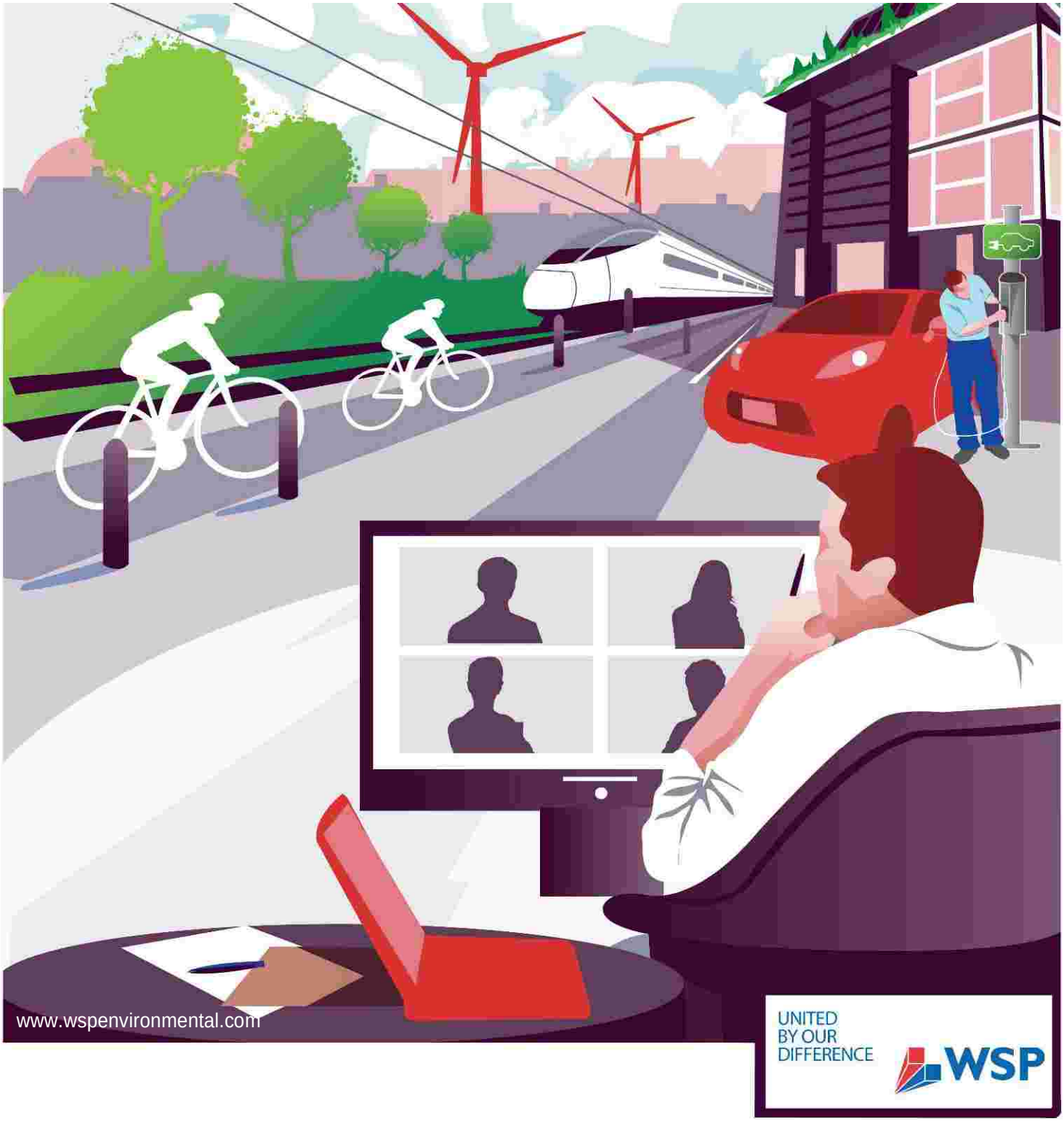

Air Quality Assessment Report

New Road Link - Kings Road, Newbury

July 2012

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QUALITY MANAGEMENT

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Draft			
Date	5th July 2012			
Prepared by	Paul Day			
Signature				
Checked by	Joanne Gough			
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Project number	00031445.00			
File reference	M:\Environmental Planning\Projects\ 00031445 - Kings Road, Newbury			

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APPENDICES

1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 WSP Environmental Ltd (WSPE) has been commissioned to carry out an assessment of the potential air quality impacts arising from the proposed Heavy Goods Vehicle (HGV) restrictions and a new road link on Kings Road, Newbury. The proposals comprise an HGV restriction for Boundary Road and Mill Road and a new road link (referred to hereafter as the Kings Road Link). The new road link will connect the existing Sainsbury's Roundabout with Kings Road close to the Boundary Road/Hambridge Road junction. The Kings Road Link will provide an alternative route to the Sainsbury's Roundabout, avoiding Kings Road and the residential properties located either side of this road.

1.1.2 This report presents the findings of an assessment of the potential air quality impacts of the proposed Kings Road Link during both the construction and operational phases, as well as the impacts of the HGV restriction that will occur with the operation of the link road. For both phases the type, source and significance of potential impacts are identified, and the measures that should be employed to minimise these impacts are described.

1.1.3 A glossary of terms used is provided in **Appendix A**.

2 RELEVANT LEGISLATION AND GUIDANCE

2.1 AIR QUALITY STRATEGY FOR ENGLAND, SCOTLAND, WALES & NORTHERN IRELAND

2.1.1 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[1]. 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.

2.1.2 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).

2.1.3 The air quality standards are concentration limits which 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.

2.1.4 The air quality objectives are medium-term policy based targets set by the Government which 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.

2.1.5 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.

2.1.6 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 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.

2.1.7 Of the pollutants included in the AQS, NO_2 and PM_{10} will be particularly relevant to this assessment as road traffic is a major source and concentrations of these pollutants tend to be close to air quality objectives in urban locations such as Newbury. Local authorities undertaking review and assessments of air quality are finding that, where road traffic is the dominant source of air pollution, the objectives for these pollutants are likely to be the most difficult to achieve. 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.

2.2 AIR QUALITY (ENGLAND) REGULATIONS

2.2.1 Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000[2] and the Air Quality (England) (Amendment) Regulations 2002[3] for the purpose of Local Air Quality Management (LAQM). The standards and objectives for each pollutant in the AQS and the Regulations are given in **Appendix B**.

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2) – July 2007.

[2] The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

[3] The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

2.3 THE ENVIRONMENTAL PROTECTION ACT 1990 - CONTROL OF DUST AND PARTICULATES ASSOCIATED WITH CONSTRUCTION

2.3.1 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', and
- 'any accumulation or deposit which is prejudicial to health or a nuisance'.

2.3.2 Following this, Section 80 says 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.

2.3.3 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 which has occurred.

2.4 LOCAL AIR QUALITY MANAGEMENT (LAQM)

2.4.1 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.

2.4.2 The Department for Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their review and assessment work[4]. This guidance, referred to in this report as LAQM.TG(09), has been used where appropriate in the assessment presented herein. DEFRA has also has recently published a guidance note on projecting NO_2 concentrations[5] forward to future years to address concerns that background concentrations and vehicle emissions were not reducing with time at the rates previously estimated. The document has also been used where appropriate in the assessment presented herein.

West Berkshire Council's review and assessment of air quality

2.4.3 West Berkshire Council (WBC) has completed four rounds of the review and assessment process. As a result of the work undertaken during the third round, an AQMA was declared in Newbury due to measured and predicted exceedences of the AQS objectives for annual and hourly mean concentrations of NO_2 in May 2009. Further review and assessment work since the declaration has confirmed the need for the designation to continue. The AQMA covers the A339/A343/Greenham Road Junction in Newbury, approximately 360m southwest of the location of the new Kings Road Link.

2.5 NATIONAL PLANNING POLICY

National Planning Policy Framework

2.5.1 The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied. It promotes sustainable development and opportunities for local communities to engage in plan making at a neighbourhood level. The core underpinning principle of the framework is the presumption in favour of sustainable development, defined as: *'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'* One of the 12 core planning principles in the NPPF is that planning should *'contribute to conserving and enhancing the natural environment and reducing pollution.'*

2.5.2 In relation to air quality, the document 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

[4] Department for Environment, Food and Rural Affairs (DEFRA): *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)* (Feb 2009).

[5] DEFRA, Local Air Quality Management, *Note on Projecting NO_2 Concentrations* (April 2012)

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';

- '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 soils, air, water, or noise pollution..';
- 'In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Plans should allocate land with the least environmental or amenity values, where consistent with other policies in this Framework.'
- '..local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should to be revisited through the permitting regimes operated by pollution control authorities'; and
- 'Local Planning authorities should consider where otherwise unacceptable development could be made acceptable though 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.'

2.6 LOCAL PLANNING POLICY

West Berkshire District Local Plan 1991 – 2006 (saved policies)

2.6.1 Prior to the development of the documents within the Local Development Framework there are a number of saved policies within the West Berkshire District Local Plan that remain valid.

2.6.2 The Local Plan sets out the Council's current policies and proposals for the development and use of land within West Berkshire. It includes detailed policies and specific proposals to guide planning decisions. These policies have been saved from September 2007 onwards until replaced by the Local Development Framework.

2.6.3 Policy OVS.5 relating to Environmental Nuisance and Pollution Control states:

> *'The Council will only permit development proposals where they do not give rise to an unacceptable pollution of the environment. In order to minimise the adverse impact on the environment or loss of amenity proposals should have regard to:*
>
> *(a) the need to ensure the adequate storage and disposal of waste materials; and*
>
> *(b) the installation of equipment to minimise the harmful effects of emissions; and*
>
> *(c) the hours, days or seasons of operations; and*
>
> *(d) locating potential nuisance or pollution activities onto the least sensitive parts of the site or where the impacts can be best contained by physical or other appropriate measures.'*

West Berkshire Local Development Framework

2.6.4 The Local Development Framework (LDF) will eventually replace the Local Plan. It will include a number of local development documents that outline how planning will be managed in West Berkshire. The Core Strategy will set out the Council's overall planning vision for the area and will be the basis for all subsequent documents produced as part of the LDF. The Core Strategy is currently undergoing examination by a Government appointed Planning Inspector. The Inspector's report in to the Core Strategy is expected to be published by July 2012.

3 SCOPE AND METHODOLOGY

3.1 SCOPE

3.1.1 The scope of the assessment has been determined in the following way:

- consultation with the Environmental Health Department of WBC to discuss the availability of monitoring data, the assessment methodology to be applied and obtain a copy of their latest review and assessment report;
- review of air quality data for the area surrounding the site, including data from DEFRA[6] and the Environment Agency's' websites (EA)[7];
- desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
- review of the traffic flow data provided by WSP UK Ltd, which has been used as an input to the air quality assessment.

3.2 METHODOLOGY

Construction phase

3.2.1 During the construction phase, activities undertaken on the road construction site may cause dust and particulate matter to be emitted to the atmosphere.

3.2.2 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.

3.2.3 The smaller particles of dust (typically less than 10µm 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.

3.2.4 Significant increases in dust and PM_{10} deposition levels can also affect sensitive vegetation by blocking stomata, reducing photosynthesis and plant growth.

3.2.5 A qualitative assessment of the potential impacts due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken using information in guidance documents produced by the following organisations:

- Building Research Establishment (BRE)[8];
- Quality of Urban Air Review Group (QUARG)[9];
- Department of the Environment (DoE)[10]; and
- Institute of Air Quality Management (IAQM)[11].

[6] http://laqm1.defra.gov.uk/review/tools/background.php

[7] http://www.environment-agency.gov.uk

[8] Kukadia, V., Upton, S. L. and Hall, D. J.; *Control of dust from Construction and Demolition Activities.* BRE (Feb 2003).

[9] Quality of Urban Air Review Group: *Airborne Particulate Matter in the United Kingdom – Third Report of the Quality of Urban Air Review Group.* Prepared for the Department of the Environment (May 1996).

[10] Arup Environmental and Ove Arup and Partners: *The Environmental Effects of dust from Surface Mineral Workings Volume 2.* Prepared for Department of the Environment Minerals Division (Dec 1995).

3.2.6 The following potential impacts of increased dust and PM_{10} generated during the construction phase have been considered:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in exposure to PM_{10}.

3.2.7 Exhaust emissions from construction vehicles will have an impact on local air quality both on-site and adjacent to the routes used by these vehicles to access the site. As information on the number of vehicles associated with the construction phase is not available, a qualitative assessment of their impact on local air quality has been undertaken by considering:

- the level of construction traffic likely to be generated by this phase of the proposed road link;
- the number and distance of sensitive receptors in the vicinity of the site and along the likely routes to be used by construction vehicles; and
- the likely duration of the construction phase and the nature of the construction activities undertaken.

3.2.8 **Appendix C** summarises the assessment procedure given in the guidance published by the IAQM for the consideration of potential dust and PM_{10} impacts from demolition; earthworks; general construction activities and track-out. The guidance is generally aimed at the development of site including demolition of buildings and construction of new buildings rather than the construction of road links; however, the construction activities associated with road construction are common to all construction projects and therefore the IAQM guidance has been applied. It has been assumed that the demolition of the existing structures on the Stirling Cables site would be undertaken under a separate planning application for the development of the larger site and therefore, the impacts of demolition of this site have not been considered in this assessment.

Operational phase

Emissions arising from road traffic associated with the operation of the proposed Kings Road Link and HGV restriction on Mill Lane and Boundary Road

3.2.9 Once construction has been completed the traffic using the new Kings Road Link and changes to traffic flows and composition on other roads due to the HGV restrictions will have an effect on local pollution concentrations in areas adjacent to the affected roads. 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 in urban areas. Indeed, WBC has declared an AQMA covering a junction on the A339 due to predicted exceedences of the objectives for NO_2. This air quality assessment will therefore only consider concentrations of NO_2 and PM_{10}.

3.2.10 For the prediction of impacts due to emissions arising from road traffic during operation of the new road link, the air pollutant dispersion model Breeze Roads has been used. This model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user.

3.2.11 Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Met Office observing station at Boscombe Down. This station is considered to provide data representative of the conditions at the proposed new road link location and is the observing station from which data was obtained for the Council's Detailed Assessment of air quality in Newbury. The meteorological data used for this assessment was from 2011. 2011 is the most recent year for which monitoring data, meteorological data and emissions factors are all available. A wind rose is shown in **Appendix D.**

3.2.12 For the assessment, five scenarios were modelled. These scenarios are as follows:

- 2011 "model verification";
- 2012 "baseline";

[11] Institute of Air Quality Management: *Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance* (January 2012).

- 2012 “with Kings Road Link”;
- 2026 “without Kings Road Link”; and
- 2026 “with Kings Road Link”.

3.2.13 2012 is the current baseline year and has been assumed to be the opening year of the proposed new road link. 2026 has been selected to represent a future year with the new link operational, taking into account increases in traffic from growth and committed developments.

3.2.14 A summary of the traffic data and pollutant emission factors used in the assessment can be found in **Appendix E**. It includes details of Annual Average Hourly Traffic flows (AAHTs), average vehicle speeds, emission factors and the percentage of Heavy Goods Vehicles (HGVs) for the local road network in all assessment years considered. An updated version of the road traffic Emissions Factors Toolkit (EFTv5.1.1) was released by DEFRA on 29th June 2012; however, this was released after the assessment was completed and therefore, the emission factors from the previous version of the Emissions Factors Toolkit (EFT v4.2) were used to complete the assessment.

3.2.15 The traffic flows for the “without Kings Road Link” scenario includes flows for committed developments in the locality of the proposed road link and those links affected by the HGV restrictions, but do not include any alterations in traffic flow and compositions resulting from the proposed alterations to the network. The traffic flows for the “with Kings Road Link” scenarios include flows for committed developments and contributions to road traffic flow and composition changes associated with the proposed new link road and HGV restrictions.

Background concentrations and traffic emissions factors

3.2.16 The recently published DEFRA guidance relating to the projecting NO_2 concentrations to future years has been produced because recent monitoring data suggests that improvements in NO_x and NO_2 concentrations with time have been much smaller than forecast. Analysis has shown that in some areas, the current method for predicting future NO_2 concentrations as set out in DEFRA’s LAQM.TG(09) may result in overly optimistic predictions of air quality for assessments covering the years 2011 to around 2020. The guidance note provides alternative methods for projecting NO_2 concentrations based on assumptions regarding background concentrations, vehicle emissions or a combination of both.

3.2.17 The guidance indicates that it may be appropriate to keep background concentrations for future years the same as for the baseline year. This is particularly true if review of historic data for the location (if available) shows little or no reduction over the last five years.

3.2.18 The guidance suggests that local monitoring data can be used where available to determine whether background concentrations are falling and whether these are in-line with the projections that the background maps published by DEFRA are based. Background pollutant concentrations have been taken from the DEFRA background maps as this was the approach taken by the WBC in their most recent Detailed Assessment (DA) for the Newbury AQMA undertaken in 2009. For the purposes of the assessment, the 2011 NO_2 background concentrations used in the model verification scenario have been used for the projection of concentrations to a the two future years under consideration (2012 and 2026) to provide a conservative approach.

3.2.19 With regards vehicle emissions for future years, the guidance states that emerging evidence suggests that emissions from some vehicles are much greater than previously expected, particularly for diesel cars and Light Goods Vehicles (LGV). This means that currently, under some circumstances, available emission factors are likely to be underestimating the amount of NO_x and NO_2 being emitted by some vehicles. To address this, the guidance provides a method for calculating emission factors for future years by keeping emissions from diesel cars and LGVs at 2006 levels. The guidance does however, state that this approach is likely to be overly conservative for years beyond 2017.

3.2.20 The guidance indicates that it may be appropriate to use a combination of assumptions about both background concentrations and emissions factors where, for example, both background and roadside monitoring data do not appear to be declining, but again cautions that this approach is likely to be overly conservative for years beyond 2017. Therefore, it is considered that this approach would be overly conservative for this assessment. However, to maintain some conservatism, the LAQM.TG(09) emissions factors for 2020 have been used for the 2026 scenarios. For 2012, LAQM.TG(09) emissions factors for 2011 have been used for predicting pollutant concentrations in the baseline year of 2012.

3.2.21 It is considered that assuming that background concentrations will not decline with time will provide a sufficiently conservative approach to the assessment and that assuming higher emission factors as proposed in the DEFRA guidance note would be overly conservation given that the future assessment year is 2026.

3.2.22 Consultation with WBC indicated that a conservative approach should be adopted for projecting NO_2 concentrations in the assessment based in the recent guidance. Therefore, as referred to above, the background concentrations for 2011 have been used for all future years.

Model verification

3.2.23 The Breeze Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. The model is also listed in Government guidance document LAQM.TG3(00) – Review and Assessment: Selection and Use of Dispersion Models[12.]

3.2.24 Model validation undertaken by the software developer will not have included validation in the vicinity of the 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.

3.2.25 Suitable local monitoring data for the purpose of model verification is available for concentrations of NO_2 at the locations shown in **Table 1**.

Table 1 Local monitoring data sources suitable for model verification

Location & Site Classification	O.S. Grid Reference	Distance to Site	2011 Monitored NO_2 Concentrations ($\mu g/m^3$)
A339, A339 & Greenham Rd (continuous monitor)	447379, 166557	4.7m	44.9
(34) 1 Winchester Courts (roadside diffusion tube)	447409, 166559	5m	37.80
(38) 64 Greenham Road (roadside diffusion tube)	447448, 166454	2m (15.2m to A339)	32.88
(43) 1 St Johns Street (roadside diffusion tube)	447036, 166436	4.8m	22.90
(47) 40 Bartholomew Street (roadside diffusion tube)	446939, 166848	2.7m	33.88
(61) Racecourse Road (kerbside diffusion tube)	447727, 166392	1.4m	23.11
(57) 31 Shaw Road (kerbside diffusion tube)	447688, 167820	3.6m	35.66
(56) 112 Shaw Street (roadside diffusion tube)	447773, 168041	4.9m	24.37
(1) A339 Newbury Central (kerbside diffusion tube)	447463, 167318	1.9m	49.66
(5) 132 London Road (roadside diffusion tube)	447720, 167678	3m	34.4

[12] Review and Assessment: Selection and Use of Dispersion Models; Part IV The Environment Act 1995 Local Air Quality Management LAQM.TG(00) May 2000.

3.2.26 Model verification has been undertaken following the methodology specified in Annex 3 of LAQM.TG(09) using the NO_x:NO_2 calculator available from DEFRA's website to calculate the roadside NO_x component of the annual mean NO_2 concentrations measured at the continuous monitor and diffusion tube sites. Details of the verification calculations are presented in **Appendix F**. In accordance with LAQM.TG(09), verification was undertaken for the kerbside monitoring sites and the roadside monitoring sites separately and the different adjustment factors applied to relevant receptor locations.

3.2.27 A factor of **5.6** was obtained during the verification process for the roadside sites and a factor of **8.3** for the kerbside sites. Thesefactors have been applied to the modelled NO_x roads component before addition of the relevant background NO_x concentrations and conversion to annual mean NO_2 concentrations.

3.2.28 Local monitoring data is not available for concentrations of PM_{10}; as such final modelling results for this pollutant have been verified using the factors calculated for adjusting the modelled NO_x roads concentrations. This approach is considered to be appropriate according to guidance given in LAQM.TG(09).

Results Processing

3.2.29 Following model verification, the modelled road contribution to 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.

3.2.30 For PM_{10}, the verified modelled road contribution to annual mean PM_{10} concentrations were added to the relevant background concentrations, which were then 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).

3.2.31 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[13], determined that exceedences of the 1-hour mean objective were unlikely to occur where annual mean concentrations were below 60 µg/m^3. Further research carried out in 2008[14] generally supported this relationship and as a result this criterion has been adopted for the purposes of local air quality review and assessment.

3.2.32 Quantitative assessments of the impacts on local air quality from road traffic emissions have been completed against the current statutory standards and objectives for NO_2 and PM_{10} set out in **Appendix B**.

Significance criteria

3.2.33 The significance of impacts associated with the construction phase of the proposed Kings Road Link has been determined qualitatively by identifying and understanding:

- the size of the site, and the area of which construction activities are likely to take place;
- the construction activities associated with the proposed new link road that could generate dust and PM_{10} and their likely duration;
- the proximity and type of sensitive receptors (e.g. schools, residential properties) to the road construction site boundary;
- the local meteorological conditions (wind speed, direction and rainfall) in the area in which the site is located;
- the current PM_{10} concentration in the area in which the site is located;
- the presence of vegetation surrounding the site, which might act as a buffer; and
- the potential distance which the construction traffic will travel across unpaved roads on the construction site, prior to accessing the local road network (referred to as 'trackout').

[13] D Laxen and B Marner: *Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites* (July 2003).

[14] A Cook: *Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedences of the 1-hour mean AQS Objective* (2008).

3.2.34 The impacts of the proposed Kings Road Link on local air quality once operational have been evaluated against the significance criteria published by Environmental Protection UK[15] and presented in **Appendix G.**

3.2.35 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 2**.

Table 2: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.

Sensitive Receptors

3.2.36 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 Kings Road Link once it becomes operational.

3.2.37 Examples of locations that are sensitive to dust and particulate matter generated by construction activities are shown in **Table 3**. This table is based on a table of examples provided in the guidance published by IAQM.

[15] EPUK, April 2010. Development Control: Planning for Air Quality (2010 Update)

Table 3: Examples of Receptor Sensitivity to Construction Phase Impacts

Sensitivity of Area	Examples	
	Human Receptors	**Ecological Receptors(1)**
Very High	Very densely populated area More than 100 dwellings within 20m Local PM_{10} concentrations exceed the objective Very sensitive receptors nearby (e.g. hospitals) Construction works continuing in one area of the site for more than 1 year	European Designated Site
High	Densely populated area 10-100 dwellings with 20m of the site Schools, Hi Tech & Food Processing industries nearby Local PM_{10} concentrations are within 10% of the objective Commercially sensitive horticultural land within 20m	Nationally Designated Site
Medium	Suburban of edge of town area Less than 10 receptors within 20m Local PM_{10} concentrations between 10-25% below the objective	Locally Designated Site
Low	Rural area/industrial area No receptors within 20m Local PM_{10} concentrations are below 75% of the objective Wooded area between site and receptors	No designations

(1) Only if there are ecological habitats present that may be sensitive to an increase in dust and particulate deposition.

3.2.38 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.

3.2.39 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. LAQM.TG(09) provides examples of the locations where the air quality objectives should/should not apply.

3.2.40 To complete the assessment of operational phase impacts, a number of 'receptors' were identified at which pollution concentrations were predicted. The locations of the assessment receptors are shown in **Table 4**. They include locations adjacent or near to the routes that are likely to experience the greatest change in traffic volume as a result of the proposed Kings Road Link and the HGV restrictions on Mill Lane and Boundary Road.

3.2.41 The Kings Road Link would pass through the existing Stirling Cables site. The other areas of this site will be redeveloped in future with a probable change of use, which is likely to include residential. Such redevelopment would occur after the baseline year of 2012. Therefore, to complete an assessment of exposure for future potential residential development of the Stirling Cables site, pollution concentrations were predicted at a number of locations across the proposed redevelopment site in the 2026 scenario, including locations within 2.5m of the road edge. The locations of these assessment receptors are also shown in **Table 4**.

Table 4: Receptor Locations Used in the Assessment

Receptor No.	Receptor Name	Grid Reference		Height above ground level (m)
Existing Receptors				
1	85 Kings Road (kerbside)[(a)]	447700	166914	1.8
2	138 Kings Road	447762	166924	1.8
3	66 Kings Road	447540	166946	1.8
4	42 Kings Road	447433	166995	1.8
5	1 - 6 Gordon Court	447576	166858	1.8
6	1 - 5 Roman Court	447610	166852	1.8
7	Gharial	447690	166857	1.8
8	31 Mill Lane (kerbside)	447535	167065	1.8
9	14a Mill Lane (kerbside)	447486	167057	1.8
10	45 Mill Lane (kerbside)	447588	167073	1.8
11	30 Boundary Lane	447821	167005	1.8
12	53 Boundary Lane	447819	166934	1.8
13	43 Hambridge Road	448042	166900	1.8
14	54 Hambridge Road	448160	166916	1.8
15	82 Queens Road	447847	166637	1.8
16	127 Boundary Road	447858	166499	1.8
17	52 Greenham Road	447498	166488	1.8
18	7 Queens Road	447464	166580	1.8
19	63 St Johns Road	447377	166534	1.8
20	Winchester House	447408	166560	1.8
21	14 Queens Road	447476	166618	1.8
22	51 Queens Road	447616	166616	1.8
23	109 Queens Road	447846	166618	1.8
24	1 St Johns St	447034	166436	1.8
25	39 Newtown Road	446958	166462	1.8
26	2 Feltre Place	446956	166541	1.8
27	52 Bartholomew Street	446926	166772	1.8
28	40 Bartholomew Street (kerbside)	446943	166857	4.8
29	107 London Road	447554	167693	1.8
30	134 London Road	447737	167672	1.8
31	11 Shaw Road	447623	167766	1.8
Potential Receptors(Stirling Cables Site – Indicative Scheme Design)				
32	Block A - SE Corner (kerbside)	447723	166864	1.8
33	Block A - SW Corner	447718	166831	1.8
34	Block A - NE Corner	447722	166898	1.8

Receptor No.	Receptor Name	Grid Reference		Height above ground level (m)
35	Block B - E facade	447732	166842	1.8
36	Block B - Curved facade (kerbside)	447736	166856	1.8
37	Block B - N facade	447753	166868	1.8
38	Block E - East facade	447826	166861	1.8
39	Block G - SW Corner	447768	166889	1.8
40	Block G - NW Corner	447768	166910	1.8
41	Block G - NE Corner	447805	166915	1.8
42	Block J - East facade (N)	447819	166911	1.8
43	Block J - East facade (S)	447822	166891	1.8

(a) Receptors with the reference 'kerbside' indicates locations where the adjustment factor derived from kerbside monitoring locations was applied to the modelling predictions. All other receptor locations are roadside.

4 EXISTING CONDITIONS

4.1 LOCAL EMISSION SOURCES

4.1.1 The site of the proposed road link is located in an area where air quality is mainly influenced by emissions from road transport. Kings Road is part of the B3421 and has junctions with the Hambridge and Boundary Roads to the east and Mill Lane and the A339 to the west. The A339 represents the greatest source of traffic emissions in the immediate area, with an AQMA declared at the junction of the road with the A343 and Greenham Road due to traffic emissions from the road. The AQMA is located approximately 360m to the southwest of the proposed link road location.

4.1.2 There are railway lines located to the immediate south of the proposed link road alignment; however, this is unlikely to represent a significant source of emissions. There are a number of light industrial properties to the northeast and east, however, there are no industrial pollution sources in the immediate vicinity of the site that will influence the local air quality.

4.2 BACKGROUND AIR QUALITY DATA

4.2.1 There are no automatic monitoring stations located within the vicinity of the proposed road link from which appropriate background concentrations can be obtained. Suitable estimates have therefore been taken from DEFRA's website, where estimated background concentrations of the pollutants included in the AQS have been mapped at a grid resolution of 1x1km grid squares for the whole of the UK for 2010. These estimates were released in April 2012 and replace the earlier estimates based on 2008 monitoring data.

4.2.2 **Table 5** shows the estimated background concentrations of NO_2 and PM_{10} that were used in the assessment. Background concentrations are shown for the grid squares within which sensitive receptors and diffusion tube monitoring sites are located. Background concentrations for two grid squares have been used to reflect the area modelled. Two diffusion tubes and a small number of assessment receptor locations lie just outside of these squares, however, they are located very close to the boundary of one of the grid squares and are situated in a similar urban environment and therefore the higher background concentrations of the adjacent square have been used.

Table 5:Estimated background concentrations for 2011 used in the assessment (µg/m^3)

Grid Reference		NO_2	PM_{10}
447500	167500	22.7	18.2
447500	166500	18.4	16.7

4.2.3 The table above shows that for 2011 estimated background concentrations of NO_2 are below the objective limit of 40µg/m^3 to be achieved by 2005 and thereafter. Estimated background concentrations of PM_{10} meet the objective limit of 40µg/m^3 to be achieved by 2004 and thereafter.

4.3 LOCAL AIR QUALITY MONITORING DATA

4.3.1 Concentrations of NO_2 measured by WBC in the vicinity of the proposed road link are provided in **Table 6.**

Table 6:WBC Monitoring Data (µg/m^3)

Site & ID Number	Monitoring Location Type	2011
A343, A339 and Greenham Rd junction (AQMA) (continuous monitor)	Roadside	44.9
Diffusion Tubes		
(10) A339 Newbury Central	Kerbside	49.7
(5) 132 London Road	Roadside	34.4
(7) 1 Iden Court, Newbury Road	Urban Background	28.0

(32) 44 Hambridge Road	Urban Background	27.4
(33) 42 Kings Road	Urban Background	25.0
(34) 1 Winchester Court, Greenham Road (AQMA)	Roadside	37.80
(49) 6 Market Street	Urban Centre	31.1
(42) 3 Howards Road	Roadside	20.6
(44) 63 St John's Road	Roadside	27.7

4.3.2 The results clearly show the reduction in concentrations as the monitoring locations move further away from the road. Concentrations exceed the objective (40µg/m^3) in some locations close to the roads (within the AQMA and at some locations without relevant exposure adjacent the A339), and meet it outside the AQMA and further from the road.

5 ASSESSMENT OF IMPACTS, MITIGATION AND RESIDUAL EFFECTS

5.1 IMPACT

Construction phase

Construction sources of dust and PM_{10}

5.1.1 The main sources of dust and PM_{10} during construction activities include:

- haulage routes, vehicles and construction traffic;
- materials handling, storage, stockpiling, spillage and disposal;
- exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
- site preparation and restoration after completion; and
- construction processes;

5.1.2 The majority of the releases are likely to occur during the 'working-week'. 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.

5.1.3 The construction of the proposed road link will require the breaking up and excavation of the existing surface and paving material. Construction of the road will require grading, excavation for drainage, laying of the base materials, surfacing and curbing, all of which involve the activities referred to above.

5.1.4 Depending on wind speed and turbulence it is likely that the majority of dust generated by construction activities will be deposited in the area immediately surrounding the source.

5.1.5 There are a number of properties in close proximity to the road construction location. The prevailing winds are from the southwest, with a strong northwest component also. The southwesterly winds will carry dust emissions, should they occur, towards the residential properties on the north side of Kings Road.

5.1.6 PM_{10} concentrations are not monitored in the local area, however the DEFRA background estimates for the location indicate that background PM_{10} concentrations for the area are unlikely to be higher than 20 $\mu g/m^3$ i.e. well below the objective.

5.1.7 According to the IAQM assessment procedure summarised in **Appendix C** and based on the available information on the construction phase, the proposed road link is considered to be a **Medium Risk Site** overall. **Table 7** below below provides a summary of the risk for each of the three sources of construction dust and PM_{10} (demolition impacts have not been included as it has been assumed that demolition of the existing structure would be undertaken under a separate planning application). On this basis, the significance of the construction phase impacts prior to mitigation is considered to be **moderate adverse**.

Table 7:Construction Phase Summary Significance Table Prior to Mitigation

Source	Dust soiling effects	Ecological effects	PM_{10} effects
Earthworks	Moderate adverse	None	Moderate adverse
Construction	Moderate adverse	None	Slight adverse
Trackout	Slight adverse	None	Negligible
Overall Significance		**Moderate Adverse**	

Release of emissions to air from construction traffic

5.1.8 The impact on air quality from traffic associated with this phase of the proposed road construction will be in the areas immediately adjacent to the principal means of site access for construction traffic. Based on the current local air quality in these areas and the likely volume of construction traffic, the impacts are therefore considered to be temporary, short-medium term, local and of **slight adverse** significance according to the EPUK significance criteria.

Operational phase

5.1.9 Full results of the dispersion modelling are presented in **Appendix H**, and a summary is provided below.

5.1.10 The results show that the Kings Road Link and HGV restriction on Mill Lane and Boundary Road would cause a large to imperceptible change in pollutant concentrations. The concentrations predicted for 2026 scenarios, either with or without proposed link road, are lower than for the 2012 scenarios due to an assumed reduction in vehicle emissions which is likely to still occur, particularly after 2017. This is because the EURO VI vehicles are not expected to make up more than 30% of the car and LGV fleet until around 2017, and greater improvements in fleet emissions are expected once these vehicles form a significant proportion of the fleet and therefore improving trends in emissions are anticipated. According to the EPUK significance criteria the impact of this proposed development is considered to be **slight adverse** to **negligible** for NO_2 and **negligible** for PM_{10}.

5.1.11 According to the Environmental Protection UK guidance, the impact on local air quality associated with the proposals would be a low priority consideration. This is because that whilst there is a large to medium increase at a small number of locations in close proximity to the new link road, decreases in concentrations are seen at a number of other receptor locations and the impact on the AQMA is negligible. The proposed HGV restriction and new road link would not interfere significantly with the implementation of the AQAP for Newbury.

Annual mean NO_2 concentrations

5.1.12 The objective for annual mean NO_2 concentrations is 40µg/m^3 to be achieved by the end of 2005 and thereafter. The results of the assessment show that in the 2012 baseline case concentrations are not predicted to exceed the objective at any of the receptor locations considered. The highest predicted concentration is 37.91µg/m^3 at 11 Shaw Road (receptor 31), with elevated concentrations (>35µg/m^3) also predicted to occur at the Winchester House receptor and locations in London Road. This is consistent with recent monitoring data that has shown elevated NO_2 concentrations at points of relevant exposure in these locations in the past. Concentrations are well below the objective at all other sensitive locations.

5.1.13 These results agree with the conclusions of the review and assessment work undertaken by WBC, which concluded that exceedences of the objective for this pollutant may occur in some areas of Newbury.

5.1.14 With the proposed new Kings Road Link in operation in 2012, no exceedences are predicted. The highest predicted concentration of 39.71µg/m^3, which is again predicted to occur at 11 Shaw Road.

5.1.15 The largest increase in concentrations is 3.04µg/m^3, which is predicted to occur at 1 – 6 Gordon Court (receptor 5). This receptor location would be in relatively close proximity to the Kings Road Link and therefore is likely to experience an increase in pollutant concentrations as a result of the operation of the new road link. Medium to small increases are also predicted at the other receptor locations considered on Gordon Road. It should also be noted that medium to small decreases in concentrations are predicted at a number of other receptor locations. The decreases are predicted to occur on Mill Lane (receptors 8, 9 and 10) and Kings Road (receptors 1 and 4).

5.1.16 For the receptors within, or in close proximity, the AQMA (receptors 18, 19 and 20), any change in concentration due to the operation of the Kings Road Link and HGV restrictions is imperceptible at worst; therefore, the proposed new link road and the HGV restrictions will give rise to a negligible impact on the AQMA location.

5.1.17 Overall, medium increases in concentrations are predicted to occur at two receptors, with small increases in concentrations predicted to occur at 7 receptors. At all other receptors the change in concentration is either a medium to small decrease or imperceptible change. As a result, the impact of the proposed new Kings Road Link is considered to be of **slight beneficial** significance at three receptor locations and **negligible** at all but one of the remaining receptor locations, where the impact is of **slight adverse** significance (11 Shaw Road).

5.1.18 In 2026, the predicted concentrations (with the exception of two locations with the proposed road link operational) both with and without the proposed new Kings Road Link are predicted to be less than those predicted for the 2012 scenarios. This is due to the assumption that vehicle emissions will decrease over time, particularly after

2017. No exceedences of the objective are predicted at any receptor locations, with the concentrations at all of the receptors predicted to be well below the objective. The highest predicted concentrations again occur at 11 Shaw Road (receptor 31) and are 29.67µg/m^3 without the new road link and 30.90µg/m^3 with the new road link.

5.1.19 The largest increase in concentration due to the operation of the new Kings Road Link occurs at 138 Kings Road (receptor 2), where an increase of 4.56µg/m^3 is predicted. A change in concentration of this magnitude is classified as large according to the EPUK criteria; however, because the predicted concentration with the road operational is less than 36µg/m^3, the significance of the impact is considered to be **slight adverse**. For the remaining receptor locations where increases were predicted, the change in concentration ranges from medium to imperceptible, however, the significance of the impact is considered **negligible** at all of these locations, including the AQMA, due to lower predicted concentrations.

5.1.20 On the Stirling Cables site, predicted concentrations are well below the objective even at the worse case locations assessed. It is likely that the Stirling Cable site would be redeveloped prior to 2026. On the basis of the results for 2012 at the existing receptor locations in similar proximity to Kings Road and the proposed Kings Road Link, it is considered unlikely that exceedences of the objective would occur at locations of relevant exposure on the Stirling Cables site at years between 2012 and 2026.

Hourly mean NO_2 concentrations

5.1.21 The annual mean NO_2 concentrations predicted by the model were all below 60µg/m^3, and therefore exceedences of the hourly mean NO_2 concentration objective are unlikely to occur. These results again agree with the conclusions of the review and assessment work undertaken by WBC, which concluded that, although the AQMA in Newbury was declared on the basis of exceedences of both the annual and 1-hour objectives, no breach of the 1-hour objective had occurred in the AQMA in Newbury in 2010 or 2011.

Annual mean PM_{10} concentrations

5.1.22 The objective for annual mean PM_{10} concentrations is a concentration of 40µg/m^3 to be achieved by the end of 2004 and thereafter. The results of the assessment show that in the 2012 baseline concentrations at all of the receptors considered are predicted to easily meet the objective. The highest predicted concentration is 21.69µg/m^3 at the 11 Shaw Road receptor (receptor 31).

5.1.23 These results agree with the conclusions of the review and assessment work undertaken by WBC, which concluded that no AQMAs needed to be designated for this pollutant.

5.1.24 With the proposed Kings Link Road in operation, the highest predicted concentration also occurs at the 11 Shaw Road receptor where the concentration is 21.85µg/m^3 with the new road link operational. The greatest increase in concentration due to the new road link is 0.63µg/m^3, which is predicted to occur at the Gordon Court receptor (receptors 5).

5.1.25 The increases in concentrations with the development operational are small (at 5 receptors) to imperceptible and the impact of the development is **negligible** according to the EPUK criteria.

5.1.26 In 2026, the highest predicted concentration in the ”without road link” scenario is 21.06µg/m^3, which occurs at 134 London Road (receptor 30). With the Kings Road Link operational, the highest concentration of 21.44 µg/m^3 is predicted to occur at 134 Kings Road (receptor 2). The largest increase in concentrations due to the operation of the new road link also occurs at receptor 2 and is 2.10 µg/m^3. The increases in concentrations with the development operational are medium (one receptor) to imperceptible and the impact of the development is **negligible** according to the EPUK criteria.

5.1.27 On the Stirling Cables site, predicted concentrations are well below the objective even at the worse case locations assessed.

24 hour mean PM_{10} concentrations

5.1.28 The objective for 24-hour mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year by the end of 2004 and thereafter. The results of the dispersion modelling show the number of days of exceedences is 6 in 2012, both with and without the proposed Kings Road Link, which is below the objective.

5.1.29 These results again agree with the conclusions of the review and assessment work undertaken by WBC, which concluded that no AQMAs needed to be designated for this pollutant.

5.1.30 In 2026, the number of days of exceedences at the existing receptor locations reduces to 5 both with and without the new road link operational, which is below the objective. On the Stirling Cables site, the maximum number of days on which exceedences occur is 8, which is also below the objective.

5.2 MITIGATION

Construction phase

5.2.1 A number of mitigation methods should be implemented, as appropriate including:

- vehicles carrying loose aggregate and workings should be sheeted at all times;
- implementation of design controls for construction equipment and vehicles and use of appropriately designed vehicles for materials handling;
- completed earthworks should be covered as soon as is practicable;
- regular inspection and, if necessary, cleaning of local surrounding road network and site boundaries of the road construction site to check for dust deposits (and removal if necessary);
- minimise the number and surface areas of stockpiles (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;
- where appropriate, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the construction area and the surroundings;
- where practicable, 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;
- during dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up;
- use of dust-suppressed tools for all operations;
- ensuring that all construction plant and equipment is maintained in good working order and not left running when not in use; and
- Restrict construction vehicle movements to well within road construction site and not near the perimeter, if possible.

5.2.2 Detailed mitigation measures to control construction traffic should be discussed with WBC to establish the most suitable access and haul routes for the site traffic. The most effective mitigation will be achieved by ensuring that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc) where possible, and that vehicles are kept clean (through the use of wheel washers, etc.) and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

5.2.3 It is recommended that liaison with the local authority be maintained throughout the construction process.

Operational phase

5.2.4 The aim of the proposed Kings Link Road is to improve traffic flow in and around the Kings Road area of Newbury and restrict HGV movements on Mill Lane and Boundary Road. The road link will be designed to ensure free flowing conditions are maintained as far as practicable and HGVs will be removed from narrow roads with residential dwelling located adjacent to them. This will ensure the impacts of the proposed road link on local air quality are minimised

5.2.5 The results of the assessment have shown the significance of the impact of the proposed road link is slight adverse at worst at one receptor location. The results have also shown that there will be small decreases in pollutant concentrations at a number of other receptor locations, which represent an improvement in air quality. In addition, the HGV restrictions on Mill Lane and Boundary Roads are likely to also improve the amenity in the residential locations along these roads. Therefore, further mitigation for the Kings Road Link when operational is not considered necessary.

5.3 RESIDUAL EFFECTS

Construction phase

5.3.1 The overall significance of the effects arising from the construction phase of the proposed road link following the appropriate use of mitigation measures and good site practice is shown in the **Table 8** below.

Table 8: Construction Phase Summary Significance Table with Mitigation

Source	Dust soiling effects	Ecological effects	PM_{10} effects
Earthworks	Slight adverse	None	Negligible
Construction	Slight adverse	None	Negligible
Trackout	Negligible	None	Negligible
Overall Significance		**Negligible**	

5.3.2 With appropriate use of mitigation measures and good site management the overall residual effects of dust and PM_{10} generation and deposition are considered to be **negligible**.

5.3.3 Construction traffic is likely to have some level of impact on local air quality. The residual effects of construction traffic are likely to by short term, direct, local and of **negligible** significance.

Operational phase

5.3.4 In 2012, the proposed development is predicted to cause a medium to imperceptible changes (both increases and decreases) in NO_2 concentrations and small to imperceptible changes in PM_{10} concentrations. The changes in concentrations in 2026 are predicted to be large to imperceptible for NO_2 and medium to imperceptible for PM_{10}.

5.3.5 At all but one of the sensitive locations, concentrations are predicted to meet the statutory objectives both with and without the new proposed road. At one location the annual mean NO_2 concentration is predicted to slightly exceed the objective in 2012 with the Kings Road Link operational. The predicted increase in the proportion of HGVs and the low traffic speed assumed in the assessment are likely to be the reasons for the small increase in NO_2 concentration.

5.3.6 Monitoring data from locations in Shaw Road do not show any exceedences of the objective for annual mean NO_2 concentrations and it is likely that the conservative assumption included in the modelling have over-estimated the impact of the proposed new road link in this location. Review of the past five years of monitoring data at urban background locations show that concentrations are generally declining, although this is not clear in Shaw Road, it is considered unlikely that the traffic flow changes due to the new road link would not give rise to any additional exceedences at locations of relevant exposure in Shaw Road.

5.3.7 On the Stirling Cables site, no exceedences of the objective for NO_2 or PM_{10} are predicted in 2026. Based on the concentrations predicted in 2012 at existing receptor locations in close proximity to Kings Road and the proposed Kings Road Link indicate that exceedences of the objectives are unlikely to occur on the site in the years between 2012 and 2026.

5.3.8 The residual effects of the proposed road link and HGV restrictions on air quality in 2012 are of **slight beneficial** significance (at three receptors), **slight adverse** (at one receptor location) and **negligible** (for all remaining receptors) for NO_2 and **negligible** at all locations for PM_{10} according to the EPUK significance criteria. In 2026, the residual effects are of **slight adverse** (at one receptor) to **negligible** significance (for all remaining receptors) for NO_2 and **negligible** at all locations for PM_{10} according to the EPUK significance criteria.

6 SUMMARY

6.1.1 A qualitative assessment of the potential impacts on local air quality from construction activities associated with the proposed Kings Road Link has been carried out based on the available information on this phase of the new road link and the IAQM construction assessment procedure. This showed that the proposed development is considered to be a Medium Risk Site overall for earthworks, general construction activities and trackout. However, through good site practice and the implementation of the mitigation measures described in this report, the impact of dust and PM_{10} releases will be reduced and excessive releases prevented. The overall residual effects of the construction phase on air quality are considered to be **negligible**.

6.1.2 In addition, a quantitative assessment of the potential impacts during the operational phase was undertaken using Breeze Roads to predict the changes in NO_2 and PM_{10} concentrations that would occur due to traffic flow and composition changes resulting from the proposed HGV restrictions on Mill Lane and Boundary Road and the operation of the Kings Road Link. In addition, an assessment of the potential exposure of future occupants and users of any future residential development of the Stirling Cables site to poor air quality has been included.

6.1.3 In 2012, no exceedences of the objective for annual mean NO_2 are predicted. Medium increases in annual mean NO_2 concentrations are predicted to occur at two receptors, with small increases in concentrations are predicted to occur at 7 receptors; at all other receptors the change in concentration is either a medium to small decrease or imperceptible. As a result, for annual mean NO_2 concentrations, the impact of the proposed new Kings Road Link is considered to be of **slight beneficial** significance at three receptor locations, of **slight adverse** significance at one receptor location and **negligible** at all other receptor locations.

6.1.4 In 2026, a large increase in annual mean NO_2 concentration is predicted at one receptor location; however, because the predicted concentration with the road operational is less than 36µg/m^3, the significance of the impact is considered to be **slight adverse**. For the remaining receptor locations where increases were predicted, the change in concentration ranges from medium to imperceptible, however, the significance of the impact is considered to be **negligible** at all of these locations according to the EPUK significance criteria used..

6.1.5 For PM_{10}, the increases in concentrations in 2012 with the development operational are small to imperceptible. In 2026, the increases in concentrations with the development operational are medium to imperceptible; however, due to the relatively low concentrations predicted, the impact of the development is **negligible** for both 2012 and 2026 according to the EPUK criteria.

6.1.6 The alterations to the traffic flows associated with the HGV restriction and the new link road will impact on the wider network; however, however, the results of the assessment show an imperceptible change in pollutant concentrations in the AQMA area, leading to an impact classified as **negligible** in this location.

6.1.7 Concentrations predicted at locations on the Stirling Cables site where residential development may occur were all below the objectives for NO_2 and PM_{10}. It is likely, however, that the Stirling Cable site would be redeveloped prior to 2026. On the basis of the results for 2012 at the existing receptor locations in similar proximity to Kings Road and the proposed Kings Road Link, it is considered unlikely that exceedences of the objective would occur at locations of relevant exposure on the Stirling Cables site at years between 2012 and 2026.

6.1.8 The proposals are therefore considered to comply with Policy OVS.5 ‘Environmental Nuisance And Pollution Control’ of the saved polices from the West Berkshire District Local Plan. According to the Environmental Protection UK guidance, the impact on local air quality associated with the proposals would be a low priority consideration in the planning process.

APPENDICES

Appendix A Glossary of Terms

Term	Definition
AADF/T Annual Average Daily Flow/Total	A daily total traffic flow (24 hrs), expressed as a mean daily flow across all 365 days of the year.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
Conservative	Tending to over-predict the impact rather than under-predict.
Data capture	The percentage of all the possible measurements for a given period that were validly measured.
DEFRA	Department for Environment, Food and Rural Affairs.
Emission rate	The quantity of a pollutant released from a source over a given period of time.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
LAQM	Local Air Quality Management.
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$\mu g/m^3$ microgram per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1ug/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
Validation	Refers to the general comparison of modelled results against monitoring data carried out by model

(modelling)	developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

Appendix B Air Quality Standards & Objectives

A summary of the current air quality objectives for the seven pollutants detailed in the *Air Quality Regulations 2000 and (Amendment) Regulations 2002* for the purpose of Local Air Quality Management is provided below.

Air Quality Objectives currently included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)

Pollutant	Applies to	Standard		Objective		EU AQ Daughter Directive
		Concentration	*Measured as*	*Annual exceedences allowed*	Target date	
Benzene (C_6H_6)	All UK	16.25µg/m^3	running annual mean		31.12.2003	
	England and Wales	5µg/m^3	annual mean		31.12.2010	As standard. target: 01.01.2010
	Scotland	3.25µg/m^3	running annual mean		31.12.2010	
1,3-Butadiene (C_4H_6)	All UK	2.25µg/m^3	running annual mean		31.12.2003	
Carbon monoxide (CO)	All UK	10mg/m^3	maximum daily running 8 hour mean		31.12.2003	As standard. target: 01.01.2005
Lead (Pb)	All UK	0.5µg/m^3	annual mean		31.12.2004	As standard. target: 01.01.2005[8]
	All UK	0.25µg/m^3	annual mean		31.12.2008	
Nitrogen dioxide (NO_2)	All UK	200µg/m^3	1 hour mean	18	31.12.2005	As objective. target: 01.01.2010
	All UK	40µg/m^3	annual mean		31.12.2005	As standard. target: 01.01.2010
Particulate Matter (PM_{10}) (gravimetric)[1]	All UK	40µg/m^3	annual mean		31.12.2004	As standard. target: 01.01.2005
	All UK	50µg/m^3	24 hour mean	35	31.12.2004	As objective. target: 01.01.2005
	Scotland	50µg/m^3	24 hour mean	7	31.12.2010	As objective. target: 01.01.2010
	Scotland	18µg/m^3	annual mean		31.12.2010	
Sulphur dioxide (SO_2)	All UK	266µg/m^3	15 minute mean	35	31.12.2005	
	All UK	350µg/m^3	1 hour mean	24	31.12.2004	As objective. target: 01.01.2005
	All UK	125µg/m^3	24 hour mean	3	31.12.2004	As objective. target: 01.01.2005

Provisional Air Quality Objectives currently NOT included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)						
Pollutant	**Applies to**	**Standard**		**Objective**		**EU AQ Daughter Directive**
		Concentration	*Measured as*	*Annual exceedences allowed*	Target date	
Polycyclic aromatic hydrocarbons (PAHs)[2]	All UK	0.25ng/m^3 B[a]P[3]	annual mean		31.12.2010	
Particulate Matter ($PM_{2.5}$) (gravimetric)[1,2]	UK (except Scotland)	25µg/m^3	annual mean	-	2020	As standard Target 2010
	Scotland	12µg/m^3	annual mean	-	2020	25µg/m^3 Target 2015
	UK urban areas	Target of 15% reduction in concentrations at urban background	annual mean	-	Between 2010 and 2020	Target 20% reduction in concentrations at urban background Target Between 2010 and 2020

Other Air Quality Strategy Objectives						
Pollutant	**Applies to**	**Standard**		**Objective**		**EU AQ Daughter Directive**
		Concentration	*Measured as*	*Annual exceedences allowed*	Target date	
For the protection of human health						
Ozone (O_3)[4]	All UK	100µg/m^3	maximum daily running 8 hour mean	10	31.12.2005	As objective; but 25 annual exceedences target: 01.01.2010
For the protection of vegetation and ecosystems[5]						
Nitrogen oxides (NO_X)[6]		30µg/m^3	annual mean		31.12.2000[7]	As standard. target: 19.07.2001
Sulphur dioxide (SO_2)		20µg/m^3	annual mean		31.12.2000[7]	As standard. target: 19.07.2001
		20µg/m^3	winter mean (1 October to 31 March)		31.12.2000[7]	As standard. target: 19.07.2001

Explanation:
ng/m^3 = nanograms per cubic metre; $\mu g/m^3$ = micrograms per cubic metre; mg/m^3 = milligrams per cubic metre (i.e. micrograms per cubic meter x 1,000); 1 Measured using the European gravimetric transfer sampler or equivalent. 2 Objective to be set in regulations in the future. 3 Concentration of Benzo[a]pyrene (B[a]P) to be measured as a marker for the total mixture of PAHs. 4 The objective for this pollutant is provisional and must be tackled at a national level due to its trans-boundary nature. 5 Only applies to those parts of the UK > 20km from an agglomeration; and > 5km from Part A processes, motorways and built up areas of > 5,000 people. 6 Assuming NO_X is taken as NO_2. 7 These objectives have successfully been achieved. 8 Also an EU AQ Directive Limit Value of $1\mu g/m^3$ to be achieved by 01.01.2010 in the immediate vicinity (1000 m) of certain named industrial sources situated on sites contaminated by decades of industrial activities.

The Air Quality Strategy states that further review and assessment and consultation in relation to air quality will be a rolling process, with additional revisions to the objectives for selected pollutants as appropriate, or where there is new evidence in relation to the effects of pollutants on health or ecosystems. New pollutants may be introduced through future reviews.

Appendix C Summary of IAQM Construction Phase Impact Assessment Procedure

Step 1 – Screening the need for a Detailed Assessment

An assessment will normally be required where there are sensitive receptors within 350m of the site boundary and/or within 100m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible".

Step 2 – Assess the Risk of Dust Effects Arising

The tables below show the risk categories for the potential dust and PM_{10} impacts from demolition; earthworks; general construction activities and trackout. They assume that no mitigation measures are applied and are dependent on the available information on the construction phase and professional judgement. The risk categories should be used as guidance for determining the level of mitigation that must be applied.

1) Demolition

The following are examples of the potential dust emission classes (note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment:

- Large: Total building volume >50 000 m^3 potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- Medium: Total building volume 20 000 m^3 – 50 000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- Small: Total building volume <20 000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

The potential dust emission class determined above should be used in the matrix in Table A to determine the demolition risk category with no mitigation applied (high, low or medium risk) based on the distance to the nearest receptors. This varies depending on the different effects under consideration.

Table A: Risk Category from Demolition Activities

Distance to nearest receptor (m) [(a)]		Dust Emission Class		
Dust Soiling and PM_{10}	**Ecological**	**Large**	**Medium**	**Small**
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 100	<20	High Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 - 40	Medium Risk Site	Low Risk Site	Low Risk Site
200 - 350	40 - 100	Medium Risk Site	Low Risk Site	Negligible

(a) Distance from dust emission source. Where this is not known then the distance should be taken from the site boundary. The risk is based on the distance to the nearest receptor.

2) Earthworks and Construction Activities

The following are examples of the potential dust emission classes (note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment:

Earthworks

- Large: Total site area >10 000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100 000 tonnes;
- Medium: Total site area 2 500 m^2 – 10 000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20 000 tonnes – 100 000 tonnes; and,
- Small: Total site area <2 500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.

Construction Activities

- Large: Total building volume >100 000 m^3, piling, on site concrete batching, sandblasting
- Medium: Total building volume 25 000 m^3 – 100 000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
- Small: Total building volume <25 000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The potential dust emission class determined above should be used in the matrix in Table B to determine the earthworks and construction activities risk categories with no mitigation applied (high, low or medium risk) based on the distance to the nearest receptors.

Table B: Risk Category from Earthworks & Construction Activities

Distance to nearest receptor (m) [(a)]		**Dust Emission Class**		
Dust Soiling and PM_{10}	**Ecological**	**Large**	**Medium**	**Small**
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	High Risk Site	Medium Risk Site	Low Risk Site
50 – 100	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 - 40	Medium Risk Site	Low Risk Site	Negligible
200 - 350	40 - 100	Low Risk Site	Low Risk Site	Negligible

(a) Distance from dust emission source. Where this is not known then the distance should be taken from the site boundary. The risk is based on the distance to the nearest receptor.

3) Trackout

Factors which determine the magnitude class are vehicle size, vehicle speed, vehicle numbers, geology and duration. As with all other potential sources, professional judgement must be applied when classifying trackout into one of the magnitude categories. Only receptors within 100 m of the route(s) used by vehicles on the public highway and up to 500 m from the site entrance(s) are considered to be at risk and the risk classification distances shown below reflect this.

The following are examples of the potential dust emission classes (note that not all the criteria need to be met for a particular class); other criteria may be used if justified in the assessment:

- Large: >100 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- Medium: 25-100 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and
- Small / Medium: <25 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m.

These numbers are for vehicles that leave the site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

These potential dust emission classes should be used in Table C to determine the trackout risk category with no mitigation applied.

Table C: Risk Category from Trackout

Distance to nearest receptor (m) [(a)]		Dust Emission Class		
Dust Soiling and PM_{10}	**Ecological**	**Large**	**Medium**	**Small**
<20	-	High Risk Site	Medium Risk Site	Medium Risk Site
20 – 50	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
50 – 100	20 – 100	Low Risk Site	Low Risk Site	Negligible

(a) For the trackout the distance is from the roads used by construction traffic.

There is an extra dimension to the assessment of trackout, as the distance over which it might occur depends on the site. As general guidance, significant trackout may occur up to 500m from large sites, 200m from medium sites and 50m from small sites, as measured from the site exit. These distances assume no site-specific mitigation.

The 'distance to receptor' in Table C relates to the distance from the road where mud may be deposited. Therefore in determining the risk from trackout, both distances need to be taken into account.

Step 3 – Identify the need for Site Specific Mitigation

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is a low, medium or high risk site.

Step 4 – Define Effects and their Significance

The significance is best determined using professional judgement, taking account of the factors that define the sensitivity of the surrounding area and the overall pattern of potential risks. The sensitivity of the area needs to be defined.

The sensitivity of the area surrounding the construction / demolition site is combined with the risk of the site giving rise to dust effects (from Step 2) to define the significance of the effects for each of the four activities (demolition, earthworks, construction and trackout).

The preference in the IAQM Guidance is to only assign significance to the impact with mitigation. The residual effects for most sites will be negligible as shown in Table D below.

Table D: Significance of Effects of Each Activity with Mitigation

Sensitivity of surrounding area	Risk of site giving rise of dust effects		
	High	**Medium**	**Low**
Very High	Slight adverse	Slight adverse	Negligible
High	Negligible	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

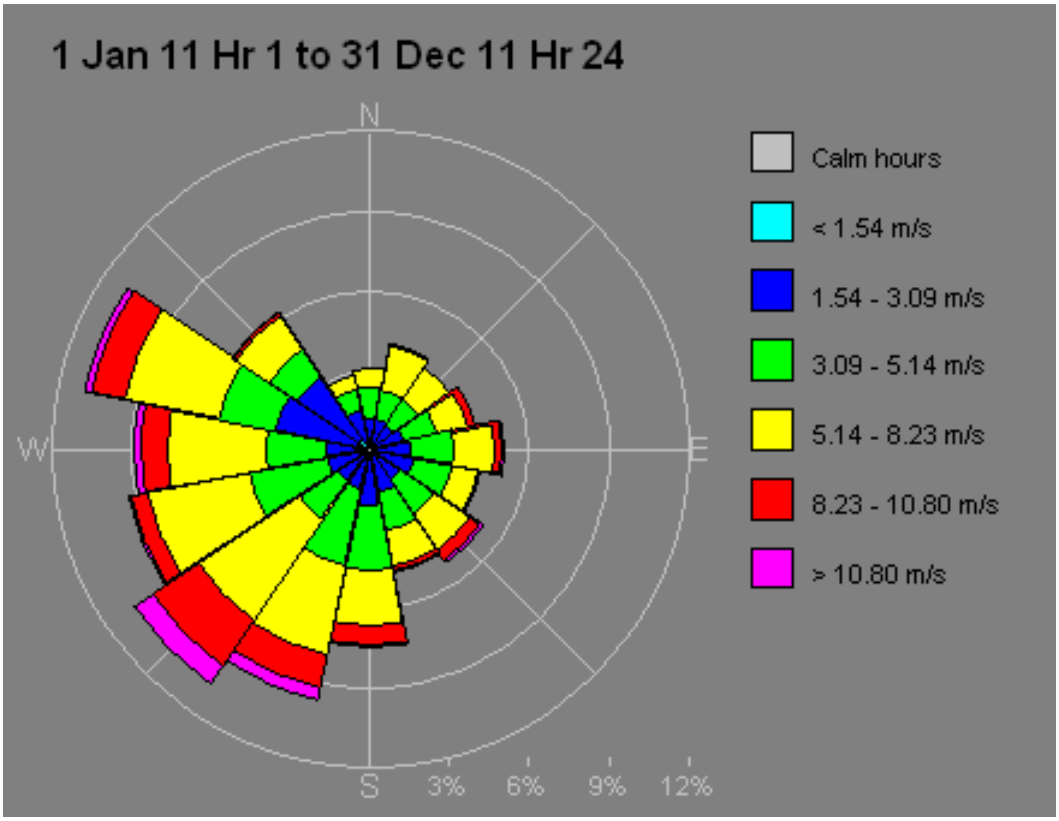
When assessment of the significance of the effects without mitigation is required, the recommended significance criteria in Table E should be used.

Table E: Significance of Effects of Each Activity without Mitigation

Sensitivity of surrounding area	Risk of site giving rise of dust effects		
	High	**Medium**	**Low**
Very High	Substantial adverse	Moderate adverse	Moderate adverse
High	Moderate adverse	Moderate adverse	Slight adverse
Medium	Moderate adverse	Slight adverse	Negligible
Low	Slight adverse	Negligible	Negligible

The final step is to determine the overall significance of the effects arising from the construction phase of a proposed development. This will be based on professional judgement but should take account of the significance of the effects for each of the four activities.

Appendix D Wind rose – Boscombe Down 2011



Appendix E Summary of Traffic Data used in the Assessment

The tables below show the data that was used in the assessment of traffic impacts on local air quality. The emission factors were obtained from spreadsheet available on DEFRA's website (EFT Version 4.2, June 2010).

2011 Verification

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	% HGV	Emission rate g/km/veh
				NOx
Kings Road (1)	41	403	2.0	0.287223
Kings Road (2)	26	412	2.0	0.343654
Kings Road (3)	48	454	2.0	0.278668
Sainsburys Roundabout	20	155	0.0	0.273886
Sainsburys entrance	24	122	0.0	0.248799
Roundabout east arm (1)	18	33	0.0	0.288739
Mill Lane (1)	42	307	2.0	0.285534
Mill Lane (2)	45	313	2.0	0.281188
Boundary Road 1 (nth of King)	43	93	0.0	0.205964
Boundary Road 2 (nth of King)	30	99	0.0	0.224132
Hambridge Rd (1)	43	517	2.0	0.283712
Hambridge Rd (2)	41	516	2.0	0.287120
Boundary Road 3 (sth of King)	30	191	1.7	0.305944
Boundary Road 4 (sth of King)	42	187	1.6	0.269839
Boundary Road 5 (sth of Queens)	40	105	0.0	0.207488
Boundary Road 6 (sth of Queens)	34	74	0.0	0.215927
Racecourse Rd (1)	30	104	1.0	0.273712
Greenham Road (1)	45	372	0.0	0.204990
Greenham Rd Roundabout (1)	15	685	0.5	0.366146
Greenham Rd Roundabout (2)	15	930	3.5	0.691005
Greenham Rd Roundabout (3)	15	720	1.0	0.402590
A339 Greenham Rd Roundabout	15	1552	2.5	0.619265
Queens Road (1)	21	319	0.6	0.302358
Queens Road (2)	28	230	1.4	0.301072
Queens Road (3)	27	123	3.0	0.387202
Queens Road (4)	29	115	3.0	0.374353

Queens Road (5)	20	117	3.0	0.456619
York Road (1)	27	112	0.0	0.234134
York Road (2)	30	35	1.2	0.286317
A339 (south of Greenham Rdbt)	60	930	3.5	0.329885
St Johns Rd (1)	40	741	1.0	0.248616
St Johns Rd (2)	45	790	1.0	0.243005
St Johns Rd Roundabout (1)	30	771	1.0	0.272614
St Johns Rd Roundabout (2)	30	368	0.5	0.248832
St Johns Rd Roundabout (3)	30	501	0.6	0.253650
Newton Street	27	526	0.0	0.234804
Bartholomew Street (1)	30	465	0.0	0.225173
Bartholomew Street (2)	30	472	0.3	0.239638
Bartholomew Street (3)	30	448	0.5	0.249147
Bartholomew Street (4)	30	531	0.7	0.258477
Craven Road	25	248	0.0	0.243083
A339 Winchcombe Road (1)	35	1659	2.5	0.323140
A339 Winchcombe Road (2)	50	1663	2.0	0.277397
Winchcombe Rd Roundabout (W)	20	1223	2.0	0.396500
Winchcombe Rd Roundabout (E)	20	1007	2.0	0.396404
A339	45	1669	2.5	0.358540
A339 Roundabout (1)	25	1644	2.0	0.350014
A339 Roundabout (2)	20	1292	2.0	0.396392
A339 Roundabout (3)	20	1526	2.0	0.396416
Shaw Road (1)	20	416	2.9	0.451982
Shaw Road (2)	30	428	2.9	0.364023
London Road (1)	60	1288	1.5	0.261387

2012 Baseline

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NOx	PM_{10}
Kings Road (1)	41	404	2.0	0.286636	0.033702
Kings Road (2)	26	414	2.0	0.343697	0.036019
Kings Road (3)	48	458	2.0	0.278592	0.033421
Sainsburys Roundabout	20	157	0.0	0.274233	0.034749
Sainsburys entrance	24	123	0.0	0.247997	0.033473
Roundabout east arm (1)	18	34	0.0	0.294048	0.035810
Mill Lane (1)	42	312	2.0	0.285690	0.033728
Mill Lane (2)	45	318	2.0	0.281215	0.033523
Boundary Road 1 (nth of King)	43	94	0.0	0.205908	0.031356
Boundary Road 2 (nth of King)	30	101	0.0	0.226051	0.032521
Hambridge Rd (1)	43	520	2.0	0.283611	0.033602
Hambridge Rd (2)	41	520	2.0	0.287247	0.033778
Boundary Road 3 (sth of King)	30	195	1.7	0.378780	0.037649
Boundary Road 4 (sth of King)	42	190	1.6	0.269276	0.033190
Boundary Road 5 (sth of Queens)	40	108	0.0	0.208890	0.031624
Boundary Road 6 (sth of Queens)	34	74	0.0	0.214811	0.031755
Racecourse Rd (1)	30	104	1.0	0.247655	0.032553
Greenham Road (1)	45	337	0.0	0.204912	0.031269
Greenham Rd Roundabout (1)	15	697	0.5	0.270371	0.034057
Greenham Rd Roundabout (2)	15	933	3.5	0.504077	0.038424
Greenham Rd Roundabout (3)	15	731	1.0	0.296623	0.034742
A339 Greenham Rd Roundabout	15	1555	2.5	0.451619	0.036957
Queens Road (1)	21	324	0.6	0.301920	0.035322
Queens Road (2)	28	234	1.4	0.300983	0.034636
Queens Road (3)	27	124	3.0	0.386113	0.036946
Queens Road (4)	29	117	3.0	0.374835	0.036628
Queens Road (5)	20	118	3.0	0.455506	0.039513
York Road (1)	27	115	0.0	0.234560	0.032815
York Road (2)	30	37	1.2	0.286504	0.034546
A339 (south of Greenham Rdbt)	60	933	3.5	0.349944	0.035700
St Johns Rd (1)	40	752	1.0	0.272553	0.033681
St Johns Rd (2)	45	804	1.0	0.257873	0.033079
St Johns Rd Roundabout (1)	30	784	1.0	0.296817	0.034762

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NOx	PM_{10}
St Johns Rd Roundabout (2)	30	377	0.5	0.270282	0.034043
St Johns Rd Roundabout (3)	30	654	0.6	0.275251	0.034145
Newton Street	27	536	0.0	0.234818	0.032851
Bartholomew Street (1)	30	486	0.0	0.235117	0.032893
Bartholomew Street (2)	30	482	0.3	0.351499	0.037916
Bartholomew Street (3)	30	458	0.5	0.282070	0.034578
Bartholomew Street (4)	30	545	0.7	0.293086	0.034858
Craven Road	25	254	0.0	0.248019	0.033476
A339 Winchcombe Road (1)	35	1662	2.5	0.297711	0.033956
A339 Winchcombe Road (2)	50	1665	2.0	0.281867	0.033558
Winchcombe Rd Roundabout (W)	20	1228	2.0	0.396337	0.038056
Winchcombe Rd Roundabout (E)	20	1013	2.0	0.396462	0.038073
A339	45	1684	2.5	0.352964	0.033880
A339 Roundabout (1)	25	1658	2.0	0.350152	0.036238
A339 Roundabout (2)	20	1301	2.0	0.396428	0.038068
A339 Roundabout (3)	20	1539	2.0	0.396389	0.038063
Shaw Road (1)	20	423	2.9	0.451251	0.039557
Shaw Road (2)	30	435	2.9	0.363223	0.036218
London Road (1)	60	1299	1.5	0.261509	0.032930

2012 With Kings Road Link

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NOx	PM_{10}
Kings Road (1)	26	540	2.7	0.379642	0.036964
Kings Road (2B)	30	131	0.0	0.225850	0.032492
Kings Road (3)	48	395	2.0	0.278687	0.033428
Sainsburys Roundabout	20	481	3.0	0.458329	0.039811
Sainsburys entrance	23	123	0.0	0.253358	0.033721
Roundabout east arm (1)	30	459	3.0	0.368371	0.036393
Mill Lane (1)	20	165	0.0	0.273551	0.034662
Mill Lane (2)	20	172	0.0	0.274575	0.034792
Boundary Road 1 (nth of King)	44	53	0.0	0.207143	0.031582
Boundary Road 2 (nth of King)	28	59	0.0	0.231452	0.032710

Hambridge Rd (1)	42	626	2.5	0.304894	0.034229
Hambridge Rd (2)	41	624	2.4	0.302649	0.034168
Boundary Road 3 (sth of King)	20	213	1.5	0.366015	0.037257
Boundary Road 4 (sth of King)	42	223	1.4	0.262075	0.033049
Boundary Road 5 (sth of Queens)	40	134	0.0	0.207457	0.031407
Boundary Road 6 (sth of Queens)	34	80	0.0	0.216522	0.032008
Racecourse Rd (1)	40	105	1.0	0.248507	0.032665
Greenham Road (1)	33	348	0.0	0.217731	0.031999
Greenham Rd Roundabout (1)	25	719	0.5	0.269706	0.033969
Greenham Rd Roundabout (2)	25	938	3.0	0.478089	0.037712
Greenham Rd Roundabout (3)	25	738	1.0	0.296919	0.034778
A339 Greenham Rd Roundabout	25	1541	2.0	0.425362	0.036220
Queens Road (1)	21	351	0.6	0.301889	0.035320
Queens Road (2)	28	262	1.3	0.296410	0.034546
Queens Road (3)	27	132	3.0	0.387496	0.037098
Queens Road (4)	29	125	3.0	0.374659	0.036633
Queens Road (5)	20	126	3.0	0.455657	0.039550
York Road (1)	27	135	0.0	0.234052	0.032744
York Road (2)	30	58	0.1	0.229033	0.032399
A339 (south of Greenham)	76	931	3.0	0.333102	0.035256
St Johns Rd (1)	30	759	1.0	0.272864	0.033720
St Johns Rd (2)	35	810	1.0	0.257619	0.033047
St Johns Rd Roundabout (1)	25	791	1.0	0.296664	0.034745
St Johns Rd Roundabout (2)	25	376	0.5	0.270174	0.034029
St Johns Rd Roundabout (3)	25	654	1.0	0.296698	0.034746
Newton Street	27	545	0.0	0.235025	0.032880
Bartholomew Street (1)	27	471	0.0	0.235092	0.032889
Bartholomew Street (2)	15	474	0.6	0.372922	0.038440
Bartholomew Street (3)	23	450	0.5	0.281965	0.034565
Bartholomew Street (4)	23	533	0.7	0.292854	0.034830
Craven Road	24	248	0.6	0.281743	0.034502
A339 Winchcombe Road (1)	47	1650	2.0	0.279258	0.033437
A339 Winchcombe Road (2)	64	1651	1.5	0.264672	0.033046
Winchcombe Rd Roundabout (W)	29	1193	2.0	0.325481	0.035247
Winchcombe Rd Roundabout (E)	35	989	2.0	0.301093	0.034271
A339	58	1672	2.4	0.349039	0.033781
A339 Roundabout (1)	15	1647	2.0	0.475696	0.041192

A339 Roundabout (2)	15	1297	2.0	0.475551	0.041180
A339 Roundabout (3)	15	1536	2.0	0.475755	0.041196
Shaw Road (1)	20	415	3.4	0.482220	0.040422
Shaw Road (2)	30	427	3.4	0.386925	0.036868
London Road (1)	60	1294	1.0	0.244158	0.032408
Kings Road New Link (1)	40	447	3.0	0.328976	0.034951
Kings Road New Link (2)	40	439	3.0	0.329492	0.035001
Kings Road (2A)	31	158	4	0.410844	0.037636

2026 Baseline

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NOx	PM_{10}
Kings Road (1)	41	542	1.0	0.102182	0.025243
Kings Road (2)	26	556	1.0	0.120572	0.025622
Kings Road (3)	48	657	1.0	0.099825	0.025177
Sainsburys Roundabout	15	323	0.0	0.151682	0.026042
Sainsburys entrance	24	285	0.0	0.113166	0.025088
Roundabout east arm (1)	18	38	0.0	0.134767	0.025739
Mill Lane (1)	42	554	1.0	0.101615	0.025212
Mill Lane (2)	45	564	1.0	0.100471	0.025186
Boundary Road 1 (nth of King)	43	312	0.0	0.092443	0.024616
Boundary Road 2 (nth of King)	30	319	0.0	0.102010	0.024820
Hambridge Rd (1)	43	327	1.0	0.101250	0.025223
Hambridge Rd (2)	41	771	1.6	0.107606	0.025608
Boundary Road 3 (sth of King)	20	186	1.5	0.146673	0.026440
Boundary Road 4 (sth of King)	42	189	1.4	0.104812	0.025363
Boundary Road 5 (sth of Queens)	40	146	0.5	0.097633	0.024814
Boundary Road 6 (sth of Queens)	34	122	0.6	0.103619	0.025099
Racecourse Rd (1)	40	232	1.0	0.102682	0.025241
Greenham Road (1)	33	590	0.0	0.098365	0.024710
A339/Greenham Rd Junction (1)	25	915	0.0	0.110808	0.025029
A339/Greenham Rd Junction (2)	25	1223	2.5	0.141581	0.026720
A339/Greenham Rd Junction (3)	25	911	1.0	0.123174	0.025718
A339/Greenham Rd Junction (3)	25	2117	2.0	0.135415	0.026381
Queens Road (1)	21	299	0.5	0.128710	0.025645
Queens Road (2)	28	187	0.1	0.106044	0.024928

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NOx	PM_{10}
Queens Road (3)	27	65	3.0	0.141137	0.026774
Queens Road (4)	29	56	3.0	0.135930	0.026572
Queens Road (5)	20	60	3.0	0.167819	0.027476
York Road (1)	27	124	0.0	0.106340	0.024834
York Road (2)	30	30	1.8	0.120392	0.025653
A339 (south of Greenham)	76	1223	2.5	0.121174	0.026469
St Johns Rd (1)	30	926	1.0	0.112995	0.025474
St Johns Rd (2)	35	962	1.0	0.106536	0.025309
St Johns Rd Roundabout (1)	25	931	1.0	0.123171	0.025718
St Johns Rd Roundabout (2)	25	420	0.4	0.115724	0.025298
St Johns Rd Roundabout (3)	25	765	1.0	0.123110	0.025704
Newton Street	27	563	0.0	0.106771	0.024934
Bartholomew Street (1)	27	519	0.0	0.106705	0.024919
Bartholomew Street (2)	15	518	0.6	0.161914	0.026497
Bartholomew Street (3)	23	497	0.5	0.122246	0.025494
Bartholomew Street (4)	23	549	0.3	0.119655	0.025356
Craven Road	24	279	0.0	0.112968	0.025044
A339 Winchcombe Road (1)	47	2225	2.0	0.108468	0.025796
A339 Winchcombe Road (2)	64	2285	2.0	0.110177	0.025914
Winchcombe Rd Roundabout (W)	20	1871	1.0	0.139584	0.026086
Winchcombe Rd Roundabout (E)	20	1374	2.0	0.153831	0.026813
A339 (1)	58	2073	2.0	0.108349	0.025855
A339 Roundabout (1)	25	1987	2.0	0.135373	0.026372
A339 Roundabout (2)	20	1282	2.0	0.153788	0.026803
A339 Roundabout (3)	20	1510	2.0	0.153762	0.026800
Shaw Road (1)	20	446	1.9	0.152585	0.026774
Shaw Road (2)	32	456	1.5	0.115283	0.025712
London Road (1)	60	1562	1.0	0.101052	0.025265
A339 (2)	58	1775	2.4	0.111399	0.026077

2026 With Kings Road Link

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV	Emission rate g/km/veh	
				NOx	PM_{10}
Kings Road (1)	41	834	2.0	0.111129	0.025828
Kings Road (2B)	30	191	1.0	0.112949	0.025462
Kings Road (3)	48	1028	1.5	0.104071	0.025499
Sainsburys Roundabout	15	853	1.4	0.175442	0.027086
Sainsburys entrance	24	287	0.0	0.113115	0.025076
Roundabout east arm (1)	14	722	2.4	0.202151	0.028081
Mill Lane (1)	15	177	0.0	0.151333	0.025982
Mill Lane (2)	16	187	0.0	0.145202	0.025910
Boundary Road 1 (nth of King)	43	128	0.0	0.092376	0.024598
Boundary Road 2 (nth of King)	13	134	0.0	0.167718	0.026366
Hambridge Rd (1)	44	857	2.0	0.109622	0.025830
Hambridge Rd (2)	41	835	2.0	0.111196	0.025844
Boundary Road 3 (sth of King)	20	230	1.2	0.142580	0.026256
Boundary Road 4 (sth of King)	42	239	1.1	0.102479	0.025265
Boundary Road 5 (sth of Queens)	40	192	0.4	0.097114	0.024855
Boundary Road 6 (sth of Queens)	34	127	0.6	0.103613	0.025097
Racecourse Rd (1)	40	241	1.0	0.102840	0.025281
Greenham Road (1)	33	582	0.0	0.098520	0.024749
A339/Greenham Rd Junction (1)	25	954	0.4	0.115643	0.025280
A339/Greenham Rd Junction (2)	25	954	0.4	0.115643	0.025280
A339/Greenham Rd Junction (3)	25	1250	2.5	0.141587	0.026724
A339/Greenham Rd Junction (3)	25	2117	2.0	0.135410	0.026380
Queens Road (1)	21	340	1.0	0.135758	0.026031
Queens Road (2)	28	233	0.0	0.104789	0.024836
Queens Road (3)	27	72	3.0	0.141220	0.026804
Queens Road (4)	29	64	4.0	0.148670	0.027511
Queens Road (5)	20	67	4.0	0.180982	0.028020
York Road (1)	27	124	0.0	0.106340	0.024834
York Road (2)	30	70	1.0	0.111934	0.025227
A339 (south of Greenham Rdbt)	76	1250	2.5	0.121183	0.026472
St Johns Rd (1)	30	901	1.0	0.112921	0.025457
St Johns Rd (2)	35	953	1.0	0.106495	0.025299
St Johns Rd Roundabout (1)	25	922	1.0	0.123064	0.025695

St Johns Rd Roundabout (2)	25	175	0.0	0.110553	0.024972
St Johns Rd Roundabout (3)	25	758	1.0	0.123035	0.025688
Newton Street	27	564	0.0	0.106751	0.024930
Bartholomew Street (1)	27	491	0.0	0.106704	0.024919
Bartholomew Street (2)	15	487	0.3	0.156776	0.026267
Bartholomew Street (3)	23	467	0.6	0.123351	0.025522
Bartholomew Street (4)	23	546	0.4	0.121059	0.025448
Craven Road	24	285	0.0	0.113269	0.025111
A339 Winchcombe Road (1)	47	2217	2.0	0.108521	0.025810
A339 Winchcombe Road (2)	64	2280	2.0	0.110171	0.025913
Winchcombe Rd Roundabout (W)	20	1823	1.0	0.139587	0.026088
Winchcombe Rd Roundabout (E)	20	1482	2.0	0.153807	0.026806
A339 (1)	58	2114	2.0	0.108342	0.025853
A339 Roundabout (1)	15	1958	2.0	0.185745	0.027553
A339 Roundabout (2)	15	1332	2.0	0.185678	0.027542
A339 Roundabout (3)	15	1597	2.0	0.185733	0.027551
Shaw Road (1)	20	476	2.9	0.166629	0.027456
Shaw Road (2)	32	484	2.4	0.124627	0.026260
London Road (1)	60	1506	1.0	0.101058	0.025267
Kings Road New Link (1)	40	709	2.4	0.115521	0.026540
Kings Road New Link (2)	40	698	1.8	0.434226	0.101540
Kings Road (2A)	31	177	0.0	0.100785	0.024807
A339 (2)	58	1832	2.0	0.108282	0.025838

Appendix F Model Verification Calculations

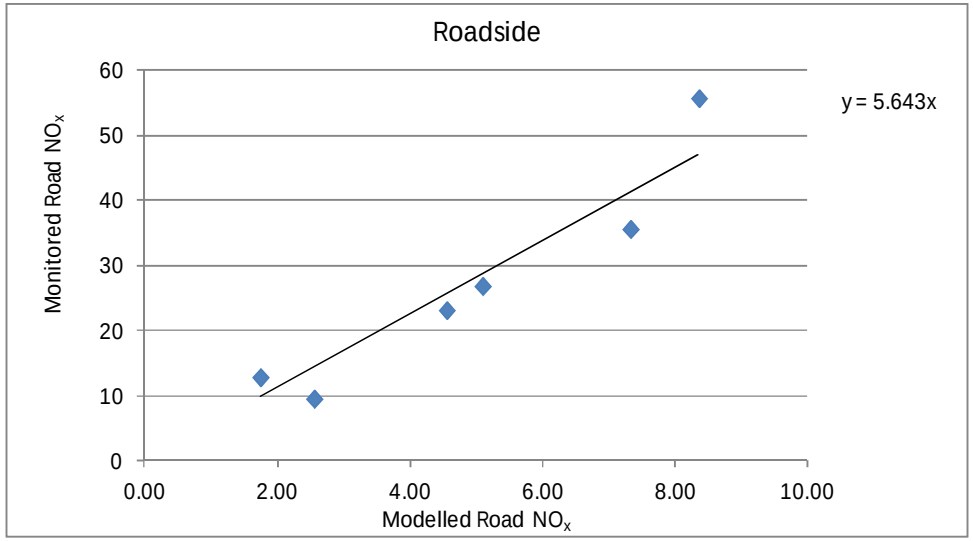
Model Verification Calculations

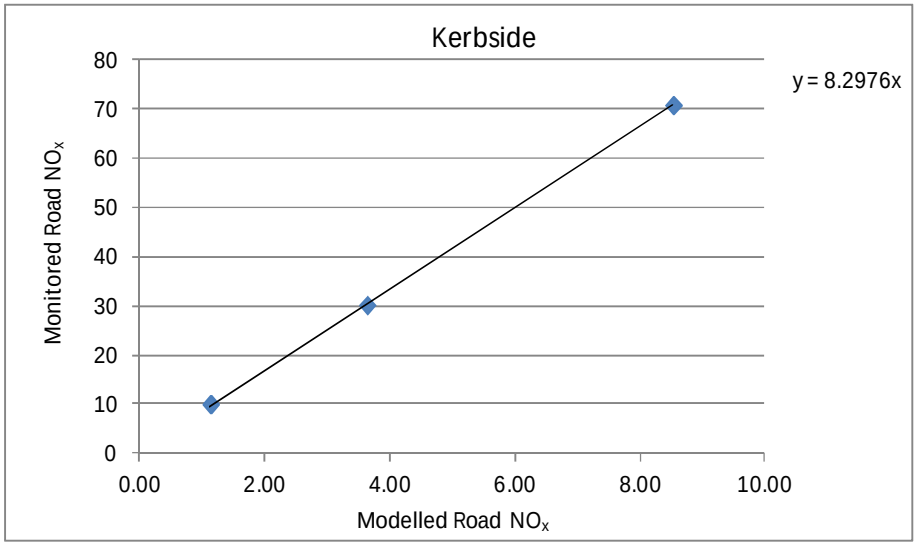
NO_2

Model verification has been undertaken following the methodology specified in Annex 3 of the Technical Guidance LAQM.TG(09). The NO_x:NO_2 calculator available from DEFRA's website was used to calculate the roadside NO_x component of the annual mean NO_2 concentrations measured at the diffusion tube sites summarised in the table below.

The diffusion tube monitoring locations in the area surrounding the site of the proposed Kings Road Link suitable for modelling verification are both kerbside and roadside locations; therefore, in accordance with LAQM.TG(09), verifications was done separately for the different site classifications. The factors were then applied to the predicted concentrations for receptors of relevant location. A correction factor of 5.64 was obtained for the roadside monitoring locations during the verification process and a factor of 8.30 for kerbside sites. These factors have been applied to the modelled Road-NO_x contribution before addition of the appropriate background concentration to determine total predicted annual mean NO_2 concentrations. It should be noted that the diffusion tubes located at 40 Bartholomew Street was also included in the early stages of the roadside verification process; however the results from this location were outside the required accuracy required by the LAQM.TG(09) methodology and the tube was therefore removed from the verification process.

Monitoring Site		*Type*	*X Coordinate*	*Y Coordinate*	*Monitored Total NO_2*	*NO_2 Background*	*Monitored Road NO_x*	*Modelled Road NO_x*	*Ratio*
34	1 Winchester Court	Roadside	447410	166559.4	37.8	22.70	35.55	7.32	4.86
1	Continuous Monitor Newbury	Roadside	447408.1	166559.8	44.9	22.70	55.64	8.35	6.66
2	64 Greenham Road	Roadside	447443.3	166458.1	32.9	22.70	23.08	4.55	5.07
43	1 St John's Street	Roadside	447036	166436	22.9	18.40	9.48	2.55	3.72
5	132 London Road	Roadside	447720.2	167678.5	34.4	22.70	26.79	5.09	5.26
56	112 Shaw Street	Roadside	447773.9	168040.8	24.4	18.40	12.78	1.74	7.34
3	Racecourse Road	Kerbside	447727.1	166391.1	23.1	18.40	9.92	1.14	8.70
6	A339 Newbury Central	Kerbside	447463.3	167317.9	49.7	22.70	70.77	8.53	8.30
4	31 Shaw Road	Kerbside	447688.9	167819.1	35.7	22.70	30.08	3.64	8.26


Roadside
y = 5.643x
Monitored Road NO_x
Modelled Road NO_x
0
10
20
30
40
50
60
0.00
2.00
4.00
6.00
8.00
10.00


Kerbside
y = 8.2976x
Monitored Road NO_x
Modelled Road NO_x
0
10
20
30
40
50
60
70
80
0.00
2.00
4.00
6.00
8.00
10.00

Appendix G Significance Criteria Used In the Assessment

The following criteria relate to changes in annual mean NO_2/PM_{10} concentrations and 24-hour mean PM_{10} concentrations resulting from the new link road.

ANNUAL MEAN NO_2 AND PM_{10} CONCENTRATIONS

Significance criteria	Definition
NEUTRAL	The development causes no change in concentrations.
NEGLIGIBLE IMPACT	The development gives rise to a IMPERCEPTIBLE change in concentrations or; The development gives rise to a SMALL change in concentrations and predicted concentrations are below 36μg/m^3; or The development gives rise to a MEDIUM change in concentrations and predicted concentrations are below 30μg/m^3.
A SLIGHT ADVERSE IMPACT	The development gives rise to a SMALL increase in concentrations and predicted concentrations with the development in place are above 36μg/m^3; or The development gives rise to a MEDIUM increase in concentrations and predicted concentrations with the development in place are between 30-36μg/m^3; or The development gives rise to a LARGE increase in concentrations and predicted concentrations with the development in place are less than 36μg/m^3.
A MODERATE ADVERSE IMPACT	The development gives rise to a MEDIUM increase in concentrations and predicted concentrations with the development in place are above 36μg/m^3; or The development gives rise to a LARGE increase in concentrations and predicted concentrations with the development in place are between 36-40μg/m^3.
A SUBSTANTIAL ADVERSE IMPACT	The development gives rise to a LARGE increase in concentrations and predicted concentrations with the development in place exceed the objective level of 40μg/m^3.
A SLIGHT BENEFICIAL IMPACT	The development gives rise to a SMALL decrease in concentrations and predicted concentrations without the development in place are above 36μg/m^3; or The development gives rise to a MEDIUM decrease in concentrations and predicted concentrations without the development in place are between 30-36μg/m^3; or The development gives rise to a LARGE decrease in concentrations and predicted concentrations without the development in place are less than 36μg/m^3.
A MODERATE BENEFICIAL IMPACT	The development gives rise to a MEDIUM decrease in concentrations and predicted concentrations without the development in place are above 36μg/m^3; or The development gives rise to a LARGE decrease in concentrations and predicted concentrations without the development in place are between 36-40μg/m^3.
A SUBSTANTIAL BENEFICIAL IMPACT	The development gives rise to a LARGE decrease in concentrations and predicted concentrations without the development in place exceed the objective level of 40μg/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 <0.4μg/m^3;

A SMALL change is a change of less than 0.4 – 2μg/m^3;

A MEDIUM change is a change of 2 - 4μg/m^3; and

A LARGE change is a change of > 4μg/m^3.

An EXCEEDENCE is defined as a concentration that is predicted to be above the standard (40μg/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).

DAILY MEAN PM_{10} CONCENTRATIONS

Significance criteria	Definition
NEUTRAL	The development causes no change in the number of days of exceedence.
NEGLIGIBLE IMPACT	The development gives rise to a 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.
A SLIGHT ADVERSE IMPACT	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.
A MODERATE ADVERSE IMPACT	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.
A SUBSTANTIAL ADVERSE IMPACT	The development gives rise to a LARGE increase and the number of days of exceedence with the development in place is above 35 days.
A SLIGHT BENEFICIAL IMPACT	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.
A MODERATE BENEFICIAL IMPACT	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.
A SUBSTANTIAL BENEFICIAL IMPACT	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 50µg/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 EXCEEDENCE is defined as predicted 24-hour mean concentrations in excess of 50µg/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).

Appendix H Assessment Results

NO_2 Annual Mean	2005	Source
AQS Objective ($\mu g/m^3$)	40	UK Air Quality Strategy

Receptor Number	Receptor Name/Description	2012 Baseline	2012 with New Road Link	2012 Change	Magnitude of Change	Significance	2026 Baseline	2026 with New Road Link	2026 Change	Magnitude of Change	Significance
Existing Receptors											
1	85 Kings Road	31.71	29.15	-2.56	MEDIUM	SLIGHT BENEFICIAL	27.54	27.46	-0.08	IMPERCEPTIBLE	NEGLIGIBLE
2	138 Kings Road	27.37	27.88	0.51	SMALL	NEGLIGIBLE	25.14	29.70	4.56	LARGE	SLIGHT ADVERSE
3	66 Kings Road	28.26	28.05	-0.21	IMPERCEPTIBLE	NEGLIGIBLE	25.93	27.06	1.13	SMALL	NEGLIGIBLE
4	42 Kings Road	30.23	29.25	-0.98	SMALL	NEGLIGIBLE	27.09	27.81	0.72	SMALL	NEGLIGIBLE
5	1 - 6 Gordon Court	26.15	29.19	3.04	MEDIUM	NEGLIGIBLE	24.86	27.83	2.97	MEDIUM	NEGLIGIBLE
6	1 - 5 Roman Court	25.67	27.79	2.12	MEDIUM	NEGLIGIBLE	24.40	26.75	2.35	MEDIUM	NEGLIGIBLE
7	Gharial	25.12	26.49	1.37	SMALL	NEGLIGIBLE	23.98	26.81	2.83	MEDIUM	NEGLIGIBLE
8	31 Mill Lane	31.94	29.54	-2.40	MEDIUM	SLIGHT BENEFICIAL	28.43	27.07	-1.36	SMALL	NEGLIGIBLE
9	14a Mill Lane	32.44	30.17	-2.27	MEDIUM	SLIGHT BENEFICIAL	28.64	27.55	-1.09	SMALL	NEGLIGIBLE
10	45 Mill Lane	26.50	24.46	-2.04	MEDIUM	NEGLIGIBLE	23.36	22.19	-1.17	SMALL	NEGLIGIBLE
11	30 Boundary Lane	21.21	21.07	-0.14	IMPERCEPTIBLE	NEGLIGIBLE	20.53	20.68	0.15	IMPERCEPTIBLE	NEGLIGIBLE
12	53 Boundary Lane	27.38	28.54	1.16	SMALL	NEGLIGIBLE	25.27	26.80	1.53	SMALL	NEGLIGIBLE
13	43 Hambridge Road	26.64	27.49	0.85	SMALL	NEGLIGIBLE	24.06	25.39	1.33	SMALL	NEGLIGIBLE
14	54 Hambridge Road	27.10	28.04	0.94	SMALL	NEGLIGIBLE	25.23	25.65	0.42	SMALL	NEGLIGIBLE
15	82 Queens Road	21.31	21.56	0.25	IMPERCEPTIBLE	NEGLIGIBLE	19.59	19.90	0.31	IMPERCEPTIBLE	NEGLIGIBLE
16	127 Boundary Road	20.21	20.31	0.10	IMPERCEPTIBLE	NEGLIGIBLE	19.46	19.63	0.17	IMPERCEPTIBLE	NEGLIGIBLE
17	52 Greenham Road	27.91	27.93	0.02	IMPERCEPTIBLE	NEGLIGIBLE	25.76	25.69	-0.07	IMPERCEPTIBLE	NEGLIGIBLE
18	7 Queens Road	30.06	30.06	0.00	NO CHANGE	NEGLIGIBLE	26.78	26.85	0.07	IMPERCEPTIBLE	NEGLIGIBLE
19	63 St Johns Road	33.85	33.52	-0.33	IMPERCEPTIBLE	NEGLIGIBLE	27.95	27.42	-0.53	SMALL	NEGLIGIBLE
20	Winchester House	35.79	35.54	-0.25	IMPERCEPTIBLE	NEGLIGIBLE	29.40	29.24	-0.16	IMPERCEPTIBLE	NEGLIGIBLE
21	14 Queens Road	29.24	29.27	0.03	IMPERCEPTIBLE	NEGLIGIBLE	25.90	26.12	0.22	IMPERCEPTIBLE	NEGLIGIBLE
22	51 Queens Road	22.71	22.94	0.23	IMPERCEPTIBLE	NEGLIGIBLE	20.25	20.49	0.24	IMPERCEPTIBLE	NEGLIGIBLE
23	109 Queens Road	20.90	21.09	0.19	IMPERCEPTIBLE	NEGLIGIBLE	19.44	19.71	0.27	IMPERCEPTIBLE	NEGLIGIBLE

24	1 St John's St	29.36	29.42	0.06	IMPERCEPTIBLE	NEGLIGIBLE	26.32	26.20	-0.12	IMPERCEPTIBLE	NEGLIGIBLE
25	39 Newtown Road	27.08	27.21	0.13	IMPERCEPTIBLE	NEGLIGIBLE	25.08	25.01	-0.07	IMPERCEPTIBLE	NEGLIGIBLE
26	2 Feltre Place	21.66	21.7	0.04	IMPERCEPTIBLE	NEGLIGIBLE	20.10	20.10	0.00	NO CHANGE	NEGLIGIBLE
27	52 Bartholomew Street	22.99	23.11	0.12	IMPERCEPTIBLE	NEGLIGIBLE	20.85	20.70	-0.15	IMPERCEPTIBLE	NEGLIGIBLE
28	40 Bartholomew Street	28.69	28.76	0.07	IMPERCEPTIBLE	NEGLIGIBLE	25.81	25.80	-0.01	IMPERCEPTIBLE	NEGLIGIBLE
29	107 London Road	33.46	34.6	1.14	SMALL	NEGLIGIBLE	27.62	28.10	0.48	SMALL	NEGLIGIBLE
30	134 London Road	34.22	33.86	-0.36	IMPERCEPTIBLE	NEGLIGIBLE	28.58	28.56	-0.02	IMPERCEPTIBLE	NEGLIGIBLE
31	11 Shaw Road	37.92	39.71	1.79	SMALL	SLIGHT ADVERSE	29.67	30.90	1.23	SMALL	NEGLIGIBLE
Proposed Receptors - Stirling Cables Development											
32	Block A - SE Corner							35.78			
33	Block A - SW Corner							27.76			
34	Block A - NE Corner							27.12			
35	Block B - E facade							30.6			
36	Block B - Curved facade							37.75			
37	Block B - N facade							27.66			
38	Block E - East facade							25.38			
39	Block G - SW Corner							27.29			
40	Block G - NW Corner							31.92			
41	Block G - NE Corner							27.87			
42	Block J - East facade (N)							26.53			
43	Block J - East facade (S)							25.82			

PM_{10} Annual Mean	2004	Source
AQS Objective ($\mu g/m^3$) 2004	40	UK Air Quality Strategy

Receptor Number	Receptor Name/Description	2012 Baseline	2012 with New Road Link	2012 Change	Magnitude of Change	Significance	2026 Baseline	2026 with New Road Link	2026 Change	Magnitude of Change	Significance
Existing Receptors											
1	85 Kings Road	20.45	19.68	-0.76	SMALL	NEGLIGIBLE	20.44	20.31	-0.13	IMPERCEPTIBLE	NEGLIGIBLE
2	138 Kings Road	19.34	19.39	0.04	IMPERCEPTIBLE	NEGLIGIBLE	19.34	21.44	2.10	MEDIUM	NEGLIGIBLE
3	66 Kings Road	19.56	19.51	-0.06	IMPERCEPTIBLE	NEGLIGIBLE	19.67	20.12	0.45	SMALL	NEGLIGIBLE
4	42 Kings Road	20.02	19.85	-0.17	IMPERCEPTIBLE	NEGLIGIBLE	20.14	20.43	0.29	IMPERCEPTIBLE	NEGLIGIBLE
5	1 - 6 Gordon Court	19.02	19.65	0.63	SMALL	NEGLIGIBLE	19.10	19.98	0.89	SMALL	NEGLIGIBLE
6	1 - 5 Roman Court	18.89	19.35	0.46	SMALL	NEGLIGIBLE	18.92	19.64	0.72	SMALL	NEGLIGIBLE
7	Gharial	18.75	19.07	0.32	IMPERCEPTIBLE	NEGLIGIBLE	18.75	20.01	1.26	SMALL	NEGLIGIBLE
8	31 Mill Lane	20.50	19.92	-0.58	SMALL	NEGLIGIBLE	20.93	19.95	-0.98	SMALL	NEGLIGIBLE
9	14a Mill Lane	20.60	20.07	-0.53	SMALL	NEGLIGIBLE	20.97	20.17	-0.80	SMALL	NEGLIGIBLE
10	45 Mill Lane	18.65	18.17	-0.49	SMALL	NEGLIGIBLE	19.02	18.19	-0.84	SMALL	NEGLIGIBLE
11	30 Boundary Lane	17.39	17.32	-0.06	IMPERCEPTIBLE	NEGLIGIBLE	17.68	17.59	-0.09	IMPERCEPTIBLE	NEGLIGIBLE
12	53 Boundary Lane	19.36	19.54	0.18	IMPERCEPTIBLE	NEGLIGIBLE	19.39	19.98	0.59	SMALL	NEGLIGIBLE
13	43 Hambridge Road	19.18	19.35	0.17	IMPERCEPTIBLE	NEGLIGIBLE	18.84	19.43	0.60	SMALL	NEGLIGIBLE
14	54 Hambridge Road	19.30	19.50	0.21	IMPERCEPTIBLE	NEGLIGIBLE	19.37	19.55	0.18	IMPERCEPTIBLE	NEGLIGIBLE
15	82 Queens Road	17.35	17.42	0.07	IMPERCEPTIBLE	NEGLIGIBLE	17.20	17.33	0.13	IMPERCEPTIBLE	NEGLIGIBLE
16	127 Boundary Road	17.14	17.19	0.04	IMPERCEPTIBLE	NEGLIGIBLE	17.16	17.24	0.07	IMPERCEPTIBLE	NEGLIGIBLE
17	52 Greenham Road	19.43	19.46	0.03	IMPERCEPTIBLE	NEGLIGIBLE	19.56	19.55	-0.01	IMPERCEPTIBLE	NEGLIGIBLE
18	7 Queens Road	19.92	19.96	0.04	IMPERCEPTIBLE	NEGLIGIBLE	19.97	20.00	0.03	IMPERCEPTIBLE	NEGLIGIBLE
19	63 St Johns Road	20.45	20.45	0.00	IMPERCEPTIBLE	NEGLIGIBLE	20.29	20.17	-0.12	IMPERCEPTIBLE	NEGLIGIBLE
20	Winchester House	21.14	21.16	0.02	IMPERCEPTIBLE	NEGLIGIBLE	20.98	20.98	0.00	NO CHANGE	NEGLIGIBLE
21	14 Queens Road	19.68	19.72	0.04	IMPERCEPTIBLE	NEGLIGIBLE	19.52	19.60	0.08	IMPERCEPTIBLE	NEGLIGIBLE
22	51 Queens Road	17.70	17.78	0.08	IMPERCEPTIBLE	NEGLIGIBLE	17.49	17.59	0.10	IMPERCEPTIBLE	NEGLIGIBLE
23	109 Queens Road	17.25	17.30	0.05	IMPERCEPTIBLE	NEGLIGIBLE	17.14	17.24	0.10	IMPERCEPTIBLE	NEGLIGIBLE
24	1 St John's St	19.97	19.99	0.02	IMPERCEPTIBLE	NEGLIGIBLE	19.76	19.71	-0.06	IMPERCEPTIBLE	NEGLIGIBLE
25	39 Newtown Road	19.40	19.42	0.02	IMPERCEPTIBLE	NEGLIGIBLE	19.22	19.19	-0.03	IMPERCEPTIBLE	NEGLIGIBLE

26	2 Feltre Place	17.59	17.60	0.01	IMPERCEPTIBLE	NEGLIGIBLE	17.44	17.44	0.00	IMPERCEPTIBLE	NEGLIGIBLE
27	52 Bartholomew Street	17.77	17.77	0.00	IMPERCEPTIBLE	NEGLIGIBLE	17.55	17.51	-0.04	IMPERCEPTIBLE	NEGLIGIBLE
28	40 Bartholomew Street	19.80	19.79	-0.01	IMPERCEPTIBLE	NEGLIGIBLE	19.50	19.49	-0.01	IMPERCEPTIBLE	NEGLIGIBLE
29	107 London Road	20.66	20.74	0.09	IMPERCEPTIBLE	NEGLIGIBLE	20.29	20.22	-0.07	IMPERCEPTIBLE	NEGLIGIBLE
30	134 London Road	21.35	21.30	-0.04	IMPERCEPTIBLE	NEGLIGIBLE	21.06	20.99	-0.08	IMPERCEPTIBLE	NEGLIGIBLE
31	11 Shaw Road	21.69	21.85	0.16	IMPERCEPTIBLE	NEGLIGIBLE	20.84	20.95	0.11	IMPERCEPTIBLE	NEGLIGIBLE
Proposed Receptors - Stirling Cables Development											
32	Block A - SE Corner							22.45			
33	Block A - SW Corner							20.48			
34	Block A - NE Corner							20.19			
35	Block B - E facade							21.86			
36	Block B - Curved facade							23.16			
37	Block B - N facade							20.45			
38	Block E - East facade							19.32			
39	Block G - SW Corner							20.28			
40	Block G - NW Corner							22.53			
41	Block G - NE Corner							20.55			
42	Block J - East facade (N)							19.87			
43	Block J - East facade (S)							19.53			

PM_{10} Daily Mean (50 µg/m^3)	2004	Source
AQS Objective days allowed in exceedences per annum	35	UK Air Quality Strategy

Receptor Number	Receptor Name/Description	2012 Baseline	2012 with New Road Link	2012 Change	Magnitude of Change	Significance	2026 Baseline	2026 with New Road Link	2026 Change	Magnitude of Change	Significance
Existing Receptors											
1	85 Kings Road	4.0	3.0	-0.9	IMPERCEPTIBLE	NEGLIGIBLE	4.0	3.8	-0.2	IMPERCEPTIBLE	NEGLIGIBLE
2	138 Kings Road	2.6	2.7	0.0	IMPERCEPTIBLE	NEGLIGIBLE	2.6	5.4	2.8	MEDIUM	NEGLIGIBLE
3	66 Kings Road	2.9	2.8	-0.1	IMPERCEPTIBLE	NEGLIGIBLE	3.0	3.5	0.5	IMPERCEPTIBLE	NEGLIGIBLE
4	42 Kings Road	3.4	3.2	-0.2	IMPERCEPTIBLE	NEGLIGIBLE	3.6	3.9	0.4	IMPERCEPTIBLE	NEGLIGIBLE
5	1 - 6 Gordon Court	2.3	3.0	0.7	IMPERCEPTIBLE	NEGLIGIBLE	2.4	3.4	1.0	SMALL	NEGLIGIBLE
6	1 - 5 Roman Court	2.2	2.6	0.5	IMPERCEPTIBLE	NEGLIGIBLE	2.2	3.0	0.8	IMPERCEPTIBLE	NEGLIGIBLE
7	Gharial	2.0	2.4	0.3	IMPERCEPTIBLE	NEGLIGIBLE	2.0	3.4	1.4	SMALL	NEGLIGIBLE
8	31 Mill Lane	4.0	3.3	-0.7	IMPERCEPTIBLE	NEGLIGIBLE	4.6	3.3	-1.3	SMALL	NEGLIGIBLE
9	14a Mill Lane	4.2	3.5	-0.7	IMPERCEPTIBLE	NEGLIGIBLE	4.7	3.6	-1.1	SMALL	NEGLIGIBLE
10	45 Mill Lane	2.0	1.5	-0.4	IMPERCEPTIBLE	NEGLIGIBLE	2.3	1.6	-0.8	IMPERCEPTIBLE	NEGLIGIBLE
11	30 Boundary Lane	2.0	1.5	-0.4	IMPERCEPTIBLE	NEGLIGIBLE	1.2	1.1	-0.1	IMPERCEPTIBLE	NEGLIGIBLE
12	53 Boundary Lane	1.0	0.9	0.0	IMPERCEPTIBLE	NEGLIGIBLE	2.7	3.4	0.7	IMPERCEPTIBLE	NEGLIGIBLE
13	43 Hambridge Road	2.5	2.7	0.2	IMPERCEPTIBLE	NEGLIGIBLE	2.1	2.7	0.6	IMPERCEPTIBLE	NEGLIGIBLE
14	54 Hambridge Road	2.6	2.8	0.2	IMPERCEPTIBLE	NEGLIGIBLE	2.7	2.9	0.2	IMPERCEPTIBLE	NEGLIGIBLE
15	82 Queens Road	0.9	1.0	0.0	IMPERCEPTIBLE	NEGLIGIBLE	0.9	0.9	0.1	IMPERCEPTIBLE	NEGLIGIBLE
16	127 Boundary Road	0.8	0.8	0.0	IMPERCEPTIBLE	NEGLIGIBLE	0.8	0.9	0.0	IMPERCEPTIBLE	NEGLIGIBLE
17	52 Greenham Road	2.7	2.8	0.0	IMPERCEPTIBLE	NEGLIGIBLE	2.9	2.9	0.0	IMPERCEPTIBLE	NEGLIGIBLE
18	7 Queens Road	3.3	3.3	0.0	IMPERCEPTIBLE	NEGLIGIBLE	3.4	3.4	0.0	IMPERCEPTIBLE	NEGLIGIBLE
19	63 St Johns Road	4.0	4.0	0.0	IMPERCEPTIBLE	NEGLIGIBLE	3.8	3.6	-0.1	IMPERCEPTIBLE	NEGLIGIBLE
20	Winchester House	4.9	5.0	0.0	IMPERCEPTIBLE	NEGLIGIBLE	4.7	4.7	0.0	IMPERCEPTIBLE	NEGLIGIBLE
21	14 Queens Road	3.0	3.1	0.0	IMPERCEPTIBLE	NEGLIGIBLE	2.8	2.9	0.1	IMPERCEPTIBLE	NEGLIGIBLE
22	51 Queens Road	1.2	1.2	0.1	IMPERCEPTIBLE	NEGLIGIBLE	1.0	1.1	0.1	IMPERCEPTIBLE	NEGLIGIBLE
23	109 Queens Road	0.9	0.9	0.0	IMPERCEPTIBLE	NEGLIGIBLE	0.8	0.9	0.1	IMPERCEPTIBLE	NEGLIGIBLE
24	1 St John's St	3.4	3.4	0.0	IMPERCEPTIBLE	NEGLIGIBLE	3.1	3.0	-0.1	IMPERCEPTIBLE	NEGLIGIBLE
25	39 Newtown Road	2.7	2.7	0.0	IMPERCEPTIBLE	NEGLIGIBLE	2.5	2.5	0.0	IMPERCEPTIBLE	NEGLIGIBLE

26	2 Feltre Place	1.1	1.1	0.0	IMPERCEPTIBLE	NEGLIGIBLE	1.0	1.0	0.0	IMPERCEPTIBLE	NEGLIGIBLE
27	52 Bartholomew Street	1.2	1.2	0.0	IMPERCEPTIBLE	NEGLIGIBLE	1.1	1.0	0.0	IMPERCEPTIBLE	NEGLIGIBLE
28	40 Bartholomew Street	3.2	3.1	0.0	IMPERCEPTIBLE	NEGLIGIBLE	2.8	2.8	0.0	IMPERCEPTIBLE	NEGLIGIBLE
29	107 London Road	4.3	4.4	0.1	IMPERCEPTIBLE	NEGLIGIBLE	3.8	3.7	-0.1	IMPERCEPTIBLE	NEGLIGIBLE
30	134 London Road	5.3	5.2	-0.1	IMPERCEPTIBLE	NEGLIGIBLE	4.8	4.7	-0.1	IMPERCEPTIBLE	NEGLIGIBLE
31	11 Shaw Road	5.8	6.1	0.3	IMPERCEPTIBLE	NEGLIGIBLE	4.5	4.7	0.2	IMPERCEPTIBLE	NEGLIGIBLE
Proposed Receptors - Stirling Cables Development											
32	Block A - SE Corner							7.1			
33	Block A - SW Corner							4.0			
34	Block A - NE Corner							3.6			
35	Block B - E facade							6.1			
36	Block B - Curved facade							8.4			
37	Block B - N facade							4.0			
38	Block E - East facade							2.6			
39	Block G - SW Corner							3.8			
40	Block G - NW Corner							7.2			
41	Block G - NE Corner							4.1			
42	Block J - East facade (N)							3.2			
43	Block J - East facade (S)							2.9			