8.57 With regards to the primary development site, the key sensitive receptors include predominantly residential properties located in Longstanton to the south and south west of the site (notably those properties located off High Street, Lady Walk, Prentice Close, Thornhill Place and Magdalene Close). There is also a school located immediately to the south-south west of the site (off Thornhill Place). Aside from a few isolated properties, there are currently few existing sensitive receptors located to the north, north east, east, south east or north west of the site. With regard to the Hatton's Road attenuation ponds, there are currently very few receptors located in the immediate vicinity and the key sensitive receptors will include those isolated properties located off Hatton's Road.

8.58 The wind rose in technical appendix E4 indicates that the prevailing wind direction is from the south west, with a smaller contribution from the south and south-south east. Therefore, properties located to the north east of the site are most likely to be affected by emissions from the site, although properties located to the north and north-north west may also experience increased risk under certain meteorological conditions. As shown in figure 8.1, there are essentially no significant receptors located to the north east and only a small number of isolated receptors located to the north and north-north east.

8.59 Given the size and nature of the development, the timescales over which it will be implemented and the provisional phasing programme (see table 8.11 above) the receptors likely to be affected during the construction phase will vary depending on the nature and location of activities taking place within the site. It is unlikely that the properties illustrated on figure 8.1 and described above will be affected by emissions of dust or suffer sustained nuisance for the duration of the construction phase.

8.60 It is considered that the most significant dust generating activities will occur during the initial earthworks and land forming works, which will take place during the first two phases of construction (year 1 to year 4), with the works in the northern half of the site being undertaken first (year 1-2) and the lower half of the site second (year 2-4).

8.61 As no buildings or residential properties, other than the sports building, are proposed within the south western part of the site (which borders the village of Longstanton), once the bulk of the earthworks and landscaping in this area is completed (anticipated to be sometime during phase 1-2; year 2-4) the allotments and sports pitches will create a reasonable buffer between existing receptors in Longstanton and the on-going construction activities in the wider site, which will help to reduce the potential for dust nuisance in the latter stages of the construction phase.

8.62 Finally, it is assumed that some parts of the site will be occupied prior to completion of the entire site; consequently, there is the potential for these proposed sensitive receptors to be affected by nuisance dust emissions generated by on-going construction activities in the wider site.

8.63 The sensitivity of the receptors to emissions of dust is generally considered to be medium and the magnitude of change, prior to mitigation, is likely to range from medium to large. By consideration of the factors described above, the degree of effect of nuisance dust would therefore be temporary (for the duration of the construction phase), short to medium term, local and substantial adverse. According to the assessment criteria, this is considered to be a significant effect.

Generation of PM_{10} during on site construction activities

8.64 The smaller particles of dust (typically less than 10 μm in aerodynamic diameter) are known as PM_{10} and represent only a small proportion of total dust released. The sources of PM_{10} will be similar to those described above for dust (see paragraph 8.92). However, as these particles are at the smaller end of the size range of dust particles, they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area.

8.65 As discussed previously, PM_{10} is small enough to be drawn into the lungs during breathing. In sensitive members of the public this could cause an adverse health reaction. As a result of this potential effect on health, standards and objectives for PM_{10} are defined in the AQS and Regulations.

8.66 The sensitivity of the [human] receptors to elevated concentrations of PM_{10} is considered to be high and the magnitude of change, prior to mitigation, is likely to be medium. By consideration of the factors described above, the degree of effect of elevated PM_{10} concentrations will be temporary (for the duration of the construction phase), short to medium term, local in effect and substantial adverse In accordance with the assessment criteria, this is considered to be a significant effect.

Emissions of NO_2 and PM_{10} arising from construction traffic and plant

8.67 During the construction phase, there will be a requirement to deliver materials and equipment to and from the site and to transfer fill materials between the primary development site and the Hatton's Road attenuation ponds to the south. In addition, further traffic movements will be generated by construction staff travelling to and from the site each day.

8.68 As previously discussed, exhaust emissions associated with construction traffic will contribute to local pollutant concentrations in the area (and most notably to concentrations of NO_x, NO_2 and PM_{10}). The greatest potential for effects on air quality from traffic associated with the construction phase will be in the areas immediately adjacent to the principal means of site access.

8.69 It is anticipated that traffic will primarily travel to the site via the A14 Bar Hill interchange, along the B1050 Hatton's Road and the western bypass to the site access off the B1050 north of Longstanton. A dedicated construction route will be established within the site itself (which will follow the route of the proposed primary roads) and will connect directly onto the B1050 at the western end of the site.

8.70 At the time of writing, detailed information regarding the level of construction traffic was not available. However, initial estimates indicated that on a typical construction day approximately 45 HGVs will be generated on the road network; of which approximately 70% will travel on the A14 (west) and 30% on the A14 (east). It is anticipated that all associated movements will occur outside of the peak periods.

8.71 Receptors located along the B1050 Hatton's Road and the A14 are therefore most likely to be affected by emissions from construction traffic. As illustrated in figure 8.1, there are only a small number of residential properties located adjacent to the relevant sections of the B1050, Hatton's Road and the A14. Routing construction traffic along the western bypass will avoid the need for the construction traffic to travel through Longstanton village itself.

8.72 The nature of the traffic and the periods over which the increases may occur are considered to be temporary, localised and short to medium term in duration. Furthermore, compared to the existing daily traffic flows on relevant road links, the magnitude of change as a result of construction traffic is likely to be negligible.

8.73 With regards to construction plant, it is anticipated that typical plant and equipment will be employed during the construction phase. This is likely to include excavators, dumper trucks, hydraulic breakers, concrete batching plant and haulage trucks.

8.74 The main construction compound and delivery holding area will be provided in the north western corner of the site (in the proposed employment area), slightly away from the main entrance. Whilst there are a small number of existing receptors located to the west of the site off Station Road, locating the

compound and delivery area in this part of the site will help to maintain a distance between the compound and the majority of the existing receptors in the village of Longstanton.

8.75 The sensitivity of the receptors is high and the magnitude of change, prior to mitigation, is likely to be negligible. Therefore the degree of effect will be temporary (for the duration of the construction phase), short to medium term, local in effect and slight adverse. In accordance with the assessment criteria, this is considered to be an insignificant effect.

Effects post-construction

Emissions of NO_2 and PM_{10} arising from road traffic generated by the proposed development post-construction

8.76 Full results of the dispersion modelling are provided in technical appendix E6. The results show that the proposed development will cause a very small increase in pollutant concentrations at the majority of sensitive receptors included in the assessment, and either no discernible change or a very slight reduction in concentrations at a small number of receptors. The concentrations predicted for future years, either with or without the proposed development, are all below those predicted for the 2011 baseline scenario. This is due to an expected future improvement in vehicle emissions as a result of improved vehicle technologies.

8.77 According to the Environmental Protection UK (EPUK) criteria used in the assessment, the effect of the proposed development is considered to be negligible to neutral for both NO_2 and PM_{10}. Air quality would therefore be considered a 'low priority consideration' in the planning decision.

Annual mean NO_2 concentrations

8.78 The objective for annual mean NO_2 concentrations is 40 $\mu g/m^3$, to be achieved by the end of 2005 and every year thereafter. The results of the assessment indicate that in the baseline year of 2011, exceedences of this objective may occur at a small number of locations. Of the 25 existing long term receptors included in the assessment, exceedences were predicted at two locations; at receptor 23, 1 Hill Farm Cottages, a concentration of 45.45 $\mu g/m^3$ was predicted, and at receptor 25, Hackers Fruit Farm, a concentration of 40.14 $\mu g/m^3$ was predicted. Both of these receptors are located adjacent to the A14 and lie close to or within the AQMA that has been declared for this pollutant. Concentrations at the remaining receptors are predicted to range from 12.69 $\mu g/m^3$ to 38.59 $\mu g/m^3$.

8.79 As discussed, this agrees with the findings of SCDC's review and assessment work as the council has declared an AQMA for this pollutant.

8.80 By 2015, the anticipated initial opening year of the proposed development, predicted concentrations at all of the receptors both with and without the

proposed development in operation are reduced from the 2011 baseline case. Furthermore, concentrations are predicted to meet the annual mean objective level at all 25 of the relevant existing sensitive receptors considered in the assessment. The highest concentrations are predicted at receptor 23, 1 Hill Farm Cottages, which is located adjacent to the A14, and are 33.99 $\mu g/m^3$ in the future baseline scenario and 34.03 $\mu g/m^3$ in the with development scenario.

8.81 The proposed development will alter the level and distribution of traffic on the local road network. The results of the assessment indicate that the changes associated with the initial stages of the development becoming operational will result in (according to the EPUK assessment criteria summarised in table 8.3) an imperceptible increase of between 0.01 $\mu g/m^3$ and 0.10 $\mu g/m^3$ at 13 of the 25 existing long term sensitive receptors (notably receptors 1-4, 14-16 and 19-23 and 25), an imperceptible decrease of between -0.01 $\mu g/m^3$ and -0.03 $\mu g/m^3$ at eight of the receptors (notably receptors 5-9, 17-18 and 24) and no discernible change at the four remaining receptors (receptors 10-13).

8.82 In the completion year of 2021, annual mean NO_2 concentrations are predicted to meet the objective level at all locations considered. The highest concentrations are again predicted at receptor 23, 1 Hill Farm Cottages and are 21.50 $\mu g/m^3$ in the future baseline scenario and 21.53 $\mu g/m^3$ in the with development scenario.

8.83 In 2021, the development is predicted to cause an imperceptible increase of between 0.01 $\mu g/m^3$ and 0.12 $\mu g/m^3$ at 14 of the 25 existing long term sensitive receptors (receptors 1-4, 14-16, and 19 to 25), an imperceptible decrease of between -0.01 $\mu g/m^3$ and -0.03 $\mu g/m^3$ at nine of the existing receptors (receptors 5-11 and 17-18) and no discernible change in concentrations at the two remaining receptors (receptors 12 and 13).

8.84 As part of the assessment, pollutant concentrations were also predicted within the proposed development site itself to indicate the likely exposure of future occupants to potentially poor air quality. The results of the modelling indicate that in both assessment years (2015 and 2021) predicted annual mean NO_2 concentrations are likely to be well below the relevant statutory objective level. In 2015 predicted concentrations within the site range from 12.01 $\mu g/m^3$ to 13.33 $\mu g/m^3$; in 2021 they range from 11.83 $\mu g/m^3$ to 12.48 $\mu g/m^3$.

8.85 Taking into account the EPUK assessment criteria summarised in table 8.3, at those receptors where an 'imperceptible' change in concentrations is predicted the effect of the proposed development on concentrations of annual mean NO_2 is considered to be direct, long term, permanent, negligible and not significant. At those receptors where no change in concentrations is predicted the effect of the development will be neutral and not significant.

8.86 SCDC has declared an AQMA along a stretch of the A14 due to predicted exceedences of the objective for annual mean NO_2 concentrations. As part of the assessment, concentrations were also predicted at approximately 20 m intervals from the kerbside north and south of the A14 to indicate the potential

impact of the development on the AQMA. Full results of the modelling are provided in technical appendix E6. They indicate that in 2015 and 2021 concentrations of annual mean NO_2 are likely to be below the objective level along each of the transects, although in 2015 concentrations are predicted to be close to the objective immediately adjacent to the road. Furthermore, in 2015, the modelling indicates that the changes in traffic flows resulting from the development would have a neutral or negligible (but positive) effect on NO_2 concentrations. In 2021, the development is predicted to cause a negligible increase in concentrations (between 0.01 $\mu g/m^3$ and 0.16 $\mu g/m^3$) at all locations, with the greatest effect predicted within the first 20 m from the kerb. These changes will not be significant.

Hourly mean NO_2 concentrations

8.87 In all assessment scenarios considered, and at all of the existing and proposed sensitive receptors, the annual mean NO_2 concentrations predicted by the model are below 60 $\mu g/m^3$. It can therefore be assumed that exceedences of the hourly mean objective are unlikely to occur at these locations.

Annual mean PM_{10} concentrations

8.88 The objective for annual mean PM_{10} concentrations is a concentration of 40 $\mu g/m^3$, to be achieved by the end of 2004 and every year thereafter. The results of the assessment show that in the 2011 baseline scenario, concentrations are predicted to meet the objective at all of the relevant existing sensitive receptors considered. The highest predicted concentration is 31.17 $\mu g/m^3$ at receptor 23, 1 Hill Farm Cottages. Concentrations at the remaining long term existing sensitive receptors are predicted to range from 18.77 $\mu g/m^3$ to 29.32 $\mu g/m^3$.

8.89 These results agree with the review and assessment work undertaken by SCDC, which concluded that no AQMAs need to be declared for this pollutant at the current time.

8.90 By 2015, predicted concentrations at all of the existing long term receptors are reduced from the 2011 baseline scenario, both with and without the proposed development. The highest concentrations are again predicted at receptor 23, 1 Hill Farm Cottages, and are 26.85 $\mu g/m^3$ in the future baseline scenario and 26.86 $\mu g/m^3$ in the with development scenario.

8.91 The proposed development is predicted to cause an imperceptible increase (of between 0.01 $\mu g/m^3$ and 0.20 $\mu g/m^3$) in PM_{10} concentrations at 16 of the 25 existing receptor locations considered (i.e. receptors 1-4, 11, 14-23 and 25), with the greatest impact (0.20 $\mu g/m^3$) predicted at receptor 19, Hazelwell Cottage. The development is also predicted to cause an imperceptible decrease in concentrations (of between -0.01 $\mu g/m^3$ and -0.04 $\mu g/m^3$) at seven receptors (notably receptors 5-10 and 24) and no discernible change at the one remaining receptor (receptor 13).

8.92 In the completion year of 2021, the highest concentrations are again predicted at receptor 23, 1 Hill Farm Cottages and are 24.20 $\mu g/m^3$ in the future baseline scenario and 24.22 $\mu g/m^3$ in the with development scenario.

8.93 In 2021, the development is predicted to cause an imperceptible increase of between 0.01 $\mu g/m^3$ and 0.18 $\mu g/m^3$ at 16 of the 25 existing long term sensitive receptors, an imperceptible decrease of between -0.02 $\mu g/m^3$ and -0.04 $\mu g/m^3$ at seven of the existing receptors and no discernible change in concentrations at the two remaining receptors.

According to the assessment criteria summarised in table 8.3, at those receptors where an imperceptible increase or decrease in concentrations is predicted the effect of the proposed development on concentrations of annual mean PM_{10} is considered to be direct, long term, permanent, negligible and not significant. At those receptors where no change in concentrations are predicted the effect of the development is considered to be neutral and not significant.

24 hour mean PM_{10} concentrations

8.94 The objective for 24-hourly mean PM_{10} concentrations is 50 $\mu g/m^3$, to be exceeded no more than 35 times a year by the end of 2004 and every year thereafter. The results of the detailed modelling indicate that this objective will be met in all assessment scenarios and at all relevant locations considered.

8.95 In the baseline year of 2011 the maximum number of days on which exceedences of this level occur at a relevant receptor is 32 days, which is predicted at receptor 23, 1 Hill Farm Cottages (adjacent to the A14). The two other sensitive receptors close to the A14 (receptors 24 and 25) are also predicted to experience a relatively high number of days of exceedences; 23 and 25 days respectively, although these values are below the objective level. At all remaining receptors, the number of days on which exceedences of 50 $\mu g/m^3$ are predicted ranges from two to seven days.

8.96 In 2015, the maximum number of days reduces to 17 days in both the with and without development scenarios. The proposed development is not predicted to cause any additional exceedences of the objective at a relevant receptor.

8.97 In 2021, the maximum number of days reduces to 11 days in both the with and without development scenarios. Again, the development is not predicted to cause any additional exceedences of the objective at a relevant receptor.

8.98 No exceedences of the 24 hour objective are predicted at the receptor locations considered within the proposed development in either assessment year (2015 or 2021).

8.99 According to the assessment criteria summarised in table 8.4, the effect of the proposed development on 24-hourly mean PM_{10} concentrations is considered to be direct, long term, permanent, neutral and not significant.

8.100 As the current AQMA has also been designated due to exceedences of the objective for 24-hourly PM_{10} concentrations, PM_{10} concentrations were also modelled along the two transects north and south of the A14. The results indicate that in 2015 the maximum number of days on which exceedences of 50 $\mu g/m^3$ are predicted to occur is 25 days (both with and without the development), which is well below the objective level of 35 days. In 2021, the maximum number of days is reduced to 14 (both with and without the development), which is again well below the objective level of 35 days. Furthermore, the proposed development is not predicted to cause any additional days of exceedence.

Mitigation

Construction phase

Generation of dust during on site construction activities

8.101 A Construction Management Strategy (CMS) has been prepared for the site that outlines the overall strategies, standards, best practice techniques and procedures that will be adopted throughout the construction process. The standards and procedures outlined in the CMS will be periodically reviewed and updated as the development progresses. In addition, a series of more detailed Construction Environmental Management Plans (CEMPs) will be prepared for different aspects of the site to be brought forward by the various contractors and house builders involved in the development. The scope and content of each CEMP will be agreed with SCDC and will adhere to the framework outlined in the CMS.

8.102 The CMS and CEMPs will outline a number of mitigation measures that will help to minimise the level of dust generated by on site activities, thereby reducing the potential for dust deposition in the surrounding area. The mitigation measures will include:

- Use of appropriately designed vehicles for materials handling
- Where appropriate, screening of earthworks and perimeter landscaping should be completed to provide a physical barrier between the site and the surroundings
- Surfaced and un-surfaced site access roads should be watered as necessary using a water bowser and surfaces kept in order
- Vehicles should be kept clean through the use of wheel washers as appropriate, particularly on departure from the site onto the public highway
- Vehicles carrying loose aggregate, fill materials or contaminated materials to and from the site should be sheeted at all times
- Vehicles travelling on un-made haul routes should travel at low speeds to minimise dust re-suspension and dispersion
- Regular inspection of local highways and site boundaries to check for dust deposits (evident by soiling and marking) on vegetation, cars and other objects, taking remedial measures where necessary. Inspections

will be carried out on a daily basis, during the working week, or more frequently depending on the nature of the activity being undertaken
- On site aggregate handling should be carried out in enclosed areas and transfer should be completed in a way that minimises the requirements to deposit materials from height
- When loading materials into vehicles or using transfer chutes and skips, drop heights should be kept to a minimum and enclosed wherever possible
- On site cement and concrete batching (if required) should be undertaken in enclosed areas, with suitable water dowsing and wind shielding measures applied as appropriate
- Observation of wind speed and direction prior to conducting dust-generating activities to determine the potential for dust nuisance to occur, avoiding potentially dust-generating activities during periods when wind direction may carry dust into sensitive areas and avoiding dust-generating operations during periods of high or gusty winds;
- Where possible, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of prevailing wind directions and seasonal variations in the prevailing wind
- Surface areas of stockpiles should be minimised where possible (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce the area of surfaces exposed to wind pick-up
- Stockpiles of materials should also be covered or screened, as appropriate, especially during the day when wind speeds are moderate (>20 kph) and when the site is closed to reduce the potential for wind pick-up and dispersion of dust
- Dampening of exposed soils and stockpile materials to be carried out as and when appropriate, using hoses and / or sprinklers. If longer term exposure is anticipated then these areas should be re-vegetated
- Windbreak netting should be positioned around materials stockpiles and vehicle loading / unloading areas, as well as exposed excavation and material handling operations, where appropriate
- Completed earthworks to be covered or vegetated as soon as is practicable
- Use of dust-suppressed tools for all operations
- No unauthorised burning of any material anywhere on site

8.103 It is recommended that liaison with the local authority be maintained throughout the demolition and earthworks and remediation process.

8.104 If at any time during the construction process an incident leads to excessive depositions of dust at residential locations then this should be reported to the Environmental Health Department at SCDC. Any complaints that are received from local residents should be documented in a diary or log which should be kept on site by the Site Manager. A nominated member of the construction team (e.g. the Site Manager) should act as a point of contact for local residents who may be concerned about elevated dust concentrations; the contact details for this member of staff should be passed to the local authority prior to the commencement of the construction phase.

Generation of PM_{10} during on site construction activities

8.105 The mitigation measures described for dust above (paragraphs 8.143-8.146) will also be applicable to emissions of PM_{10}.

Emissions of NO_2 and PM_{10} arising from construction traffic and plant

8.106 To minimise any effect of exhaust emissions associated with construction traffic and plant, the following measures should be implemented:

- Identified routes for all construction traffic will be agreed with SCDC and CCC prior to commencement of works. This will reduce the likelihood that construction vehicles will pass along sensitive roads (i.e. residential roads, congested roads, via unsuitable junctions)
- Large-scale vehicle movements to be timed to avoid peak hours on the local road network as far as reasonably practicable
- All plant and equipment to be maintained in good working order and not left running when not in use
- On site movements should be restricted to well within the site and not near the perimeter or existing sensitive receptors, wherever possible
- If possible, plant should also be located well within the site, away from the site perimeter and existing sensitive locations

Post-construction

Emissions of NO_2 and PM_{10} arising from road traffic generated by the proposed development once it becomes operational

8.107 The results of the assessment indicate that the changes to traffic flows and traffic distribution resulting from the operation of the proposed development will only result in small changes to local pollutant concentrations. However, to help minimise any adverse effects a range of mitigation measures should be implemented as part of the development. These will include, predominantly, the promotion of more sustainable modes of transport and reducing the need to travel, particularly by [single-occupancy] private car.

8.108 In support of the application for the proposed development a range of framework travel plans (i.e. a residential framework travel plan, a workplace travel plan and a school travel plan) have been developed that outline the key transport measures and strategies that will be implemented as part of the various aspects of the development. Many of the proposed measures will be common across the suite of travel plans. Taking into consideration the residential framework travel plan, the following list is an example of the measures that will be implemented at the site. It should be noted that whilst currently these measures relate to delivering phase 1 of Northstowe, it is anticipated that they can be built upon to support any future development phases.

- Promotion of available transport options through the provision of marketing material, a travel plan information board on site,

knowledgeable residential sales staff (including the appointment of a settlement travel plan co-ordinator) and two sustainable travel events a year for the first five years following the occupation of 250 dwellings
- Creation of a dedicated website for Northstowe residents that provides up to date travel information, including details of transport routes, walking and cycling maps etc
- Provision of resident 'Sustainable Travel Information Welcome Packs' that will include a summary of all travel options and local (including routes maps and timetables), loyalty / discount cards, details of taxi firms, details of local cycle groups etc
- A travel advisor to visit each resident within the first three months of occupation to help with personal travel planning
- Promotion of the benefits of walking and cycling and the facilities that are available within Northstowe itself
- Implementation of specific measures to promote efficient car use, including car sharing, adoption of set car parking standards within the site and car clubs

8.109 In addition, a Low Emission Strategy (LES) has been prepared that provides a mechanism for adopting the transport measures (for all aspects of the development) that will subsequently reduce the impact of transport related emissions on local air quality and public health (for both the construction and post-construction phases). The LES has been prepared in accordance with the latest *Low Emission Strategy Guidance* published by DEFRA (January, 2010) and SCDC's District Design Guide Supplementary Planning Document (Appendix 4 Air Quality: Supplementary Design Guide) (March 2010), and also takes into account the aforementioned travel plans as appropriate. The LES aims to include measures to 'encourage, educate and advise' residents on low emission standards for private vehicles and encourage low emission choices when travelling. The measures within LES should be agreed with SCDC prior to commencement of the development. Some of the key measures proposed include:

- Contributions to the local air quality monitoring data through the provision of new monitoring locations in and around the development (for example, through the use of passive diffusion tubes), the locations of which would be agreed in advance with SCDC
- Supporting local authority air quality initiatives that will have a benefit on future residents, visitors and employees within the proposed development
- Provision of supporting infrastructure for future electric charging bays and low emission fuelling points
- Provision of car clubs
- Personal travel planning (promoting low carbon travel to all site users)
- Allocated parking spaces for car clubs and / or low emissions vehicles
- Low emission incentives and mechanisms in liaison and possible partnership with proposed retail outlets
- Management charge incentives for employment-based development, based on Euro standards and VED emissions bands

- Improvements to public transport and / or incentives for the use of public transport

8.110 The success and implementation of the measures proposed within the LES (and the development travel plans) will be monitored during the construction and initial occupation years, currently envisaged to be 2014 to 2021. Thereafter, monitoring and reviews will be at intervals agreed with SCDC. The results of any air quality monitoring will be fed back to SCDC on a regular basis and will allow the local authority to implement any further monitoring or actions as necessary.

8.111 These measures will ensure that there will be no significant residual effects on air quality post-construction.

Residual effects

Construction

Generation of dust during on site construction activities

8.112 The sensitivity of the receptors (i.e. predominantly residential properties within a radius of 200 m) remains medium and the magnitude of change, following mitigation, is likely to be low to medium. The degree of effect is therefore likely to be direct, temporary (for the duration of the construction phase), short to medium term, local and moderate (adverse). In accordance with the assessment criteria, this is considered to be a significant effect.

Generation of PM_{10} during on site construction activities

8.113 The sensitivity of the receptors to elevated concentrations of PM_{10} is considered to be high and the magnitude of change, following mitigation, is likely to be medium. By consideration of the factors described above the degree of effect of elevated PM_{10} concentrations is considered to be temporary (for the duration of the construction phase), short to medium term, local in effect and moderate (adverse). In accordance with the assessment criteria this is considered to be a significant effect.

Emissions of NO_2 and PM_{10} arising from construction traffic and plant

8.114 The sensitivity of the receptors remains high and the magnitude of change following mitigation is likely to remain negligible; the degree of effect is therefore considered to be temporary, short to medium term, local and negligible. In accordance with the assessment criteria this is considered to be an insignificant effect.

Post-construction

Emissions of NO_2 and PM_{10} arising from road traffic generated by the proposed development once it becomes operational

8.115 The proposed development is predicted to cause a small increase in NO_2 and PM_{10} concentrations at the majority of receptors considered. These increases will be reduced by the implementation of the mitigation measures described above.

8.116 In the future assessment years concentrations of both NO_2 and PM_{10} are predicted to meet the statutory objective levels both with and without the development.

8.117 The sensitivity of the receptors to changes in air pollutant concentrations is high and the modelling results indicate that for all pollutants considered (i.e. annual mean NO_2, annual mean PM_{10}, hourly-mean NO_2 and 24-hourly mean PM_{10}) the proposed development will have a negligible to neutral effect (at all relevant receptors). Consequently, the residual effect is considered to be permanent, long term, direct, negligible to neutral and not significant.

Table 8.12: Significant residual effects

Topic	Significant residual effect	Sensitivity of receptor	Magnitude of change	Duration	Nature	Degree of effect	Level of certainty
Air quality	Generation of dust during on site construction activities	Medium	Medium to large	Short to medium term	Adverse	Moderate	Reasonable
	Generation of PM_{10} during on site construction activities	High	Medium	Short to medium term	Adverse	Moderate	Reasonable