



**Land at Mondelez,
Southam Road,
Banbury**
Air Quality Assessment

On behalf of



Project Ref: 26004/3001 | Rev: Issued | Date: April 2015

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Executive Summary

An air quality assessment has been undertaken for the proposed development of a new Waitrose convenience store together with car parking and access arrangements. During demolition and construction, the main impacts will be fugitive dust generation. An assessment of the risk of dust impacts indicates that the development is a low risk site. Mitigation measures to be incorporated within a Construction Environmental Management Plan will mean that construction phase effects are not significant.

The proposed development is located approximately 470m to the north of an Air Quality Management Area declared for exceedances of the annual average nitrogen dioxide objective. Atmospheric dispersion modelling has been used to assess the impact of development traffic on pollutant concentrations within the AQMA. The impact on nitrogen dioxide and particulates (PM₁₀) concentrations are predicted to be negligible at all receptors and the overall effect of the development is therefore judged to be insignificant.

1 Introduction

1.1 Proposed Development

- 1.1.1 Barwood Capital and Mondelez International have commissioned Peter Brett Associates LLP (PBA) to undertake an air quality assessment for the proposed development Land at Mondelez International, South Road, Banbury.
- 1.1.2 The development consists of the construction of a new convenience store with car parking and access arrangements. The proposed development site is located within the boundaries of Cherwell District Council.

1.2 Scope

- 1.2.1 This report describes existing air quality in proximity to the site and the likely impact of traffic associated with the development. The main air pollutants of concern relating road traffic emissions are nitrogen dioxide and fine particulate matter PM₁₀.
- 1.2.2 The assessment has been prepared taking into account all relevant local and national guidance and regulations.

2 Legislation and Policy

2.1 The Air Quality Strategy

- 2.1.1 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK. The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.
- 2.1.2 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM). This requires local authorities to regularly and systematically review and assess air quality within their boundary, and appraise development and transport plans against these assessments. The relevant NAQOs for LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) (England) Regulations 2002.
- 2.1.3 Where an objective is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.
- 2.1.4 The Local Air Quality Management Technical Guidance 2009 (LAQM.TG(09))¹ issued by the Department for Environment, Food and Rural Affairs (Defra) for Local Authorities provides advice as to where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM₁₀) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure.

2.2 EU Limit Values

- 2.2.1 The Air Quality Standards Regulations 2010 implements the European Union's Directive on ambient air quality and cleaner air for Europe (2008/50/EC), and includes limit values for NO₂. These limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with. The compliance date for the NO₂ EU Limit Value was 1 January 2010, five years later than the date for the NAQO.
- 2.2.2 Directive 2008/50/EC consolidated the previous framework directive on ambient air quality assessment and management and its first three daughter directives. The limit values remained unchanged, but it now allows Member States a time extension for compliance, subject to European Commission (EC) approval.
- 2.2.3 The UK has a time extension for compliance of the daily PM₁₀ limit value in London until the end of 2011. Despite many areas of the UK not being compliant with the annual average NO₂ limit value, the UK has decided not to seek an extension to the compliance date for this pollutant. This was on the basis that it could not be guaranteed that the UK would be compliant by the latest date allowable under the Directive (1 January 2015).
- 2.2.4 The Directive limit values are applicable at all locations except:
- Where members of the public do not have access and there is no fixed habitation;
 - On factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and

¹ Defra, 2009, Local Air Quality Management Technical Guidance LAQM.TG(09).

- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

Assessment Criteria

- 2.2.5 The NAQOs for NO₂ and PM₁₀ set out in the Air Quality Regulations (England) 2000 and the Air Quality (England) (Amendment) Regulations 2002, are shown in **Table 2.1**.

Table 2.1: Nitrogen Dioxide and PM₁₀ Objectives

Pollutant	Time Period	Objective
Nitrogen dioxide (NO ₂)	1-hour mean	200µg/m ³ not to be exceeded more than 18 times a year
	Annual mean	40µg/m ³
Particulate matter (PM ₁₀)	24-hour mean	50µg/m ³ not to be exceeded more than 35 times a year
	Annual mean	40µg/m ³

- 2.2.6 The objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Analysis of long term monitoring data suggests that if the annual mean nitrogen dioxide concentration is less than 60µg/m³ then the one-hour mean nitrogen dioxide objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved².

2.3 Planning Policy

National Policy

- 2.3.1 The National Planning Policy Framework (NPPF) was published in March 2012. This sets out the Government's planning policies for England and how they are expected to be applied. In relation to conserving and enhancing the natural environment, paragraph 109 states that:

"The planning system should contribute to and enhance the natural and local environment by.... preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."

- 2.3.2 Paragraph 124, also states that:

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

- 2.3.3 Paragraph 203 goes on to say:

"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."

² Defra, 2009. Local Air Quality Management Technical Guidance LAQM.TG(09).

National Planning Practice Guidance (NPPG)

- 2.3.4 NPPG was published and updated in March 2014 to support the NPPF. Section 1 of the NPPG provides a summary as to why air quality is a consideration for planning:

“...Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit....The local air quality management (LAQM) regime requires every district and unitary authority to regularly review and assess air quality in their area. These reviews identify whether national objectives have been, or will be, achieved at relevant locations, by an applicable date....If national objectives are not met, or at risk of not being met, the local authority concerned must declare an air quality management area and prepare an air quality action plan.....Air quality can also affect biodiversity and may therefore impact on our international obligations under the Habitats Directive.....Odour and dust can also be a planning concern, for example, because of the effect on local amenity.”

- 2.3.5 Section 2 of the NPPG concerns the role of Local Plans with regard to air quality:

“...Drawing on the review of air quality carried out for the local air quality management regime, the Local Plan may need to consider:

- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments;*
- *the impact of point sources of air pollution...; and*
- *ways in which new development would be appropriate in locations where air quality is or likely to be a concern and not give rise to unacceptable risks from pollution. This could be through, for example, identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable.”*

- 2.3.6 Section 5 of the NPPG identifies when air quality could be relevant for a planning decision:

“...When deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

- *Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area;*
- *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.*

- Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.

Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites.”

2.3.7 Section 7 of the NPPG provides guidance on how detailed an assessment needs to be:

“Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific.”

2.3.8 Section 8 of the NPPG provides guidance on how an impact on air quality can be mitigated:

“Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact....Examples of mitigation include:

- *the design and layout of development to increase separation distances from sources of air pollution;*
- *using green infrastructure, in particular trees, to absorb dust and other pollutants;*
- *means of ventilation;*
- *promoting infrastructure to promote modes of transport with low impact on air quality;*
- *controlling dust and emissions from construction, operation and demolition; and*
- *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development.”*

2.3.9 Section 9 of the NPPG provides guidance on how considerations about air quality fit into the development management process by means of a flowchart. The final two stages in the process deal with the results of the assessment:

“Will the proposed development (including mitigation) lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations.” If Yes:

“Consider how proposal could be amended to make it acceptable or, where not practicable, consider (our emphasis) whether planning permission should be refused.”

Local Policy

2.3.10 The Cherwell Local Plan³, adopted in 1996, sets out the local development policies for the Council. The Plan does not contain any specific policies relating to air quality, however, Policy ENV1 states:

“Development which is likely to cause materially detrimental levels of noise, vibration, smell, smoke fumes or other types of environmental pollution will not be permitted.

³ Available at: <http://www.cherwell.gov.uk/index.cfm?articleid=1720>

The Council will seek to ensure that the amenities of the environment, and in particular the amenities of residential properties, are not unduly affected by development proposals which may cause environmental pollution, including that caused by traffic generation.”

- 2.3.11 The new Cherwell Local Plan (2011 – 2031) submitted in January 2014 will (upon its adoption) set out broadly the long term spatial vision for the District. It considers Policy ESD 10 ‘Protection and Enhancement of Biodiversity and the Natural Environment’, which states:

“Protection and enhancement of biodiversity and the natural environment will be achieved by the following:...Air quality assessments will also be required for development proposals that would significantly adversely impact on biodiversity by generating and increase in air pollution”

- 2.3.12 The Draft Planning Obligations SPD provides guidance on the level of contribution which will be required in order to compensate for loss or damage created by a development, or to mitigate a development’s impact. It sets out the range of mitigation measures which may be required, as well as the means of calculating financial contributions towards measures or monitoring, based on the cost of Air Quality Action Plan measures. An AQMA comprising North Bar Street, Horse Fair Street, South Bar, Oxford Street, High Street, Bloxham Road, Warwick Road and Southam Road was declared 29th October 2014; Cherwell District Council has not yet prepared an Air Quality Action Plan for its existing AQMAs (Hennef Way and North Bar/Horse Fair/South Bar Street).

3 Methodology

3.1 Existing Conditions

3.1.1 Information on existing air quality has been obtained by collating the results of monitoring carried out by Cherwell District Council (CDC). Background concentrations for the site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid⁴.

3.2 Construction Impacts

3.2.1 During demolition and construction the main potential effects are dust annoyance and locally elevated concentrations of PM₁₀. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.

3.2.2 Separation distance is also an important factor. Large dust particles (greater than 30µm), responsible for most dust annoyance, will largely deposit within 100m of sources. Intermediate particles (10-30µm) can travel 200-500m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1km; however, the impact on the short-term concentrations of PM₁₀ occurs over a shorter distance. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

3.2.3 The Institute of Air Quality Management (IAQM, 2014) has issued revised guidance on the assessment of dust from demolition and construction. The IAQM guidance recommends that the risk of dust generation is combined with the sensitivity of the area surrounding the site to determine the risk of dust impacts from construction and demolition activities. Depending on the level of risk (high, medium, low or negligible) for each activity, appropriate mitigation is selected.

3.2.4 In accordance with the IAQM 2014 guidance, the dust emission magnitude is defined as either high, medium or low (**Table 3.1**) taking into account the general activity descriptors on site and professional judgement.

3.2.5 The sensitivity of the study area to construction dust impacts is defined based on the examples provided within the IAQM 2014 guidance (**Table 3.2**), taking into account professional judgement.

⁴ <http://laqm.defra.gov.uk/maps/maps2010.html>

Table 3.1: Risk Criteria for Dust Emission Magnitude

Dust Emission Magnitude	Activity
High	Demolition >50,000m ³ building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m ² site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m ³ building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty soil type (e.g. clay), >100m unpaved roads
Medium	Demolition 20,000 - 50,000m ³ building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m ² site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 - 100,000 tonnes material moved
	Construction 25,000 - 100,000m ³ building volume, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material, 50 -100m unpaved roads
Low	Demolition <20,000m ³ building demolished, non-dusty material, <10m above ground level, work in winter
	Earthworks <2,500m ² site area, non-dusty soil, <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved
	Construction <25,000m ³ , non-dusty material
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

Table 3.2: Area Sensitivity Definitions

Area Sensitivity	People and Property Receptors	Ecological Receptors
High	>100 dwellings, hospitals, schools, care homes within 50m 10 – 100 dwellings within 20m Museums, car parks, car showrooms within 50m PM ₁₀ concentrations approach or are above the daily mean objective.	National or Internationally designated site within 20m with dust sensitive features / species present
Medium	>100 dwellings, hospitals, schools, care homes within 100m 10 – 100 dwellings within 50m Less than 10 dwellings within 20m Offices/shops/parks within 20m PM ₁₀ concentrations below the daily mean objective.	National or Internationally designated site within 50m with dust sensitive features / species present Nationally designated site or particularly important plant species within 20m
Low	>100 dwellings, hospitals, schools, care homes 100 - 350m away 10 – 100 dwellings within 50 – 350m Less than 10 dwellings within 20 - 350m Playing fields, parks, farmland, footpaths, short term car parks, roads, shopping streets PM ₁₀ concentrations well below the daily mean objective.	Nationally designated site or particularly important plant species 20 - 50m Locally designated site with dust sensitive features within 50m

3.2.6 Based on the dust emission magnitude and the area sensitivity, the risk of dust impacts is then determined (**Table 3.3**), taking into account professional judgement.

Table 3.3: Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	High	Medium	Low
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

3.2.7 Based on the risk of dust impacts, appropriate mitigation is selected from the IAQM 2014 guidance using professional judgement.

Significance Criteria

3.2.8 The construction impact significance criteria are based on the IAQM 2014 guidance. The guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations. With appropriate mitigation in place, the residual effect of construction impacts on air quality is assessed as not significant.

3.3 Road Traffic Impacts

Sensitive Locations

- 3.3.1 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes, etc. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.
- 3.3.2 Based on the above criteria, eight existing properties have been identified as receptors for the assessment. These locations are described in **Table 3.4** and shown in **Figure 1**. Receptors were modelled at a height of 1.5m and 4.5m representing ground floor and first floor exposure.
- 3.3.3 Concentrations have also been predicted at the roadside diffusion tubes located in close proximity of the proposed site, in order to verify the modelled results (see **Appendix C** for further details on the verification method).

Table 3.4: Description of Receptors Locations

Receptor	Location
R1	49 Southam Road
R2	St. Mary's School
R3	Verisham Ct
R4	Residence above Alan Franklen
R5	5 Castle Street
R6	Cheshire Ct Warwick Road
R7	Cheshire Ct
R8	2 – 3 North Bar Street

Impact Predictions

- 3.3.4 Predictions have been carried out using the ADMS-Roads dispersion model (v3.2.4.0). The model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the proportion of heavy duty vehicles (HDVs), road characteristics (including road width and street canyon height, where applicable), and the vehicle speed. It also requires meteorological data. The model has been run using 2013 meteorological data from the Church Lawford monitoring station, which is considered suitable for this area.
- 3.3.5 Annual Average Daily Traffic (AADT) flows, and the proportions of each vehicle class, for roads within 250m of the proposed site and the diffusion tube have been provided by the project transport consultants (PBA). Traffic speeds were based on speed limits, taking into account the proximity to a junction. Traffic data used in this assessment are summarised in **Appendix D**.
- 3.3.6 Emissions were calculated using the recently released Emission Factor Toolkit (EFT) v6.0.2, which utilises NO_x emission factors taken from the European Environment Agency COPERT 4 (v10) emission tool. The traffic data were entered into the EFT, along with speed data to provide combined emission rates for each of the road links entered into the model. In order to provide a worst-case assessment, and to remove uncertainty relating to future year vehicle

emission factors, 2020 traffic data has been combined 2013 emissions and background concentrations.

Assessment Criteria

- 3.3.7 The NAQOs for NO₂ and PM₁₀ set out in the Air Quality Regulations (England) 2000 and the Air Quality (England) (Amendment) Regulations 2002, are shown in **Table 3.5**.

Table 3.5: Nitrogen Dioxide and PM₁₀ Objectives

Pollutant	Time Period	Objective
Nitrogen dioxide (NO ₂)	1-hour mean	200µg/m ³ not to be exceeded more than 18 times a year
	Annual mean	40µg/m ³
Particulate matter (PM ₁₀)	24-hour mean	50µg/m ³ not to be exceeded more than 35 times a year
	Annual mean	40µg/m ³

- 3.3.8 The objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Analysis of long term monitoring data suggests that if the annual mean nitrogen dioxide concentration is less than 60µg/m³ then the one-hour mean nitrogen dioxide objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved⁵.

Significance

- 3.3.9 There is no official guidance in the UK on how to assess the significance of air quality impacts of existing sources on a new development. The approach developed by the Institute of Air Quality Management⁶, and incorporated in Environmental Protection UK's guidance document on planning and air quality⁷, has therefore been used.
- 3.3.10 The guidance sets out three stages: determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance. Impact magnitude relates to the change in pollutant concentration; the impact description relates this change to the air quality objective.
- 3.3.11 **Table 3.6** sets out the impact magnitude descriptors, whilst **Table 3.7** sets out the impact descriptors.

⁵ Defra, 2009. Local Air Quality Management Technical Guidance LAQM.TG(09).

⁶ Institute of Air Quality Management, 2009. Position on the Description of Air Quality Impacts and the Assessment of their Significance, November 2009. The IAQM is the professional body for air quality practitioners in the UK.

⁷ EPUK, 2010. Development Control: Planning for Air Quality (2010 Update)

Table 3.6: Impact Magnitude for Changes in Ambient Pollutant Concentrations

Magnitude	Annual Mean NO ₂ and PM ₁₀	Number of Days with PM ₁₀ >50µg/m ³
Large	> 4µg/m ³	> 4 days
Medium	2 – 4µg/m ³	3 – 4 days
Small	0.4 – < 2µg/m ³	1 – 2 days
Imperceptible	< 0.4µg/m ³	< 1 day

Table 3.7: Impact Descriptor for Changes in Concentration at a Receptor

Absolute concentration with the development in relation to Objective / Limit Value	Change in concentration		
	Small	Medium	Large
Above objective/limit value (a)	Slight	Moderate	Substantial
Just below objective/limit value (b)	Slight	Moderate	Moderate
Below objective/limit value (c)	Negligible	Slight	Slight
Well below objective/limit value (d)	Negligible	Negligible	Slight

Where the Impact Magnitude is **Imperceptible**, the Impact Descriptor is Negligible.

Where there is an increase in concentrations, the absolute concentration relates to the 'with development' air quality. Where there is a decrease in concentrations, the absolute concentration relates to the 'without development' air quality. Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.

(a) Above: >40 µg/m³ annual mean NO₂ or PM₁₀, or >25 µg/m³ annual mean PM_{2.5}, or >35 days PM₁₀ >50 µg/m³

(b) Just below: 36 – 40 µg/m³ annual mean NO₂ or PM₁₀, or 22.5 – 25 µg/m³ annual mean PM_{2.5}, or 32 – 35 days PM₁₀ > 50 µg/m³

(c) Below: 30 – <36 µg/m³ annual mean NO₂ or PM₁₀, or 18.75 – <22.5 µg/m³ of annual mean PM_{2.5}, or 26 – <32 days PM₁₀ > 50 µg/m³

(d) Well below: < 30 µg/m³ annual mean NO₂ or PM₁₀, or <18.75 µg/m³ annual mean PM_{2.5}, or < 26 days PM₁₀ >50 µg/m³

3.3.12 The guidance states that the assessment of significance should be based on professional judgement, taking into account the following factors, with the overall air quality effect of the scheme described as either 'insignificant', or of 'minor', 'moderate' or 'major' significance:

- Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance.
- The magnitude of the changes and the descriptions of the impacts at the receptors i.e. **Tables 3.6** and **3.7** findings;
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;
- Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced;
- Uncertainty, including the extent to which worst-case assumptions have been made; and
- The extent to which an objective or limit value is exceeded.

4 Existing Air Quality

4.1 LAQM

4.1.1 CDC has investigated air quality within its area as part of its responsibilities under the LAQM regime. To date, three Air Quality Management Areas (AQMAs) have been declared within the district. The closest of which is approximately 470m from the proposed development site, which encompasses North Bar Street, Horse Fair Street, South Bar Street, Oxford Road, Bloxham Road, High Street Warwick Road and Southam Road.

4.2 Monitoring

Nitrogen Dioxide

4.2.1 CDC operates an automatic monitoring station alongside Hennef Way, which is outside of the study area for this assessment. The Council also deploys nitrogen dioxide diffusion tubes, prepared and analysed by Bristol Scientific Services (20% TEA in water), at a number of locations including eight within Banbury town centre (**Figure 1**). Data for these sites are presented in **Table 4.1**

Table 4.1: Measured Nitrogen Dioxide Concentrations, 2009 - 2013

Site ID	Site Type	Within AQMA	Annual Mean ($\mu\text{g}/\text{m}^3$)				
			2009	2010	2011	2012	2013
High Street	Kerbside	Y	40.0	43.0	42.0	39.6	38.3
North Bar	Kerbside	Y	38.1	42.0	43.8	40.3	37.4
Warwick Road	Roadside	N	-	31.1	29.6	26.4	25.3
Southam Road	Kerbside	Y	-	39.0	36.0	37.4	32.4
South Bar	Roadside	Y	-	31.7	24.1	23.4	24.5
Oxford Road/South Bar	Kerbside	Y	40.7	43.8	39.7	38.3	39.9
Bloxham Road	Kerbside	Y	39.5	44.9	46.2	44.2	37.8
Horsefair/North Bar	Roadside	Y	44.5	47.9	47.3	45.4	42.2
Objective			40				

Exceedances highlighted in bold.

2009 – 2013 Data taken from the 2014 Air Quality Progress Report Cherwell District Council

4.2.2 The measured concentrations of nitrogen dioxide have been below the objectives in the majority of the monitoring sites in 2012 and 2013, except for three locations where concentrations exceeded the objective. North Bar and Horsefair/North Bar have registered exceedances since 2010, however concentrations have reduced over that time period.

Particulates

4.2.3 There is no PM₁₀ monitoring carried out in close proximity to the site.

4.3 Background Concentrations

- 4.3.1 In addition to measured concentrations, estimated background concentrations for the site have been obtained from the national maps published by Defra (Table 4.2). The background concentrations are all well below the relevant objectives in 2013.

Table 4.2: Estimated Annual Mean Background Concentrations in 2013 ($\mu\text{g}/\text{m}^3$)

Year	NO _x	NO ₂	PM ₁₀
2013	36.0	23.9	19.4
Objective	-	40	40

4.4 Predicted Baseline Concentrations

- 4.4.1 The ADMS-Roads model has been run to predict nitrogen dioxide and PM₁₀ concentrations at each of the existing receptor locations identified in Table 3.1 for baseline years of 2013 and 2020. The results are presented in Table 4.3.

Table 4.3: predicted baseline Concentrations of NO₂ and PM₁₀ in 2013 and 2020

Receptor	Baseline 2013			Future Baseline 2020		
	NO ₂	PM ₁₀		NO ₂	PM ₁₀	
	Annual Mean ^a	Annual Mean ^a	Days ^b	Annual Mean ^a	Annual Mean ^a	Days ^b
R1	28.4	20.2	4	28.8	20.3	4
R2	27.7	19.3	3	28.4	19.4	3
R3	33.2	19.6	3	34.3	19.8	3
R4	29.9	19.1	2	30.8	19.2	2
R5	30.7	19.3	3	31.6	19.5	3
R6	34.3	19.7	3	35.5	19.8	3
R7	35.0	19.6	3	36.2	19.8	3
R8	29.0	18.9	2	29.8	19.0	2
Objectives	40	40	35	40	35	35

Exceedences highlighted in bol

^aThe number of days with PM₁₀ concentrations greater than 50 $\mu\text{g}/\text{m}^3$ have been estimated from the relationship with the annual mean concentrations described in Defra, 2009

- 4.4.2 The annual mean objective for nitrogen dioxide is not predicted to be exceeded at any of the existing receptors locations in 2013 and 2020. Predicted baseline concentrations of PM₁₀ are well below the objectives for both years.
- 4.4.3 Baseline concentrations are predicted to increase between 2013 and 2020 as additional traffic is on the network and vehicle emission factors and background concentrations are assumed to remain constant. In reality, a reduction in vehicle emission factors would be expected and therefore the baseline concentrations in 2020 are likely to be conservative.

- 4.4.4 Concentrations at receptors within the AQMA are lower than at monitoring locations as the monitoring locations are not representative of public exposure.

5 Impact Assessment

5.1 Construction Impacts

5.1.1 The main potential effects during construction are dust deposition and elevated PM₁₀ concentrations. The following activities have the potential to cause emissions of dust:

- site preparation including delivery of construction material, erection of fences and barriers;
- demolition of existing buildings on site;
- earthworks including digging foundations and landscaping;
- materials handling such as storage of material in stockpiles and spillage;
- construction and fabrication of units; and
- disposal of waste materials off-site.

5.1.2 Typically the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

5.1.3 Based on the IAQM criteria (**Table 3.1**), the risk of dust emissions is considered to be medium. The study area is considered to be of low sensitivity (**Table 3.2**), due to the presence of more than 100 dwellings 100 – 350m away from the proposed development. Appropriate mitigation corresponding to a low risk site is therefore required during the construction phase.

5.2 Road Traffic Impacts

5.2.1 Predicted concentrations of nitrogen dioxide and PM₁₀ at existing receptors in 2020 both with and without the development in place are presented in **Table 5.1**.

Table 5.1: Predicted Concentrations of NO₂ and PM₁₀ with and without the development in place

Receptor	Baseline			With Development		
	NO ₂	PM ₁₀		NO ₂	PM ₁₀	
	Annual Mean ^a	Annual Mean ^a	Days ^b	Annual Mean ^a	Annual Mean ^a	Days ^b
R1	28.8	20.3	4	29.2	20.4	4
R2	28.4	19.4	3	28.9	19.5	3
R3	34.3	19.8	3	35.0	19.9	3
R4	30.8	19.2	2	31.0	19.2	3
R5	31.6	19.5	3	31.8	19.5	3
R6	35.5	19.8	3	35.7	19.9	3

Receptor	Baseline			With Development		
	NO ₂	PM ₁₀		NO ₂	PM ₁₀	
	Annual Mean ^a	Annual Mean ^a	Days ^b	Annual Mean ^a	Annual Mean ^a	Days ^b
R7	36.2	19.8	3	36.4	19.8	3
R8	29.8	19.0	2	29.9	19.0	2
Objectives	40	40	35	40	40	35

Exceedences highlighted in bold

^a Concentrations in µg/m³

^b The number of days with PM10 concentrations greater than 50µg/m³ have been estimated from the relationship with the annual mean concentrations described in Defra, 2009

5.2.2 The changes in annual mean concentrations and the number of days with PM₁₀ concentrations greater than 50µg/m³ are presented in **Table 5.2**.

Table 5.2: Change in Predicted Concentrations brought about by the Development

Receptor	NO ₂	PM ₁₀	
	Annual Mean (µg/m ³)	Annual Mean (µg/m ³)	Number of Days >50µg/m ³ ^a
R1	0.3	0.1	0
R2	0.5	0.1	0
R3	0.7	0.1	0
R4	0.3	0.0	0
R5	0.1	0.0	0
R6	0.1	0.0	0
R7	0.1	0.0	0
R8	0.1	0.0	0

Based on unrounded numbers

5.2.3 Based on the impact magnitude descriptors in **Table 3.6**, the changes in annual mean nitrogen dioxide concentrations range from imperceptible to small with the development in place, whilst the changes in PM₁₀ concentrations and the number of days with PM₁₀ concentrations greater than 50µg/m³, are all imperceptible.

5.2.4 Using the criteria set out in **Table 3.7**, the impact on annual mean nitrogen dioxide and PM₁₀ concentrations is negligible at all receptors locations.

5.3 Uncertainty

5.3.1 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

- 5.3.2 A disparity between the national road transport emission projections and measured annual mean concentrations of nitrogen oxides and NO₂ has been identified in recent years⁸. Whilst projections suggest that both annual mean nitrogen oxides and nitrogen dioxide concentrations from road traffic emissions should have fallen by around 15-25% over the past 6 to 8 years, at many monitoring sites levels have remained relatively stable, or have even shown a slight increase.
- 5.3.3 The future year road traffic modelling has been based on 2013 emission factors and background concentrations, whilst utilising future traffic flows for the proposed development year of 2020. The model has been verified against 2013 monitoring data. This is considered to provide conservative assessment to balance against the uncertainties regarding future vehicle emissions.

5.4 Effect Significance

- 5.4.1 Overall, considering the conservative nature of the assessment, and the criteria set out in **paragraph 3.3.12**, the air quality effects of road traffic generated by the proposed development are considered to be insignificant.

⁸ Carslaw, D, Beevers, S, Westmoreland, E and Williams, M, 2011. Trends in NO_x and NO₂ emissions and ambient measurements in the UK. Available at: http://uk-air.defra.gov.uk/library/reports?report_id=645

6 Mitigation

6.1 Construction

6.1.1 The following standard low risk mitigation measures from the IAQM 2014 guidance are recommended to be included within a Construction Environmental Management Plan (CEMP) and to be agreed with the local authority.

Communication

- Display the name and contact details of persons accountable on the site boundary.
- Display the head or regional office information on the site boundary.

Management

- Develop and implement a dust management plan.
- Record all dust and air quality complaints, identify causes and take measures to reduce emissions.
- Record exceptional incidents and action taken to resolve the situation.
- Carry out regular site inspections to monitor compliance with the dust management plan and record results.
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary at least as high as any stockpile on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site run off of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove potentially dusty materials from site as soon as possible.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary.
- Avoid the use of diesel or petrol powered generators where possible.
- Only use cutting, grinding and sawing equipment with dust suppression equipment.
- Ensure an adequate supply of water on site for dust suppressant.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate.

- Ensure equipment is readily available on site to clean up spillages of dry materials.
- No on-site bonfires and burning of waste materials on site.

Demolition

- Incorporate soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure water suppression is used during demolition operation.
- Avoid explosive blasting, using appropriate manual and mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process.

Trackout

- Use water assisted dust sweepers on the site access and local roads.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials.
- Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable.
- Install hard surfaced haul routes which are regularly damped down.
- Install a wheel wash with a hard-surfaced road to the site exit where site layout permits.

6.2 Operation

- 6.2.1 The effects of development traffic for the proposed development are judged to be insignificant, especially regarding the conservative nature of the assessment. No additional mitigation is therefore required.

7 Conclusions

- 7.1.1 The air quality impacts associated with the proposed commercial development on a land adjacent to Southam Road, Banbury have been assessed. The development site is located approximately 470m away from North Bar/Horse Fair AQMA declared by the CDC for exceedences of the annual mean nitrogen dioxide objective.
- 7.1.2 The proposed development will lead to an insignificant increase in emissions on the local road network. Taking into consideration the conservative nature of the assessment, the overall air quality effect of the development is considered to be insignificant.

Appendix A Glossary

Appendix A: Glossary

AADT	Annual Average Daily Traffic
AQMA	Air Quality Management Area
Diffusion Tube	A passive sampler used for collecting NO ₂ in the air
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes Includes HGVs and buses
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NAQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides, generally considered to be nitric oxide and NO ₂ . Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
PM ₁₀	Small airborne particles less than 10µm in diameter
Receptor	A location where the effects of pollution may occur
TEA	Triethanolamine

Appendix B References

Appendix B: References

Department of the Environment, Food and Rural Affairs (Defra) (2014). *2011 Based Background Maps for NO_x, NO₂, PM₁₀ and PM_{2.5}*. Available: <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011>.

Department of the Environment, Food and Rural Affairs (Defra) in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland (2009). *Local Air Quality Management Technical Guidance, LAQM.TG(09)*. HMSO, London.

Department of the Environment, Transport and the Regions (DETR, 2007) in Partnership with the Welsh Office, Scottish Office and Department of the Environment for Northern Ireland (2007). *The Air Quality Strategy for England, Scotland, Wales, Northern Ireland*, HMSO, London.

Institute of Air Quality Management (2014) *Guidance on the assessment of dust from demolition and construction*, IAQM, London

Environmental Act 1995, Part IV.

Statutory Instrument 2000, No 921, *The Air Quality (England) Regulations 2000*, HMSO, London.

Statutory Instrument 2002, No 3034, *The Air Quality (England) (Amendment) Regulations 2002*, HMSO, London.

Statutory Instrument 2010, No. 1001, *The Air Quality Standards Regulations 2010*, HMSO, London.

Appendix C Verification

Nitrogen Dioxide

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides ($\text{NO}_x = \text{NO} + \text{NO}_2$). The model has been run to predict the 2013 annual mean road- NO_x contribution at eight roadside diffusion tubes and one automatic monitoring station (identified in **Table 4.1**).

The model output of road- NO_x has been compared with the 'measured' road- NO_x , which was calculated from the measured NO_2 concentrations and the adjusted background NO_2 concentrations within the NO_x from NO_2 calculator⁹.

A primary adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (**Figure C1**). This factor was then applied to the modelled road- NO_x concentration for each monitoring site to provide adjusted modelled road- NO_x concentrations. The total nitrogen dioxide concentrations were then determined by combining the adjusted modelled road- NO_x concentrations with the predicted background NO_2 concentration within the NO_x from NO_2 calculator. A secondary adjustment factor was finally calculated as the slope of the best fit line applied to the adjusted data and forced through zero (**Figure C2**).

The following primary and secondary adjustment factors have been applied to all modelled nitrogen dioxide data:

Primary adjustment factor: 1.2848

Secondary adjustment factor: 0.9907

Figure C3 compares final adjusted modelled total NO_2 at each of the monitoring sites, to measured total NO_2 , and shows the 1:1 relationship, as well as $\pm 10\%$ and $\pm 25\%$ of the 1:1 line. All data points lie within $\pm 25\%$.

⁹ <http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>

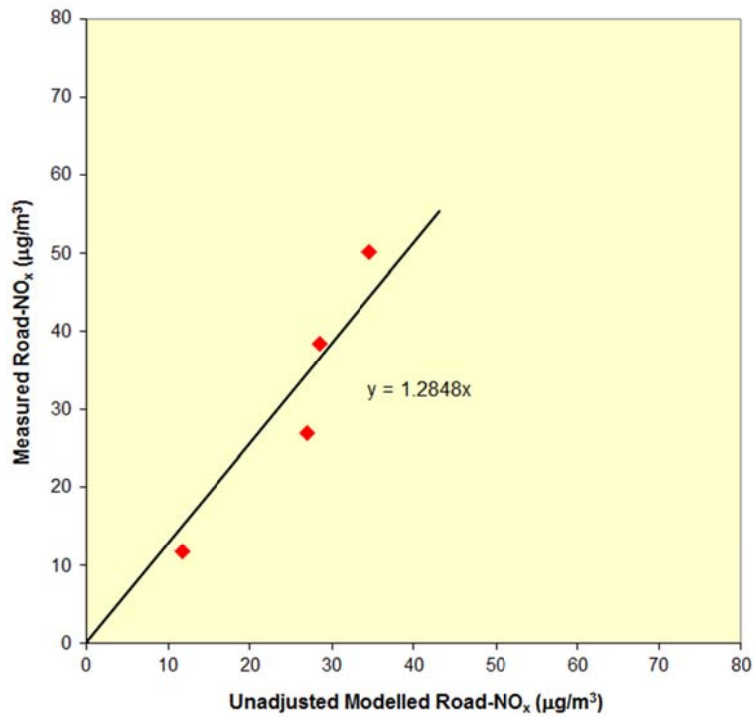


Figure C1: Comparison of Measured Road-NO_x with Unadjusted Modelled Road-NO_x Concentrations

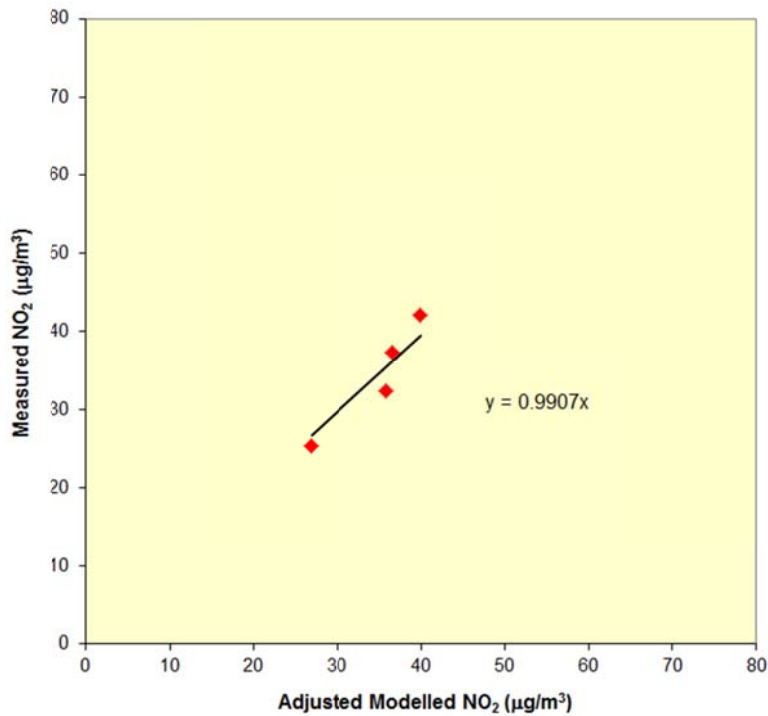


Figure C2: Comparison of Measured NO₂ with Primary Adjusted Modelled NO₂ Concentrations

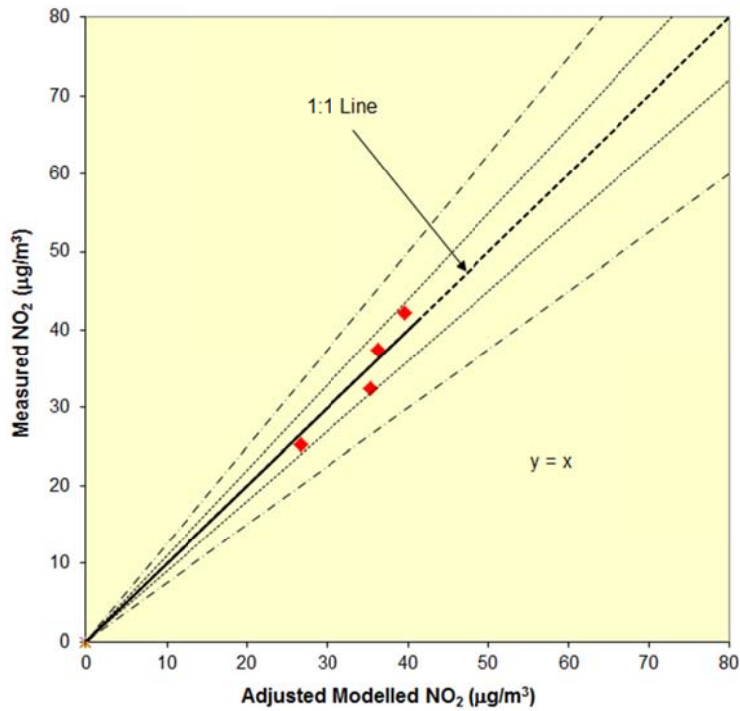


Figure C3: Comparison of Measured NO₂ with Fully Adjusted Modelled NO₂ Concentrations

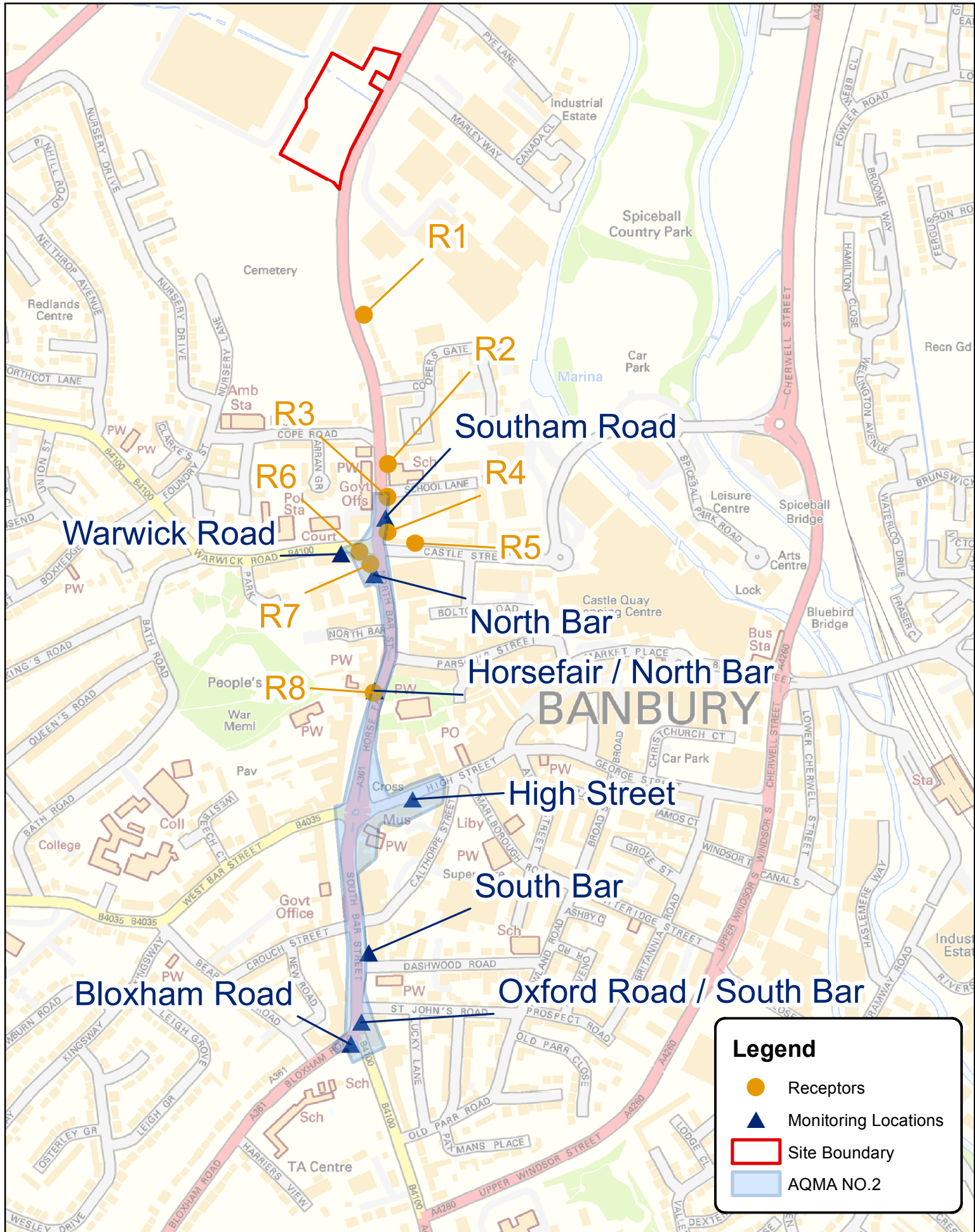
PM₁₀

No monitoring of PM₁₀ is carried out in proximity adjacent to the road network in proximity to the development site. The primary adjustment factor calculated for nitrogen dioxide concentrations has therefore been applied to the modelled road-PM₁₀ concentrations.

Appendix D Traffic Data

Road	Location	2013 Baseline		2020 Baseline		2020 With Development	
		AADT	%HDV	AADT	%HDV	AADT	%HDV
Southam Road	North of Site	14,077	4.7	15,337	4.7	16,953	4.3
Southam Road	South of Site	14,077	4.7	15,337	4.7	16,827	4.3
North Bar Street	-	22,356	5.4	24,357	5.4	24,508	5.4
Warwick Road	-	12,311	2.7	13,414	2.7	13,443	2.7
Castle Street	-	11,466	2.8	12,492	2.8	12,514	2.8

Appendix E Figures



Legend

- Receptors
- ▲ Monitoring Locations
- Site Boundary
- AQMA NO.2

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Client

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0 0.075 0.15 Kilometers

N

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Southam Road, Banbury
Receptors and Monitoring Locations

Date	05/05/2015
Scale	1:6,921 @ A4
Drawn By	YO
Checked By	GH
Revision Number	01
Figure Number	Figure 1