Air Quality Assessment Report

St Edmunds Terrace, London NW8

February 2011

QUALITY MANAGEMENT

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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 redevelopment of land on St Edmunds Terrace, Primrose Hill, Camden for circa 37 residential dwellings and 37 car parking spaces. A 55kWt gas fired CHP is included within the scheme proposals.

1.1.2 This report presents the findings of an assessment of the potential air quality impacts of the proposed redevelopment during both the construction and operational phases. 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 published in 2007 replaces the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (January 2000) and Addendum (February 2003). The majority of objectives set out in the previous version of the AQS have been retained; however, the provisional objectives previously proposed for PM_{10} have been replaced in England, Wales and Northern Ireland with a new framework for considering the effects of a finer group of particles known as '$PM_{2.5}$'. The introduction of this framework is based on increasing evidence that this size of particles can be more closely associated with observed adverse health affects 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, and there is insufficient emissions data available to enable assessment of $PM_{2.5}$ concentrations at this time.

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 the proposed redevelopment site. 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.

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

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**.

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.

London Borough of Camden's review and assessment of air quality

2.4.3 The London Borough of Camden (LBC) has designated the whole Borough an AQMA due to measured and predicted exceedences of the AQS objectives for NO_2 and PM_{10}. The conclusions of their most recent Updating and Screening Assessment, published in 2009, were that the AQS objective for annual mean NO_2 concentrations is still being exceeded across the Borough, and that there is the potential for exceedences of the objective for hourly mean NO_2 concentrations at locations adjacent to busy roads; however the objective for daily mean PM_{10} concentrations was being achieved.

[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

[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).

The Mayor's Air Quality Strategy

2.4.4 In 2010 the GLA/Mayor of London published a new Mayor's Air Quality Strategy for London[5]. This strategy is focused on improving London's air quality and it explains the current air quality experienced across London and gives predictions of future levels of pollution. The sources of this pollution are outlined and a comprehensive set of policies and proposals are set out that will improve air quality in the London Boroughs.

2.4.5 The strategy sets out a framework for delivering improvements to London's air quality and includes measures aimed at reducing emissions from transport, homes, offices and new developments, promoting smarter more sustainable travel, as well as raising awareness of air quality issues.

2.5 NATIONAL PLANNING POLICY

Planning Policy Statement 23 (PPS23): Planning and Pollution Control

2.5.1 Policy guidance for local planning authorities (in England only) regarding local air quality and new development is provided in PPS23[6]. PPS23 advises on the policies and practices that should be taken into account by those involved in the planning of any development that has the potential to cause pollution.

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

2.6 LOCAL PLANNING POLICY

London Borough of Camden Core Strategy (November 2010)

2.6.1 Policy DP32 – Air Quality and Camden's Clear Zone states that:

'The Council will require air quality assessments where development could potentially cause significant harm to air quality. Mitigation measures will be expected in developments that are located in areas of poor air quality.

The Council will also only grant planning permission for development in the Clear Zone region that significantly increases travel demand where it considers that appropriate measures to minimise the transport impact of development are incorporated. We will use planning conditions and legal agreements to secure Clear Zone measures to avoid, remedy or mitigate the impacts of development schemes in the Central London Area.'

Camden Planning Guidance (2006)

2.6.2 The Camden Planning Guidance document provides examples of cases where air quality assessments are required as part of planning application submissions, and the level of information that the assessment report should contain.

The London Plan (Consolidated with Alterations since 2004)

2.6.3 Policy 4A.19 Improving air quality states:

'The Mayor will and boroughs should, implement the Mayor's Air Quality Strategy and achieve reductions in pollutant emissions and public exposure to pollution by:

- *improving the integration of land use and transport policy and reducing the need to travel especially by car;*
- *promoting sustainable design and construction;*
- *promoting sustainable construction to reduce emissions from the demolition and construction of buildings;*

[5] Mayor of London: Cleaning London's air, *The Mayor's Air Quality Strategy* (December 2010)

[6] Communities and Local Government: *Planning Policy Statement 23: Planning and Pollution Control* (Oct 2004).

- *ensuring at the planning application stage, that air quality is taken into account along with other material considerations, and that formal air quality assessments are undertaken where appropriate, particularly in designated Air Quality Management Areas;*
- *seeking to reduce the environmental impacts of transport activities by supporting the increased provision of cleaner transport fuels, including hydrogen, particularly with respect to the refuelling infrastructure;*
- *working in partnership with relevant organisations, taking appropriate steps to achieve an integrated approach to air quality management and to achieve emissions reductions through improved energy efficiency and energy use.*

The Mayor will work with strategic partners to ensure that the spatial, transport and design policies of this plan support his Air Quality Strategy'.

London Councils Guidance for Air Quality Assessments

2.6.4 The London Councils have published guidance[7] for undertaking air quality assessments in the London Boroughs, the majority of which have declared AQMAs. The guidance sets out suggested methods for undertaking such an assessment within the London area and provides a methodology to assist in determining the impacts of a development proposal on air quality. The main message of the document is, as above, that the factor of greatest importance will generally be the difference in air quality as a result of the proposed development.

[7] London Councils (January 2007) *Air Quality and Planning Guidance – Revised version*.

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 LBC 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's[8] website;
- 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 available on the DfT website[9] and traffic flows provided by TTP Consulting, 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 application 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 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)[10];
- Quality of Urban Air Review Group (QUARG)[11]; and
- Department of the Environment (DoE)[12].

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

[9] http://www.dft.gov.uk/matrix/

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

[11] 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).

[12] 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).

3.2.5 The Greater London Authority and London Councils have produced guidance[13] for the London Boroughs that looks at best practicable means to control dust and emissions from construction sites. This guidance has been referred to in this assessment.

3.2.6 As there are no formal assessment criteria for dust and PM_{10} generation and dispersion during construction, the significance of impacts associated with this phase of the proposed redevelopment has been determined qualitatively by:

- identifying the construction activities associated with the proposed redevelopment which could generate dust and PM_{10} and their likely duration;
- identifying sensitive receptors (e.g. schools, residential properties) within 200m of the construction site boundary; and
- the prevailing wind direction.

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 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 redevelopment;
- 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.

Operational phase

Emissions arising from the Road Traffic generated by the operation of the proposed redevelopment

3.2.8 Once construction has been completed the traffic generated by the redevelopment will have an effect on local pollution concentrations, both within and around the proposed redevelopment site. The main pollutants of concern for road traffic are generally considered to be NO_2, PM_{10}, CO and C_6H_6. Of these pollutants, emissions of NO_2 and PM_{10} are most likely to result in exceedences of the relevant air quality standards or objectives in urban areas. Indeed, LBC has declared the whole of the Borough as an AQMA due to predicted exceedences of the objectives for NO_2 and PM_{10}. This air quality assessment will therefore only consider these two pollutants.

3.2.9 For the prediction of impacts due to emissions arising from road traffic during operation, the DMRB Local Air Quality Assessment screening tool (version 1.03c, July 2007) has been used.

3.2.10 For the assessment, four scenarios were modelled. These scenarios are as follows:

- 2009 “model verification”;
- 2010 “baseline”;
- 2015 “without redevelopment”; and
- 2015 “with redevelopment”.

3.2.11 2015 is the proposed opening year of the redevelopment. 2010, has been taken as the baseline year and 2009 used for the model verification year, as it is the most recent year for which a full set of ratified monitoring data is available.

3.2.12 A summary of the traffic data and pollutant emission factors used in the assessment can be found in **Appendix C**. It includes details of Annual Average Hourly Traffic flows (AAHTs), average vehicle speeds and the percentage of Heavy Goods Vehicles (HGVs) for the local road network in all assessment years considered.

3.2.13 Annual mean oxides of nitrogen (NO_x) concentrations predicted by the DMRB screening tool were converted to annual mean NO_2 concentrations using the methodology given in LAQM.TG(09) and the NO_x:NO_2 calculator

[13] London Councils and Greater London Authority: *The control of dust and emissions from construction and demolition – Best Practice Guidance* (November 2006).

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.

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

3.2.15 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[14], determined that exceedences of the 1 hour mean objective were unlikely to occur where annual mean concentrations were below 60µg/m^3. Further research carried out in 2008[15] generally supported this relationship and as a result this criterion has been adopted for the purposes of local air quality review and assessment.

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

Model validation and verification

3.2.17 The DMRB Local Air Quality Assessment screening tool is not always 'conservative' and therefore it is important to verify the predicted concentrations against local monitoring data.

3.2.18 Suitable local monitoring data for the purpose of model verification is not available in the LBC; therefore monitoring data from a nearby diffusion tube site in the London Borough of Brent has been used. Details of this monitoring site are shown in **Table 1**.

Table 1 Local monitoring data sources suitable for model verification

Location & Site Classification	O.S. Grid Reference	2009 Monitored NO_2 Concentration (µg/m^3)
Chichele Road (Roadside Diffusion tube)	523663, 185353	68.10

3.2.19 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 diffusion tube site. Details of the verification calculations are presented in **Appendix D**.

3.2.20 A factor of **5.17** was obtained during the verification process and this factor has been applied to the predicted NO_x roads component before addition of the relevant background NO_x concentrations and conversion to annual mean NO_2 concentrations.

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

Emissions arising from the proposed CHP

3.2.22 Emissions from the proposed 55kWt gas fired CHP will be released to air through a stack of 21.4m above ground level i.e. 1m above roof height. Technical data for the CHP gives an emission rate for NO_x of 0.02g/s for the CHP. Using these figures and the two nomograms provided in Figures 5.20 and 5.21 of LAQM.TG(09) shows that the impact of the CHP on annual mean and hourly mean NO_2 concentrations will be insignificant, and therefore it is not considered further in this assessment.

[14] 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).

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

Significance criteria

3.2.23 The impacts of the redevelopment proposals on local air quality once operational have been evaluated against the significance criteria published by the Environmental Protection UK[16] and presented in **Appendix E.**

3.2.24 In addition to these quantitative criteria, the London Councils' guidance contains a flow chart method for determining the significance of the predicted air quality impacts of a proposed development. A summary of the flow chart for determining significance is shown below in **Table 2**.

Table 2:Summary of the London Councils flow chart method for assessing the significance of air quality impacts

Effect of development	Outcome
Will development interfere with or prevent implementation of measures in the AQAP	Air Quality is an overriding consideration.
Is development likely to cause a worsening of air quality or introduce new exposure into the AQMA?	Air Quality is a highly significant consideration.
Would the development contribute to air quality exceedences or lead to the designation of a new AQMA?	Air Quality is a highly significant consideration.
Is the development likely to increase emissions of or increase/introduce new exposure to PM_{10}	Air Quality is a significant consideration.
None of the above.	Air Quality is not a significant consideration but mitigation measures may still need to be considered.

3.2.25 In determining both the significance of exposure to air pollution and the levels of mitigation required, consideration should be given to the Air Pollution Exposure Criteria (APEC) given in **Table 3** below.

Table 3:London Councils' Air Pollution Exposure Criteria

APEC Level	Applicable Range Annual average NO_2	Applicable Range PM_{10}	Recommendation
A	> 5% below national objective	**Annual Mean** > 5% below national objective **24 hour mean** > 1 day less than the national objective	No air quality grounds for refusal; however mitigation of any emissions should be considered.
B	Between 5% below or above national objective	**Annual Mean** Between 5% below or above national objective **24 hour mean** Between 1 day above or below the national objective	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g., maximise distance from pollution source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
C	> 5% above national objective	**Annual Mean** > 5% above national objective **24 hour mean** > 1 day more than the national objective	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

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

Sensitive Receptors

3.2.26 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 redevelopment, once it becomes operational.

3.2.27 Locations with a high sensitivity to dust generated by construction activities include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive to dust include schools, residential areas and food retailers.

3.2.28 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.

3.2.29 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.

3.2.30 To complete the assessment of operational phase impacts and establish the potential exposure of future residents to air pollution, three 'receptors' were identified at which pollution concentrations were predicted. The details of these assessment receptors are shown in **Table 5** below.

Table 5: Details of Assessment Receptors

Receptor Name	Distance from road centre (m)	Grid Reference
Façade of Development overlooking St Edmunds Terrace	7.3m from St Edmunds Terrace 129m from A5205	(527609, 183620)
4 St Edmunds Terrace	10.2m from St Edmunds Terrace 111.6m from A5205	(527629, 183609)
Kings Court, Ormonde Terrace	8.7m from St Edmunds Terrace 27.7m from A5205	(527731, 183563)

4 EXISTING CONDITIONS

4.1 LOCAL EMISSION SOURCES

4.1.1 The proposed redevelopment site is located in an area where air quality is mainly influenced by emissions from road transport using the A5205 Prince Albert Road, Avenue Road and St Edmunds Terrace itself.

4.1.2 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 Background concentrations for the assessment have been taken from the London Borough of Brent's continuous urban background monitoring site at St Mary's Primary School (525173, 183297). Annual mean NO_x, NO_2 and PM_{10} concentrations have been obtained from this monitoring station for 2009 and factored forward to future years using scaling factors obtained from DEFRA's website.

4.2.2 **Table 6** shows the measured and estimated background concentrations of NO_x, NO_2, and PM_{10} that were used in the assessment.

Table 6:Background concentrations used in the assessment (µg/m^3)

Pollutant	2009	2010	2015
NO_x	56.50	52.38	42.83
NO_2	35.70	33.74	27.22
PM_{10}	21.10	20.55	19.31

4.2.3 The table above shows that for all years the background concentrations of NO_2 are below the objective limit of 40µg/m^3 to be achieved by 2005 and thereafter. The 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 in the vicinity of the proposed redevelopment site by LBC are provided in **Table 7**.

Table 7:LBC Monitoring Data (µg/m^3)

Site	Grid Reference	2007	2008	2009
Gospel Oak School, Mansfield Road (roadside)	(528215, 185637)	**40.4**	**42.8**	**45.6**
Frognal Way (background)	(526213, 185519)	28.7	30.4	33.9
La Sainte School, Croftdown Road (background)	(528588, 186249)	31.4	36.3	35.5
St Mary's School, Fitzjohn Avenue (roadside)	(526547, 185125)	**66.6**	**55.5**	**62.9**
Corner Gloucester Avenue/Parkway (kerbside)	(528672, 183642)	**63.6**	**56.7**	**61.7**

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) close to the road, and meet it 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;
- demolition;
- construction and fabrication processes; and
- internal and external finishing and refurbishment.

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 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 (up to 200 metres away). There a number of residential properties located within this distance to the south and southwest of the site.

5.1.4 By consideration of the factors described above the overall impact of dust deposition would therefore be temporary, short-medium term, local in effect and of a **moderate** to **slight adverse** significance. Any adverse impacts resulting from the generation and dispersion of PM_{10} during construction are likely to be temporary, short-term and of **moderate** to **slight adverse** significance.

Release of emissions to air from construction traffic

5.1.5 The impact on air quality from traffic associated with this phase of the proposed redevelopment will be in the areas immediately adjacent to the principal means of site access for construction traffic. The impacts are therefore considered to be temporary, short-medium term, local and of **slight adverse** significance.

Operational phase

Annual mean NO_2 concentrations

5.1.6 The predicted annual mean NO_2 concentrations are presented in **Table 8** below.

Table 8:Predicted Annual Mean NO_2 Concentrations ($\mu g/m^3$)

Receptor	2010	2015 Without Development	2015 With Development	Change due to development
Façade of Development overlooking St Edmunds Terrace	36.37	29.59	29.64	+0.05
4 St Edmunds Terrace	37.22	30.32	30.34	+0.02
Kings Court, Ormonde Terrace	52.34	44.23	44.25	+0.02

5.1.7 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 2010 baseline case concentrations exceed the objective at the receptor located nearest to the A5205 at Kings Court.

5.1.8 By 2015, the opening year of the proposed redevelopment, predicted concentrations at all of the receptors both with and without the development are reduced from the 2010 baseline case, however they still exceed the objective at the Kings Court Receptor. Concentrations predicted on the redevelopment site itself are well below the objective.

5.1.9 Traffic associated with the proposed redevelopment is predicted to result in a maximum increase in annual mean NO_2 concentrations of 0.05µg/m^3. Therefore, according to the EPUK significance criteria, the impact of the proposed development on annual mean NO_2 concentrations is considered to be **negligible**.

Hourly mean NO_2 concentrations

5.1.10 The annual mean NO_2 concentrations predicted by the DMRB screening tool were all below 60µg/m^3, and therefore exceedences of the hourly mean NO_2 concentration objective are unlikely to occur.

Annual mean PM_{10} concentrations

5.1.11 The predicted annual mean PM_{10} concentrations are presented in **Table 9** below.

Table 9:Predicted Annual Mean PM_{10} Concentrations (µg/m^3)

Receptor	2010	2015 Without Development	2015 With Development	Change due to development
Façade of Development overlooking St Edmunds Terrace	21.33	19.93	19.98	+0.05
4 St Edmunds Terrace	21.58	20.14	20.14	No Change
Kings Court, Ormonde Terrace	26.29	23.65	23.65	No Change

5.1.12 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 2010 baseline case concentrations do not exceed the objective at any of the assessment receptors.

5.1.13 By 2015, the opening year of the proposed redevelopment, predicted concentrations at all of the receptors both with and without the development are reduced from the 2010 baseline case and continue to be below the objective.

5.1.14 Traffic associated with the proposed redevelopment is predicted to result in an increase in annual mean PM_{10} concentrations of 0.05µg/m^3 on the receptor located on the proposed redevelopment site, but not change elsewhere. Therefore, according to the EPUK significance criteria, the impact of the proposed development on annual mean PM_{10} concentrations is considered to be **negligible** to **neutral.**

24 hour mean PM_{10} concentrations

5.1.15 The predicted number of days of exceedence of the objective for daily mean PM_{10} concentrations is presented in **Table 10** below.

Table 10:Days of Exceedence of the daily mean PM_{10} concentration objective

Receptor	2010	2015 Without Development	2015 With Development	Change due to development
Façade of Development overlooking St Edmunds Terrace	5	3	3	No Change
4 St Edmunds Terrace	6	4	4	No Change
Kings Court, Ormonde Terrace	16	9	9	No Change

5.1.16 The objective for 24 hourly 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 assessment show that this objective is met in all assessment years at all of the assessment receptors. The proposed redevelopment is not predicted to increase the number of exceedences of the objective.

5.1.17 Therefore, according to the EPUK significance criteria, the impact of the proposed development on daily mean PM_{10} concentrations is considered to be **neutral.**

Mitigation

Construction phase

5.1.18 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 or vegetated as soon as is practicable;
- regular inspection and, if necessary, cleaning of local highways and site boundaries to check for dust deposits (and removal if necessary);
- minimise 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;
- 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;
- Restrict on-site movements to well within site and not near the perimeter, if possible; and
- no unauthorised burning of any material anywhere on site.

5.1.19 The most effective mitigation for construction traffic will be achieved by ensuring 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.

Operational phase

5.1.20 Given the nature of the proposed redevelopment, the imperceptible increase in NO_2 and PM_{10} concentrations that traffic associated with it will generate, and the predicted compliance with the AQS objectives on the site, no mitigation measures are considered necessary.

Residual effects

Construction phase

5.1.21 The greatest potential for nuisance problems to occur will be within 200 metres of the construction site perimeter. There may be limited incidences of increased dust deposited on property beyond this distance. With appropriate use of mitigation measures and good site management the residual effects of dust generation and deposition would be **slight adverse**.

5.1.22 The potential for short-term releases of PM_{10} from materials handling and site plant will remain following mitigation. However, reducing the use of site plant and equipment near sensitive receptors and implementing the mitigation measures outlined above would result in **slight adverse** residual effects.

5.1.23 The residual effects of emissions from construction vehicles will be **slight adverse** to **negligible**.

Operational phase

5.1.24 The residual effects of the redevelopment on air quality are **negligible** for NO_2 and **negligible** to **neutral** for PM_{10} according to the EPUK significance criteria.

5.1.25 According to the London Council's criteria the proposed redevelopment site falls into APEC A, which means that there should be no air quality grounds for refusal.

6 SUMMARY

6.1.1 A qualitative assessment of the potential impacts on local air quality from construction activities on the proposed redevelopment has been carried out. This showed that during site activities releases of dust and PM_{10} were likely to occur. However, through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases will be reduced and excessive releases prevented. The residual effects of the construction phase on air quality are considered to be **slight adverse** to **negligible.**

6.1.2 In addition, a quantitative assessment of the potential impacts during the operational phase was undertaken using the DMRB local air quality screening tool to predict the changes in NO_2 and PM_{10} concentrations that would occur due to traffic generated by the redevelopment. The results of this assessment showed that the impact of the redevelopment on air quality would be **negligible** for NO_2 and **negligible** to **neutral** for PM_{10} according to the EPUK significance criteria.

6.1.3 According to the London Council's criteria the proposed redevelopment site falls into APEC A, which means that there should be no air quality grounds for refusal. Furthermore, the results of the assessment show that the development complies with relevant local planning policy for air quality.

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.
AURN	Automatic Urban and Rural (air quality monitoring) Network, managed by contractors on behalf of DEFRA and the Devolved Administrations.
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.
DfT	Department for Transport.
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.

µg/m^3 micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
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 = nanogram per cubic metre;
$\mu g/m^3$ = microgram per cubic metre;
mg/m^3 = milligrams per cubic metre (i.e. microgram 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 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.

2009 Model Verification (Traffic Flow Data from DfT Website)

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV
A5 Broadway	30	617	6
Walm Lane	30	580	14.5

2010 Baseline

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV
St Edmunds Terrace	24	24	0.5
A5205	48	889	3.42

2015 Without development

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV
St Edmunds Terrace	24	26	0.5
A5205	48	890	3.42

2015 With development

Road link	Speed (km/hour)	Annual Average Hourly Flows (AAHT)	%HGV
St Edmunds Terrace	24	27	0.45
A5205	48	891	3.41

Appendix D Model Verification Calculations

Model Verification Calculations

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 site summarised in the table below.

A correction factor of 5.17 was obtained during the verification process. This factor has been applied to the predicted Road-NO_x contribution before addition of the appropriate background concentration to determine total predicted annual mean NO_2 concentrations.

Monitoring Site	Type	2009 Monitored Annual Mean NO_2 Conc. (µg/m^3)	Background		Monitored Road-NO_x (µg/m^3)	Modelled Road NO_x (µg/m^3)	Ratio
			NO_x	NO_2			
Chichele Road	Diffusion Tube	68.10	56.5	35.7	112.55	21.77	5.17

Appendix E 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 redevelopment.

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).