Lidl Foodstore

Air Quality Assessment

Botwell Lane, Hayes

On Behalf of Lidl UK GmbH






RPS

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Quality Management

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Executive Summary

This report details the Air Quality Assessment undertaken to support the planning application for the proposed Lidl foodstore on the site of the former swimming pool at Botwell Lane in Hayes, Middlesex.

This assessment considers the air quality impacts from the construction phase and once the development is fully operational.

The most important consideration during the construction phase is dust. Without appropriate mitigation, dust could cause soiling of surfaces, particularly windows, cars and laundry. The mitigation measures provided within this report should ensure that the risk of adverse dust effects is reduced to a minimum.

Once the development is operational, arrivals at and departures from the development may change the number, type and speed of vehicles using the local road network. Changes in road vehicle emissions are the most important consideration during this phase of the development. Concentrations of the key traffic-related pollutants have been estimated, with and without these changes in emissions. The estimates suggest that the changes in pollutant concentrations are likely to be very small and the estimated concentrations are within the standards set at a national level for the protection of human-health. The effect of the development on air quality at existing locations is expected to be negligible.

The Proposed Development does not conflict with policies at a national, regional or local level.

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1 Introduction

1.1 This report details the air quality assessment undertaken for the proposed Lidl foodstore on the site of the former swimming pool at Botwell Lane in Hayes, Middlesex. The proposed foodstore would be located within the administrative area of London Borough of Hillingdon (LBH).

1.2 LBH has designated the '*area from the southern boundary north to the border defined by, the A40 corridor from the western borough boundary, east to the intersection with the Yeading Brook north until its intersection with the Chiltern-Marylebone railway line and then east along the railway line to the eastern borough boundary*' an Air Quality Management Area (AQMA) due to high levels of nitrogen dioxide (NO_2) attributable to road traffic emissions. The Application Site is located within this AQMA.

1.3 The key objectives for this air quality assessment are:

- **Construction Effects:** to evaluate the effects from fugitive dust and exhaust emissions associated with construction activities on nearby sensitive receptors; and
- **Operational Effects:** to describe the significance of the potential effects resulting from changes in traffic flow characteristics on the local road network due to the operation of the proposed development, with due regard for the potential air quality effects on the AQMA.

1.4 This report begins by setting out the policy and legislative context for the assessment. The methods and criteria used to assess potential air quality effects have then been described. Local authority documents and the results of local monitoring have been reviewed to establish existing air quality conditions. The results of a risk assessment of dust effects and effects from vehicle and plant exhaust emissions during construction have been set out. Predicted pollutant concentrations at the façades of existing properties have been presented to determine the operational effects of the development. Where adverse air quality effects have been predicted, measures to eliminate, reduce or mitigate the effects have been proposed.

2 Policy and Legislative Context

European Legislation

2.1 The European Union Framework Directive 2008/50/EC [1] on ambient air quality assessment and management came into force in May 2008 and had to be implemented by Member States, including the UK, by June 2010. The Directive aims to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

National Legislation

Air Quality Standards Regulations

2.2 The Air Quality Standards Regulations 2010 [2] implement limit values prescribed by the Directive 2008/50/EC. The limit values are legally binding and the Secretary of State, on behalf of the UK Government, is responsible for their implementation.

UK Air Quality Strategy

2.3 The first Air Quality Strategy was published in March 1997 setting out policies for the management of ambient air quality and thus fulfilling the requirement of the Environment Act 1995 for a national air quality strategy. This was reviewed and a revised Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland [3] was published in January 2000. The AQS described the Government's strategy for improving air quality in the UK. One of the key aspects of the strategy was the setting of air quality objectives for eight pollutants, namely benzene, 1,3-butadiene, ozone, carbon monoxide, lead, nitrogen dioxide, particulates and sulphur dioxide. The objectives are statements of policy intentions made by the UK Government and its Devolved Administrations. The AQS objectives are based on the evidence supporting the identification of the limit values and, in some instances, are more onerous than the requirements established by the limit values.

2.4 The Government announced tighter objectives for particulates (since removed), benzene and carbon monoxide and a new objective for polycyclic aromatic hydrocarbons in an Addendum to the AQS [4], published in February 2003. The Addendum included new provisional objectives for particulates in addition to existing objectives within the 2000 Strategy.

2.5 The current UK AQS [5] was published in July 2007 and updates the original strategy to set out new objectives for local authorities in undertaking their local air quality management duties. Objectives in the current AQS are in some cases more onerous than the limit values set out within the relevant EU Directives and the Air Quality Standards Regulations 2010. In addition, objectives have been established for a wider range of pollutants.

2.6 Under the AQS, local authorities have a duty to review and assess local air quality within their administrative area. The Review & Assessment (R&A) process requires local authorities to undertake a phased assessment to identify any areas likely to experience exceedences of the air quality objectives. The process involves regular Progress Reports and Updating and Screening Assessments (USAs). If required, the authority must progress to Detailed Assessments and Further Assessments. Any location likely to exceed the objectives must be designated an Air Quality Management Area (AQMA) and an Air Quality Action Plan (AQAP) must be prepared and implemented, with the aim of achieving the objectives in the designated area.

2.7 It is expected that local air quality management in the UK will be assessed and controlled under the AQS for the foreseeable future. For the purposes of this assessment, the limit values set out in the Air Quality Standards Regulations 2010 and the objective levels specified under the current UK AQS have been used. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the EU Directives.

2.8 The limit values and objectives relevant to this assessment are summarised in Table 2.1.

Table 2.1 Summary of Relevant Air Quality Limit Values and Objectives

Pollutant	Averaging Period	Objectives/ Limit Values	Not to be Exceeded More Than	Target Date
Nitrogen Dioxide (NO_2)	1 hour	200 µg.m^{-3}	18 times per calendar year	-
	Annual	40 µg.m^{-3}	-	-
Particulate Matter (PM_{10})	24 Hour	50 µg.m^{-3}	35 times per calendar year	-
	Annual	40 µg.m^{-3}	-	-
Particulate Matter ($PM_{2.5}$)	Annual	Target of 15% reduction in concentrations at urban background locations	-	Between 2010 and 2020 (a)
		Variable target of up to 20% reduction in concentrations at urban background locations (c)		Between 2010 and 2020 (b)
	Annual	25 µg.m^{-3}	-	01.01.2020 (a)
		25 µg.m^{-3}		01.01.2015 (b)

(a) Target date set in UK Air Quality Strategy 2007
(b) Target date set in Air Quality Standards Regulations 2010
(c) Aim to not exceed 18 µg.m^{-3} by 2020

Limit Value Compliance Summary in the UK

2.9 The UK is required to submit air quality data annually to demonstrate compliance with the limit values in Directive 2008/50/EC. To facilitate this, the UK is divided into 43 zones and agglomerations.

2.10 Regarding PM_{10}, the UK identified in 2010 an exceedence of the daily-mean limit value in the Greater London Urban Area zone and applied for an extension until June 2011; the daily-mean PM_{10} limit value was met in all other zones and agglomerations. The latest Compliance Assessment Summary [6] published in September 2012 indicates that, taking into account the maximum margin of tolerance, the daily-mean limit value was met in 2011. The annual-mean

PM_{10} limit value was also met in all zones in 2011. The UK is now required to comply with the daily and annual-mean limit values for PM_{10}.

2.11 Regarding NO_2, the latest Compliance Assessment Summary reported that the hourly-mean limit value was exceeded in three zones in 2011: the Greater London Urban Area, the Glasgow Urban Area and the South East. Furthermore, the annual-mean NO_2 limit value was exceeded at 40 out of the 43 zones and agglomerations in 2011. The UK government has been granted a time extension at nine zones and agglomerations and the annual-mean NO_2 limit value must now be complied with by January 2015, with the exception of Reading/Wokingham where compliance must be demonstrated by January 2013.

2.12 For the remaining zones and agglomerations, the UK government has abandoned its application to the EU for a time extension to 2015 to meet the annual-mean NO_2 limit values, acknowledging that it will take up to 2025 in some areas to meet these limits and leaving itself open to EU legal action.

National Planning Policy and Guidance

Local Air Quality Management Policy Guidance

2.13 Policy Guidance: Local Air Quality Management LAQM.PG(09) [7], issued under Part IV of the Environment Act 1995, is designed to help local authorities with their local air quality management duties. The guidance requires that local authorities integrate air quality considerations into the planning process at the earliest possible stage. As a result, the land use planning system is integral to improving air quality.

2.14 The guidance applies to all English local authorities both with and without AQMAs. This common approach to air quality will provide benefits such as raising the profile of air quality in transport planning, and increasing communication across local authority departments.

National Planning Policy Framework

2.15 In March 2012, the National Planning Policy Framework (NPPF) [8] was published. The document provides a framework within which plans will be produced at a local level to reflect the individual needs and priorities of separate communities. The NPPF constitutes guidance and is a material consideration for local planning authorities and decision-takers in determining applications. At the heart of the NPPF is a presumption in favour of sustainable development. For determining planning applications, this means approving development proposals if they accord with the local development plan, unless material considerations indicate otherwise. If the development plan is absent, silent or the policies are out of date, then planning permission should be granted unless any adverse impacts would significantly outweigh the benefits, or specific policies in the NPPF indicate development should be restricted.

2.16 The NPPF states that sustainable development has economic, social and environmental dimensions. In the environmental dimension, the planning system contributes to *"protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy."* (Paragraph 7)

2.17 Within the overarching roles, the NPPF sets out 12 core land-use planning principles. The relevant core-principle in the context of this air quality assessment is that planning should *"contribute to conserving and enhancing the natural environment and reducing pollution".* (Paragraph 17)

2.18 Under the heading 'Conserving and Enhancing the Natural Environment', the NPPF states:

"The planning system should contribute to and enhance the natural and local environment by:

- *…*
- *preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability…* (Paragraph 109)

To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. (Paragraph 120)

In doing so, 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 not be revisited through the permitting regimes operated by pollution control authorities. (Paragraph 122)

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

2.19 The NPPF is not prescriptive in terms of the methodology for assessing air quality effects or describing significance; practitioners continue to use guidance provided by Defra and non-governmental organisations, including Environmental Protection UK and the Institute of Air Quality Management.

Low Emissions Strategies

2.20 In January 2010, Defra published good practice guidance [9] for advising local authorities on ways in which the planning system may be used to reduce transport emissions. The guidance informs local authorities that Low Emissions Strategies, packages of measures designed to mitigate the transport impacts of development through the use of low emission fuels and technologies, can be secured through planning conditions and legal obligations (section 106 agreements). The guidance provides local authorities with typical measures and examples of good practice including:

- On-site parking - residential/customer parking spaces set aside for car clubs or low emission vehicles;
- Low emission infrastructure – provision of charging electric charging bays or low emissions fuelling points, cycle rental schemes, development and promotion of car clubs;
- Innovative and creative ideas;
- Commitments via procurement and supply chains; and
- Contributions to local plans – standardised for all developments over a certain threshold but related to the actual impact.

2.21 The guidance states that where local authorities elect to use a standard charging system, the levels should be published in advance in public documents such as a Local Development Framework or a supplementary planning document.

Regional Policy Guidance – The London Plan

2.22 The Mayor of London is responsible for all strategic planning in London. Amongst the Mayor's duties is the requirement to develop a Spatial Development Strategy for London, known as the London Plan [10]. The current version of the London Plan was published in July 2011 and replaces the original version, published in 2004, and subsequent amendments. The Plan acts as an integrating framework for a set of strategies, including improvements to air quality.

2.23 The key policy relating to air quality is Policy 7.14: Improving Air Quality:

"Strategic

A. The Mayor recognises the importance of tackling air pollution and improving air quality to London's development and the health and well-being of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimise public exposure to pollution.

<u>Planning decisions</u>

B Development proposals should:

a. minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3)

b. promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'

c. be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs).

d. ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches

e. where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified.

<u>LDF preparation</u>

C Boroughs should have policies that:

a. seek reductions in levels of pollutants referred to in the Government's National Air Quality Strategy having regard to the Mayor's Air Quality Strategy

b. take account of the findings of their Air Quality Review and Assessments and Action Plans, in particular where Air Quality Management Areas have been designated."

2.24 The Mayor's Air Quality Strategy (MAQS) [11], referred to in Policy 7.14, sets out policies and proposals seeking to improve London's air quality to the point where air pollution no longer poses a significant risk to human health.

2.25 As stated previously, the annual-mean NO_2 objective and the daily-mean PM_{10} objective are not being met throughout Greater London. The AQS objectives for all other pollutants are being met. Road traffic emissions in London are the major source of PM_{10} emissions, contributing an estimated 83% of PM_{10}. For NO_x, the major sources of emissions are road traffic emissions, contributing an estimated 46% and the use of domestic gas, contributing an estimated 22%.

2.26 A Low Emission Zone (LEZ) for London was introduced under the Strategy on 4 February 2008. Vehicles meeting the required emissions standards for the LEZ can be driven within the LEZ free of charge. However, operators of vehicles not meeting the required emissions standards are subject to a daily charge. All roads within Greater London, excluding those parts of the M25 located within the Greater London boundary, are included within the LEZ.

2.27 The first phase of the LEZ scheme applied to lorries, motor caravans and horse boxes weighing more than 12 tonnes. On 7 July 2008, the second phase of the LEZ was introduced to include lorries, motor caravans and horse boxes weighing more than 3.5 tonnes and buses or coaches, with more than eight seats, weighing more than 5 tonnes.

2.28 On 3 January 2012, phase 3 of the LEZ scheme was introduced. Euro III lorries, buses and coaches were previously exempt but now need to be classified as Euro IV to avoid the charge. From 3 January 2012, large vans, mini buses and certain other diesel vehicles are also required to meet Euro III emission standards.

2.29 The MAQS introduces the following transport-related policies including:

- Encouraging smarter choices and sustainable travel behaviour;
- Promoting technological change and cleaner vehicles;
- Identifying priority locations and improving air quality through a package of local measures;
- Reducing emissions from public transport; and
- Emissions control schemes (such as additions to the London LEZ).

2.30 The MAQS introduces the following non-transport related policies including:

- *"Reducing emissions from construction and demolition - through the review and full implementation of the Best Practice Guidance for construction and demolition sites across London;*
- *Making new developments 'air quality neutral or better' - by making better use of the planning system to ensure no new development has a negative impact on air quality in London;*
- *Maximising the air quality benefits of a low to zero carbon energy supply by using the planning process to ensure that low to zero carbon energy supply does not have a negative impact on local air quality;*
- *Energy efficiency schemes – by implementing programmes that will make London's buildings more energy efficient;*
- *Improving air quality in the public realm - by planting urban vegetation and by discouraging anti-social burning of waste;*
- *Encouraging innovation – by making London a centre for new ideas that will improve air quality; and*

- *Raising awareness - by highlighting the impact of poor air quality on health to encourage Londoners to take action to reduce emissions and by making them aware of any potential personal health risks."*

2.31 The Mayor of London has published a consultation draft Supplementary Planning Guidance (SPG) on Sustainable Design and Construction (July 2013) that proposes how the Air Quality Neutral policy will be implemented; and a consultation draft SPG on The Control of Dust and Emissions During Construction and Demolition (September 2013). These SPG's are not expected to be published in final form until the end of 2013.

Local Planning Policy

2.32 The London Borough of Hillingdon Unitary Development Plan (UDP) [12] set out policies to guide development. In September 2004, the Planning & Compulsory Purchase Act [13] introduced a new development plan system intended to streamline the local planning process. Under the new system, Local Plans will be replaced by a Local Development Framework (LDF). In 2007, the policies in the UDP were 'saved' until they are replaced by emerging documents prepared under the LDF. However, the 'saved' policies relating to air quality refer to previous MAQS. Public consultation on the draft Core Strategy, the first of the LDF documents, has just been completed. The results of the consultation are awaited.

2.33 Relevant to this assessment, the UDP refers to Supplementary Planning Guidance (SPG) [14].

2.34 Section 2 of the SPG provides guidance on when an air quality assessment is required and for determining the significance of air quality effects:

Whether a particular proposed development will affect air quality significantly is a matter for consideration by local planning authority, based on matters of fact and degree related to the development being proposed. The air quality impacts will be considered to be significant where the air quality objectives are likely to be breached. The acceptability of the development will depend on:

In such cases,

(i) the scale of the emissions,

(ii) whether the emissions caused by the development would impede the London Borough of Hillingdon's overriding objective to improve air quality in the area;

(iii) whether significant public exposure occurs; and

(iv) ground level concentrations.

If an area is close to an area where the air quality objectives are likely to be breached, the air quality impacts would be significant if the development would cause a deterioration, however small, in the quality of the air in that area. The following factors will need to be considered in the air quality assessment:

(i) The quality of the air without the development in comparison to the air quality objectives. (The level of risk that any further deterioration in the quality of the air might cause an extension to the area where the air quality objectives are likely to be breached);

(ii) Predicted changes in the concentration of pollutants, with and without the development;

(iii) the scale of the emissions;

(iv) whether the emissions caused by the development would impede the London Borough of Hillingdon's overriding objective to improve air quality in the area; and

(v) whether significant public exposure occurs.

The LPA does not intend to be prescriptive about the contribution to pollution levels that should be regarded as significant; each case will be assessed on its merits.

2.35 Section 3 of the SPG sets out mitigation measures which should be considered if significant effects are predicted and Section 4 sets out conditions and Section 106 Planning Obligations/Agreements relating to air quality which may apply to any permission.

2.36 The approach adopted for this assessment is entirely consistent with this guidance.

3 Assessment Methodology

Approach

3.1 The approach to this air quality assessment includes the key elements listed below and is consistent with Local Air Quality Management Technical Guidance: LAQM.TG(09)[15]:

- assessment of existing local air quality conditions through a review of available air quality monitoring data for the area and consideration of relevant Air Quality Review and Assessment (R&A) documents;
- qualitative assessment of potential construction-phase impacts on local air quality; and
- quantitative assessment of the impact on local air quality of changes in vehicle emissions resulting from traffic flow changes generated by the proposed development.

Summary of Key Pollutants

3.2 During the construction phase of the proposed development, the major influences on air quality are likely to be dust-generating activities, such as movement of plant and vehicles both on and around the site. Potentially, temporary annoyance effects could be caused by the deposition of construction dust.

3.3 Regarding the operational phase of the proposed development, the UK AQS identifies the pollutants associated with road traffic emissions and local air quality as nitrogen oxides (NO_x), particulate matter (PM_{10}), carbon monoxide (CO), 1, 3-butadiene and benzene. Emissions of total NO_x from motor vehicle exhausts comprise nitric oxide (NO) and NO_2. NO oxidises in the atmosphere to form NO_2. Currently, AQMAs designated in the UK attributable to road traffic emissions are associated with high concentrations of NO_2 and PM_{10}.

3.4 This assessment focuses on changes in NO_2 and PM_{10} concentrations associated with the proposal. The impact from fine particulate matter, known as $PM_{2.5}$ (a subset of PM_{10}) concentrations has also been considered.

Construction Phase - Methodology

Construction Traffic

3.5 With respect to emissions from traffic, construction of the proposed development would generate vehicle movements on the local road network, which would include contractors' vehicles and Heavy Goods Vehicles (HGVs), diggers, and other diesel-powered vehicles. This would result in emissions of nitrogen oxides (NO_X), particulates and other combustion-related pollutants. The use of these construction vehicles would be localised and temporary.

3.6 Environmental Protection UK has produced guidance relating to the assessment of air quality effects [16]. In relation to construction, this indicates that air quality assessment should include construction traffic for those large, long-term construction sites that would generate large HGV flows (of over 200 movements per day) over a period of a year or more. The results of the Highways and Access assessment indicates that the EPUK thresholds are not likely to be exceeded for any individual road during the construction phase of this project.

3.7 Based on the above and, assuming standard levels of maintenance are applied, emissions from construction related vehicles on the local road network are expected to be negligible in terms of the effect on local air quality.

3.8 This is further supported by the Institute of Air Quality Management (IAQM) *Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance,* which states that exhaust emissions from on-site plant and site traffic are unlikely to have a significant impact on local air quality and notes that in most cases there would be no need for a quantitative assessment. (This IAQM guidance is considered the general good practice assessment approach, and has been used for this development because the Mayor's SPG on construction dust assessment and control for London has not yet been published in its final revised form.)

Construction Dust

3.9 Dust is the generic term used to describe particulate matter in the size range 1-75 µm in diameter [17]. Particles greater than 75 µm in diameter are termed grit rather than dust.

3.10 Dusts can contain a wide range of particles of different sizes. The normal fate of suspended (i.e. airborne) dust is deposition. The rate of deposition depends largely on the size of the particle and its density; together these influence the aerodynamic and gravitational effects that determine the distance it travels and how long it stays suspended in the air before it settles out onto a surface. In addition, some particles may agglomerate to become fewer, larger particles; whilst others react chemically.

3.11 The effects of dust are linked to particle size and two main categories are usually considered:

- PM_{10} particles, those up to 10 µm in diameter, remain suspended in the air for long periods and are small enough to be breathed in and so can potentially impact on health; and
- Dust, generally considered to be particles larger than 10 µm which fall out of the air quite quickly and can soil surfaces (e.g. a car, window sill, laundry).

3.12 Concentration-based limit values and objectives have been set for the PM_{10} suspended particle fraction, but no statutory or official numerical air quality criterion for dust annoyance has been set at a UK, European or World Health Organisation (WHO) level. Construction dust assessments have tended to be risk based, focusing on the appropriate measures to be used to keep dust impacts at an acceptable level. This approach has continued to evolve and in December 2011 (revised in January 2012), the Institute of Air Quality Management (IAQM) published *Guidance on* *the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance*. The IAQM guidance aims to estimate the impacts of both PM_{10} and dust, together, through a single risk-based assessment procedure. The IAQM guidance document states: "*As the effects depend to a large extent to the mitigation measures adopted, the emphasis has been on classifying sites according to the risk of the effects, to identify the mitigation appropriate to the risk*."

3.13 The IAQM guidance provides a methodological framework, but notes that professional judgement is required to assess effects: "*This is necessary, because the diverse range of projects that are likely to be subject to dust impact assessment means that it is not possible to be prescriptive as to how to assess the impacts. Also a wide range of factors affect the amount of dust that may arise, and these are not readily quantified*."

3.14 Consistent with the recommendations in the IAQM guidance, a risk-based assessment has been undertaken for the development, using the well-established source-pathway-receptor approach:

- The dust impact (the change in dust levels attributable to the development activity) at a particular receptor will depend on the magnitude of the dust source and the effectiveness of the pathway (i.e. the route through the air) from source to receptor.
- The effects of the dust are the results of these changes in dust levels, for example annoyance or adverse health effects. The effect depends on the sensitivity of the receptor to dust. An assessment of the overall dust effect for the area as a whole has been made using professional judgement taking into account both the change in dust levels (as indicated by the Dust Impact Risk for individual receptors) and the absolute dust levels, together with the sensitivities of local receptors and other relevant factors for the area.

3.15 The organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations that include Member of the Institute of Air Quality Management, Chartered Chemist, Chartered Scientist, Chartered Environmentalist and Member of the Royal Society of Chemistry and have the required academic qualifications for these professional bodies.

3.16 This assessment does not consider the air quality impacts of dust from any contaminated land or buildings. If contaminated land is identified on the Application Site, the impacts will be assessed in other technical discipline reports.

Source

3.17 The IAQM guidance categorises the likely magnitude of dust sources during activities such as earthworks and construction. These example dust emission categories are based on the method of construction and the materials used. These example classifications have been combined with details of the period of construction activities to provide the ranking for the source magnitude that is set out in Table 3.1.

Table 3.1 Risk Allocation - Source

Features of the Source of Dust Emissions	Dust Emission Magnitude
Demolition - building over 50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities > 20 m above ground level. **Earthworks** – total site area over 10,000 m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved > 100,000 tonnes. **Construction** - total building volume over 100,000 m^3, activities include piling, on-site concrete batching, sand blasting. Period of activities more than two years.	Large
Demolition - building between 20,000 to 50,000 m^3, potentially dusty construction material and demolition activities 10 - 20 m above ground level. **Earthworks** – total site area between 2,500 to 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 - 8 m in height, total material moved 20,000 to 100,000 tonnes. **Construction** - total building volume between 25,000 and 100,000 m^3, use of construction materials with high potential for dust release (e.g. concrete), activities include piling, on-site concrete batching. Period of construction activities between one and two years.	Medium
Demolition - building less than 20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities < 10 m above ground, demolition during winter months. **Earthworks** – total site area less than 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 winter months. **Construction** - total building volume below 25,000 m^3, use of construction materials with low potential for dust release (e.g. metal cladding or timber). Period of construction activities less than one year.	Small

3.18 The IAQM guidance also includes a category for 'track-out', defined as the transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. As a general rule, significant track-out may occur up to 500 m from the exit of large sites, 200 m from medium sites and 50 m from small sites, assuming no site-specific mitigation. The key measures for controlling track-out dust are washing the wheels of vehicles leaving the site and the damping down of haul routes. Even the most basic level of control and mitigation applied to the main work phases should make provision for both measures; consequently, the dust impacts associated with track-out are not considered as a separate issue within this assessment.

Pathway

3.19 Pathway means the route by which dust may be carried from the source to a receptor. The key aspects affecting the pathway effectiveness are the distance between the receptor and the dust source and the orientation of the source and the receptors relative to the prevailing wind direction.

3.20 Within distances of 20 m of the site boundary, impacts from dust may occur, regardless of the prevailing wind direction. At greater distances, the wind direction has a greater influence on the impact; consequently, the score allocated to the pathway takes the orientation of the receptor relative to the source into account only for distances beyond 20 m.

3.21 For receptors more than 350 m from the site boundary, the risk is deemed negligible. Table 3.2 sets out the criteria used for ranking the pathway risk within this assessment.

Table 3.2 Risk Allocation - Pathway

Distance between source* and receptor	Orientation of receptor relative to source	Pathway Risk
Less than 20 m	All directions	High
Between 20 and 100 m	Downwind	High
Between 20 and 100 m	Upwind	Medium
Between 100 and 350 m	Downwind	Medium
Between 100 and 350 m	Upwind	Low

*Where the distance from the specific dust emission sources is not known, the distance from the site boundary is used.

3.22 In the case where there is a significant obstruction between the source of emissions and the receptor, e.g. a large wooded area, the risk is reduced by one classification.

3.23 Where there are a large number of receptors of a similar sensitivity grouped closely together, a single receptor has been selected as being representative of the larger number.

Dust Impact Risk

3.24 In the next step, the magnitude of the dust source and the effectiveness of the pathway are considered together using Table 3.3 to estimate the risk of dust impact (the change in dust levels attributable to the development activity) at an individual receptor. This is the Dust Impact Risk in the absence of mitigation.

Table 3.3 Risk of Dust Impacts at Individual Receptors

Pathway			Dust Emission Magnitude		
Distance between source and receptor	Orientation of receptor relative to source	Pathway Risk	Large	Medium	Small
Less than 20 m	All directions	High	High Risk	High Risk	Medium Risk
Between 20 and 100 m	Downwind	High	High Risk	Medium Risk	Medium Risk
	Upwind	Medium	Medium Risk	Low Risk	Low Risk
Between 100 and 350 m	Downwind	Medium	Medium Risk	Low Risk	Low Risk
	Upwind	Low	Low Risk	Low Risk	Negligible Risk

Assessment of Dust Effects and Assignment of Significance

3.25 The effect of the dust (i.e. the result of the change in dust levels) depends on the sensitivity of the receptor to the change. Receptors are the users of the adjacent land and they may vary in their sensitivity to dust. The focus of this assessment is the direct and indirect effects of particulate matter on the identified local human receptors, whose sensitivities have been categorised as per Table 3.4, which is based on the definitions set out in the IAQM guidance, EPUK guidance on air quality assessments, the classifications set out in the Technical Guidance to NPPF, and examples provided in LAQM.TG(09) [15] for where the air quality objectives apply. It is recognised that dust emissions also have the potential to affect ecological receptors, which is discussed in the next section.

Table 3.4 Categorisation of Receptor Sensitivities

Receptor Type	Sensitivity
Very sensitive receptors (eg. oncology units, European designated sites, sites with Sphagnum mosses).	Very High
Building façades of residential properties, schools, hospitals, clinics, care homes and retirement homes.	High
Painting and coatings operations.	
Hi tech industries.	
Food processing activities.	
Commercially sensitive horticultural land.	
Nationally designated sites.	
Other horticultural land, glasshouse, nurseries and gardens of residential properties.	Medium
Food retailers and offices.	
Locally designated ecological site.	
Outdoor storage areas.	Low
Light and heavy industrial activities.	
Car parks, bus stations and railway stations.	
Farms.	
Site has no ecological designation.	

3.26 The methodological framework in the IAQM assessment guidance categorises the significance of the dust effect for the area as a whole, by considering the change in dust levels (as indicated by the Dust Impact Risk for individual receptors), in conjunction with the absolute dust levels (specifically the available headroom between the local background PM_{10} concentration and the AQS annual-mean objective value), together with the sensitivities of local receptors and other relevant factors for the area. The characteristics of the area around the site that should be taken into account are summarised in Table 3.5.

3.27 It can be seen that this assessment of the significance of the overall effect on the area requires taking into account the variation in impacts between different receptors and consideration of several other factors; the IAQM guidance is clear that this stage requires professional judgement.

Table 3.5 Evaluation of Significance of Overall Effect (without Mitigation) on an Area

Examples of Characteristics of the Area around the Application Site	Dust Impact Risk		
	High Risk	**Medium Risk**	**Low Risk**
Very-high sensitivity receptors Very densely populated area More than 100 dwellings within 20 m of the site Ambient background PM_{10} concentrations > 40 $\mu g.m^{-3}$	Substantial Adverse	Moderate Adverse	Moderate Adverse
Predominantly high-sensitivity receptors Densely populated area 10 - 100 dwellings within 20 m of the site Commercially sensitive horticultural land within 20 m of the site Ambient background PM_{10} concentrations between 36 and 40 $\mu g.m^{-3}$	Moderate Adverse	Moderate Adverse	Slight Adverse
Predominantly medium-sensitivity receptors Where dwellings are present, they are at low density (less than 10 dwellings within 20 m of the site) Surrounding area is generally suburban or edge of town area Ambient background PM_{10} concentrations < 36 $\mu g.m^{-3}$	Moderate Adverse	Slight Adverse	Negligible
Low sensitivity receptors No dwellings within 20 m of the site Surrounding area is generally rural or industrial Ambient background PM_{10} concentrations < 36 $\mu g.m^{-3}$	Slight Adverse	Negligible	Negligible

3.28 The IAQM assessment guidance states that once the appropriate site-specific dust mitigation measures have been identified, the significance of the residual dust effects should be determined. Although the guidance notes that this is best determined using the professional judgement of the person preparing report, it states that for most sites the residual effects will be as shown in Table 3.6.

3.29 The separate IAQM guidance document Dust and Air Emissions Mitigation Measures [18] specifies three alternative levels of mitigation solution, the appropriate level being determined by whether the Dust Impact Risk is low, medium or high. The particular level of measures that have been recommended in this assessment are informed by an evaluation of the dust risk category for the development as a whole, which is based on the risk at each of the identified receptors.

Table 3.6 Evaluation of the Significance of Residual Overall Effect (with Mitigation) on an Area

Examples of Characteristics of the Area around the Application Site	Dust Impact Risk		
	High Risk	Medium Risk	Low Risk
Very-high sensitivity receptors Very densely populated area More than 100 dwellings within 20 m of the site Ambient background PM_{10} concentrations > 40 μg.m^{-3}	Slight Adverse	Slight Adverse	Negligible
Predominantly high-sensitivity receptors Densely populated area 10 - 100 dwellings within 20 m of the site Commercially sensitive horticultural land within 20 m of the site Ambient background PM_{10} concentrations between 36 and 40 μg.m^{-3}	Slight Adverse	Negligible	Negligible
Predominantly medium-sensitivity receptors Where dwellings are present, they are at low density (less than 10 dwellings within 20 m of the site) Surrounding area is generally suburban or edge of town area Ambient background PM_{10} concentrations < 36 μg.m^{-3}	Negligible	Negligible	Negligible
Low sensitivity receptors No dwellings within 20 m of the site Surrounding area is generally rural or industrial Ambient background PM_{10} concentrations < 36 μg.m^{-3}	Negligible	Negligible	Negligible

Effects on Ecological Receptors

3.30 The focus of this assessment is the direct and indirect effects of particulate matter on human receptors. However, it is recognised that dust emissions also have the potential to affect ecological receptors.

3.31 The effects of particulate matter on ecological receptors have not been subject to extensive research and therefore little published guidance is available. A majority of the research undertaken has focused on the chemical effects of alkaline dusts. A summary of a review of available research on behalf of the DETR [19] concluded that: "*The issue of dust on ecological receptors is largely confined to the associated chemical effect of dust, and particularly the effect of acidic or alkaline dust influencing vegetation through soils.*"

3.32 Annex F of Volume 11, Section 3, Part 1 of the Design Manual for Roads and Bridges [20] suggests that only dust deposition levels above 1000 mg.m^{-2}day^{-1} are likely to affect sensitive ecological receptors. This level of dust deposition is five times greater than the level of 200 mg.m^{-2}day^{-1}, at which dust deposition is generally considered likely to cause complaints of annoyance to humans. It states that most species appear to be unaffected until dust deposition rates are at levels considerably higher than this. It follows, therefore, that by ensuring dust deposition levels are kept below levels likely to cause annoyance to humans, they will be significantly below the level at which ecological receptors can be expected to be affected.

3.33 This is consistent with the IAQM guidance, where the risk category assigned to ecological receptors is consistently lower than the risk category at identical distances for the human-health receptors. This is also broadly consistent with earlier Environment Agency interim guidance [21] that concludes that most relatively insensitive vegetation species will not be significantly affected by smothering at dust deposition levels below about 200 $mg.m^{-2}day^{-1}$; although in habitats in which Sphagnum and possibly other mosses are important species within the protected site, effects may be observed at levels above about 70 $mg.m^{-2}day^{-1}$. However the report noted that the uncertainties were considerable and exceedence of these values should not be assumed to demonstrate harm. The report concluded there were insufficient data to derive thresholds for impacts of dust upon invertebrates.

Operational Phase - Methodology

Modelling of Pollutant Concentrations

3.34 In urban areas, pollutant concentrations are primarily determined by the balance between pollutant emissions that increase concentrations, and the ability of the atmosphere to reduce and remove pollutants by dispersion, advection, reaction and deposition. An atmospheric dispersion model is used as a practical way to simulate these complex processes; such a model requires a range of input data, which can include emissions rates, meteorological data and local topographical information. The model used and the input data relevant to this assessment are described in the following sub-sections.

3.35 The atmospheric pollutant concentrations in an urban area depend not only on local sources at a street scale, but also on the background pollutant level made up of the local urban-wide background, together with regional pollution and pollution from more remote sources brought in on the incoming air mass. This background contribution needs to be added to the fraction from the modelled sources, and is usually obtained from measurements or estimates of urban background concentrations for the area in locations that are not directly affected by local emissions sources. Background pollution levels are described in detail in Section 4.

Atmospheric Dispersion Modelling

Model Selection

3.36 The air quality effects associated with the changes in traffic flow characteristics on the local road network has been undertaken using ADMS-Roads, a version of the Atmospheric Dispersion Modelling System (ADMS), which is a model representing dispersion of pollutants from industrial and road traffic sources. This is a formally validated model, developed in the United Kingdom (UK) by Cambridge Environmental Research Consultants Ltd (CERC) and widely used in the UK and internationally for regulatory purposes.

3.37 Annual-mean NO_x and PM_{10} concentrations have been predicted at selected sensitive receptors using ADMS-Roads, then added to relevant background concentrations. Primary NO in the NO_X emissions is converted to NO_2 to a degree determined by the availability of atmospheric oxidants locally and the strength of sunlight. For road traffic sources, annual-mean NO_2 concentrations have been derived from the modelled road-related annual-mean NO_x concentration using the LAQM.TG(09) calculator.

Model Scenarios

3.38 Modelling has been undertaken for the following scenarios:

- Without Development – without the Proposed Development in the first year that the development is expected to be fully operational year, 2015; and
- With Development – with the Proposed Development in the first year that the development is expected to be fully operational year, 2015.

Model Input Data

Traffic Data

3.39 Traffic data used in the assessment have been provided by the project's transport consultants, Gateway TSP. The traffic flow data provided for this assessment are summarised in Table 3.7. The modelled road links are illustrated in Figure 1.

Table 3.7 Traffic Data Used Within the Assessment

Road Link ID	Road Link Name	Speed ($km.hr^{-1}$)	Daily Two Way Vehicle Flow			
			Without Development		With Development	
			LDV	HDV	LDV	HDV
1	Central Avenue	30.7	2960	113	3993	117
2	Botwell Lane (North)	44.1	15056	735	15478	737
3	Botwell Lane (South)	44.4	13408	786	13789	788

Notes: ($km.hr^{-1}$) = kilometres per hour
HDV = Heavy Duty Vehicle - vehicles greater than 3.5 t gross vehicle weight including buses
LDV = Light Duty Vehicle

3.40 The average speed on each road has been reduced by 10 $km.hr^{-1}$ to take into account the possibility of slow moving traffic near junctions and at roundabouts in accordance with LAQM.TG(09).

Car Park Emissions

3.41 Emissions from vehicle movements in the car parks have been modelled as area sources in ADMS-Roads, derived from the expected arrivals and departures in each hour provided by the project's traffic consultants.

3.42 The data provided by the project's traffic consultants are shown in Table 3.8. These data are the predicted arrivals and departures into the car park are over the course of a typical Friday trading period, and represent a conservative prediction since Friday is the busiest weekday for Lidl.

Table 3.8 Hourly Car Park Movements Modelled

Period	Arrivals	Departures
0-1	0	0
1-2	0	0
2-3	0	0
3-4	0	0
4-5	0	0
5-6	0	0
6-7	0	0
7-8	0	0
8-9	27	14
9-10	51	35
10-11	61	57
11-12	66	58
12-13	80	77
13-14	71	67
14-15	74	76
15-16	73	79
16-17	71	71
17-18	66	74
18-19	53	60
19-20	46	48
20-21	48	54
21-22	0	0
22-23	0	0
23-24	0	0

3.43 Vehicles have been assumed to travel around the car park at an average speed of 5 $km.hr^{-1}$. For the purposes of this assessment, it has been assumed that a vehicle using the car park will on average travel a total distance equal to the perimeter of the car park.

Emission Factors

3.44 The modelling has been undertaken using Defra's 2012 emission factor toolkit (version 5.1.3) which draws on emissions generated by the European Environment Agency (EEA) COPERT 4 (v8.1) emission calculation tool.

Meteorological Data

3.45 ADMS-Roads requires detailed meteorological data as an input. The most representative observing station for the region of the study area is London Heathrow approximately 4 km south-west of the Application Site. Meteorological data from this station for 2011 have been used within the dispersion model.

3.46 Figure 2 presents the wind rose for the meteorological data recorded at London Heathrow in 2011.

Receptors

3.47 The air quality assessment predicts the impacts at locations that could be sensitive to any changes. Such sensitive receptors should be selected where the public is regularly present and likely to be exposed over the averaging period of the objective. LAQM.TG(09) [15] provides examples of exposure locations and these are summarised in Table 3.9.

Table 3.9 Example of Where Air Quality Objectives Apply

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

3.48 There are few sensitive receptors along the roads for which traffic data have been provided, and in close proximity to the development; however, three sensitive receptors have been selected at properties where pollutant concentrations and/or changes in pollutant concentrations are anticipated to be greatest. These are given in Table 3.10 below and their locations are shown in Figure 1.

Table 3.10 Identified Sensitive Receptors

ID	Description	x	y
1	21 Central Avenue	509865	180192
2	11 Botwell Lane	509812	179919
3	126 Neild Road	509668	180028

3.49 The annual, daily and hourly-mean AQS objectives apply at the front and rear façades of all residential properties.

Long-Term Pollutant Predictions

3.50 Annual-mean road-related contributions of NO_x and PM_{10} have been combined with urban background concentrations. Annual-mean NO_2 concentrations have been derived from the modelled annual-mean NO_x concentration using the LAQM.TG(09) calculator [22].

Short-Term Pollutant Predictions

3.51 In order to predict the likelihood of exceedences of the hourly-mean AQS objectives for NO_2 and the daily-mean AQS objective for PM_{10}, the following relationships between the short-term objectives and the annual-mean values at each receptor have been considered.

Hourly-Mean AQS Objective for NO_2

3.52 Research undertaken in support of LAQM.TG(09) has indicated that the hourly-mean limit value and objective for NO_2 is unlikely to be exceeded at a roadside location where the annual-mean NO_2 concentration is less than 60 µg.m^{-3}. In May 2008, a re-analysis of the relationship between annual and hourly-mean NO_2 concentrations was undertaken using data collated between 2003 and 2007 [23]. The conclusions and recommendations of that report are:

"Analysis shows that statistically, on the basis of the dataset available here, the chance of measuring an hourly nitrogen dioxide objective exceedence whilst reporting an annual-mean NO_2 of less than 60 µg.m^{-3} is very low….

It is therefore recommended that local authorities continue to use the threshold of 60 µg.m^{-3} NO_2 as the guideline for considering a likely exceedence of the hourly-mean nitrogen dioxide objective."

3.53 The report recommends that this analysis is undertaken annually. However, following the current recommendation, the hourly objective is not considered further within this assessment if the annual-mean NO_2 concentration is predicted to be less than 60 µg.m^{-3}.

Daily-Mean AQS Objective for PM_{10}

3.54 The number of exceedences of the daily-mean AQS objective for PM_{10} of 50 µg.m^{-3} may be estimated using the relationship set out in LAQM.TG(09):

*Number of Exceedences of Daily Mean of 50 µg.m^{-3} = -18.5 + 0.00145 * (Predicted Annual-mean PM_{10})^3 + 206 / (Predicted Annual-mean PM_{10} Concentration)*

3.55 This relationship suggests that the daily-mean AQS objective for PM_{10} is likely to be met if the predicted annual-mean PM_{10} concentration is 31.8 µg.m^{-3} or less. The Air Quality Strategy Volume 2: Evidence Base states, throughout the document, that an annual-mean PM_{10} concentration of 31.5 µg.m^{-3} is approximately equivalent to the daily-mean objective.

3.56 The daily mean objective is not considered further within this assessment if the annual-mean PM_{10} concentration is predicted to be less than 31.5 µg.m^{-3}.

Fugitive PM_{10} Emissions

3.57 Studies suggest that brake dust and tyre wear may account for approximately one-third of the total particulate emissions from road transport. Improvements in vehicle technologies are reducing PM_{10} exhaust emissions. Therefore, the relative importance of fugitive PM_{10} emissions is increasing. Current emission factors for particulate matter include brake dust and tyre wear. No allowance is made for re-suspended road dust as this remains unquantified.

Significance Criteria

3.58 The Environmental Protection UK (EPUK) Development Control: Planning for Air Quality document [16] advises that:

"It is important to balance all aspects of development within an AQMA. For example a new residential development in the central area of a town or city may increase the number of people exposed to poor air quality. On the other hand, there may be social and economic benefits arising from the regeneration of the area. Moreover, if the development is close to a main shopping or employment area, there may be a reduction in the need to travel by car, with a corresponding potential to reduce emissions if people who previously travelled into the area by car no longer do so, leading to an improvement in air quality"

3.59 It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively. In order to ensure that the descriptions of effects are clear, consistent and in accordance with recent guidance, definitions have been adopted from the EPUK's Development Control: Planning for Air Quality document [16]. Table

3.11 provides an extract of the criteria provided for describing the change in magnitude of pollutant concentrations as a result of the operation of the Proposed Development.

Table 3.11 Descriptors for Changes in Magnitude of Predicted Pollutant Concentrations

Impact Magnitude – Descriptor	Predicted Change in Annual Mean as a Percentage of the Relevant Assessment Level
Large	> 10%
Medium	5 – 10%
Small	1 - 5%
Imperceptible	< 1%

Source: EPUK Development Control: Planning for Air Quality document (2010 Update) Table 4

3.60 When describing the air quality impact at a sensitive receptor, the change in magnitude of the concentration should be considered in the context of the absolute concentration at the sensitive receptor. Table 3.12 provides the EPUK approach for describing the air quality impacts at sensitive receptors for increases in annual-mean NO_2 concentrations. (Note: The AQS objectives and limit values for NO_2 and PM_{10} are identical in England, Wales and Northern Ireland, therefore, the approach can also be adopted for annual-mean PM_{10} concentrations in these countries).

Table 3.12 Impact Descriptors for Annual-Mean NO_2 Concentrations at Individual Sensitive Receptors

Absolute Concentrations in Relation Objective/Limit Value	Change in Concentration		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value with Scheme (> 40 μg.m^{-3})	Slight	Moderate	Substantial
Just Below Objective/Limit Value with Scheme (36 – 40 μg.m^{-3})	Slight	Moderate	Moderate
Below Objective/Limit Value with Scheme (30 – 36 μg.m^{-3})	Negligible	Slight	Slight
Well Below Objective/Limit Value with Scheme (< 30 μg.m^{-3})	Negligible	Negligible	Slight

Source: EPUK Development Control: Planning for Air Quality document (2010 Update) Table 5
Note: An imperceptible change would be described as a negligible impact.

3.61 This table is specifically for the assessment of annual-mean NO_2 concentrations, although it may also be used for the assessment of annual-mean PM_{10} and $PM_{2.5}$ concentrations using the same proportions of the assessment level, 'just below' being 90 – 100 % of the objective/limit value and 'well below' being less than 75% of the objective/limit value.

3.62 The descriptions of impacts obtained using the approach above are designed to apply at individual receptors. The significance of those impacts for the development as a whole requires a further step. The EPUK guidance advocates that the *"conclusion as to the overall significance of the air quality impacts should be based on the professional judgement of the person preparing the report."* The EPUK guidance sets out the following factors which should be considered in reaching this judgement:

- *"Number of properties affected by slight, moderate or major air quality impacts and a judgment on the overall balance;*
- *Where new exposure is being introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant;*
- *The magnitude of the changes and the descriptions of the impacts at the receptors, i.e. Tables 4 and 5 findings;*
- *Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;*
- *Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced;*
- *Uncertainty, including the extent to which worst-case assumptions have been made; and*
- *The extent to which an objective or limit value is exceeded, e.g. an annual mean NO_2 of 41 $\mu g.m^{-3}$ should attract less significance than an annual mean of 51 $\mu g.m^{-3}$."*

3.63 The organisation engaged in assessing the significance of air quality impacts should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations, as stated in paragraph 3.15 of this report. In addition, the Technical Director responsible for authorising all deliverables has over 15 years' experience.

Model Verification

3.64 LAQM.TG(09) requires that local authorities verify the results of any detailed modelling undertaken for the purposes of fulfilling their R&A duties. Model verification refers to *"checks that are carried out on model performance at a local level"*. Modelled concentrations are compared with the results of monitoring and, where there is a disparity between modelled and monitored concentrations, an adjustment may be established and applied.

3.65 For the verification and adjustment of NO_x/NO_2 concentrations, LAQM.TG(09) recommends that the comparison involves a combination of automatic and diffusion monitoring, rather than a single automatic monitor. This is to ensure any adjustment factor derived is representative of all locations modelled and not unduly weighted towards the characteristics at a single site. Where only diffusion tubes are used for the model verification, the study should consider a broad spread of monitoring locations across the study area to provide sufficient information relating to the spatial variation in pollutant concentrations. No adjustment factor is deemed necessary where the modelled concentrations are within 25% of the monitored concentrations.

3.66 Monitoring is not undertaken at a broad spread of roadside locations within the study area, therefore it has not been possible to perform a formal model verification study.

4 Baseline Air Quality Conditions

Overview

4.1 Information on background air quality in the UK is usually available from two public sources:

- Each local authority has published results of its Review and Assessment (R&A) of air quality, with reference to local monitoring and modelling studies.
- Defra maps [24], which show estimated pollutant concentrations for each 1 km grid square in the UK.

4.2 This information can be supplemented by the results of any historical monitoring campaigns undertaken in the study area or by any study-specific monitoring campaign that has been undertaken. In the case of this assessment, sufficient data are available from public sources to gain an indication of background air quality.

Review and Assessment Process

4.3 The LBH has designated the area *"from the southern boundary, north to the border defined by, the A40 corridor from the western borough boundary, east to the intersection with the Yeading Brook north until its intersection with the Chiltern-Marylebone railway line and then east along the railway line to the eastern borough boundary"* as an AQMA due to high levels of NO_2 attributable to road traffic emissions. The proposed development is located within the designated AQMA.

4.4 In 2004, the LBH developed an Air Quality Action Plan (AQAP) setting out the measures and actions it intends to take to improve air quality within the AQMA. Progress on the AQAP is reviewed on an annual basis. The most recent published review [25] was undertaken in June 2013. Up to 75% of the measures within the AQAP have now been fully adopted.

Urban Background Monitoring

4.5 Monitors at urban background locations measure concentrations away from the local influence of emission sources and are therefore broadly representative of residential areas within large conurbations. Monitoring at urban background locations is considered an appropriate source of data for the purposes of describing baseline air quality.

4.6 Automatic monitoring of air quality is undertaken by LBH in one urban background location and monitors NO_2 only. The most recent measured annual-mean concentrations are presented in Table 4.1.

Table 4.1 Automatically Monitored Urban Background Annual-Mean NO_2 Concentrations

Site Name	x	y	Approx Distance to Site (km)	Concentration (µg.m^{-3})		
				2010	2011	2012
Hillingdon Sipson	507750	176750	3.7	38	37	35

4.7 In addition, LBH monitors NO_2 concentrations at a number of other urban background locations using passive diffusion tube samplers. The most recent bias-adjusted NO_2 concentrations are presented in Table 4.2.

Table 4.2 Passively Monitored Urban Background Annual-Mean NO_2 Concentrations

Site Code	x	y	Approx Distance to Site (km)	Concentration (µg.m^{-3})		
				2010	2011	2012
HD41	***509377***	***181224***	***1.1***	***29***	***Discontinued***	
HD49	508650	182274	2.4	27	26	26
HD51	506334	180266	3.4	35	33	36
HD52	505157	183231	5.5	37	33	37
HD53	506241	185652	6.5	41	41	45
HD56	***509796***	***178633***	***1.4***	***36***	***35***	***37***
HD57	508756	177717	2.5	39	37	39
HD58	508412	177124	3.2	40	39	40
HD59	507294	177322	3.6	34	34	36
HD60	505753	177760	4.5	31	29	32
HD61	504848	176770	5.8	38	35	34
HD65	506081	177071	4.7	33	33	38

Site Code	x	y	Approx Distance to Site (km)	Concentration (µg.m^{-3})		
				2010	2011	2012
HD66	507305	177518	3.5	34	31	36
HD67	505729	180290	4.0	32	30	29
HD68	505775	182565	4.6	30	27	30
HD70	505291	190935	11.7	26	24	25
HD72	507236	177927	3.2	32	32	35
HD73	511825	185655	5.9	28	26	28
HD75	510103	186133	6.0	29	28	29
HD77	511108	189742	9.7	28	25	29
HD80b	***508542***	***179650***	***1.2***	***36***	Discontinued	
HD202	**510361**	**179820**	**0.6**			**33**
HD203	***509683***	***179486***	***0.5***			***48***
HD204	506108	180493	3.6	**-**		39
HD205	506503	179510	3.2			42
HD206	507141	179628	2.6			29
HD207	507580	179812	2.1			31
HD208	***510761***	***180766***	***1.2***			***30***
HD209	511828	182023	2.8			35
HD210	507649	184611	4.9	-		50
HD211	506143	185395	6.4			34
HD212	506035	183611	5.1			38
HD213	508773	177352	2.8			40
HD214	509499	178370	1.6			50
Maximum			**11.7**	**41**	**41**	**50**
Minimum			**0.5**	**26**	**24**	**25**

All concentrations have been adjusted using a bias factor established using three local collocation studies at: Hillingdon AURN, Hillingdon 1 and Hillingdon 2.

Bold italics – sites within 1.5 km of proposed development

4.8 The results show that whilst there is a degree of variation in the background concentrations. Across all sites, the measured annual-mean NO_2 concentration varies from 25 $\mu g.m^{-3}$ to 50 $\mu g.m^{-3}$ between 2010 and 2012.

4.9 Monitoring of particulate matter is not undertaken at any urban background location within Hillingdon. However, PM_{10} is measured automatically at a number of sites classified as roadside locations and $PM_{2.5}$ is measured at a number of locations influenced by London Heathrow airport. Concentrations of particulate matter are much more evenly distributed across the UK compared to emissions of nitrogen oxides. This reflects the wide range of PM_{10} sources and the contribution of secondary particulate matter, as reported by the Air Quality Expert Group in their report Particulate Matter in the UK [26] commissioned by Defra. On that basis, consideration has been also been given to the results of particulate matter monitoring undertaken in 'non-urban background' locations. The measured concentrations are provided in Table 4.3 and Table 4.4.

Table 4.3 Monitored Annual-Mean PM_{10} Concentrations

Site Name	x	y	Approx Distance to Site (km)	Concentration ($\mu g.m^{-3}$)		
				2010	2011	2012
Hillingdon 1	510770	184960	4.9	22	24	24
Hillingdon 2	506991	181951	3.3	26	23*	-
Hillingdon 3	509557	176994	3.0	20	23	22
Hillingdon Hayes	510283	178905	1.2	24	25	25
Maximum			**4.9**	**26**	**25**	**25**
Minimum			**1.2**	**20**	**23**	**22**

* Short to long term adjustment applied as data capture < 75% as site was discontinued September 27 2011

Table 4.4 Monitored Annual-Mean $PM_{2.5}$ Concentrations

Site Name	x	y	Approx Distance to Site (km)	Concentration (µg.m^{-3})		
				2010	2011	2012
London Harlington	508300	177800	2.6	13	16	13
Heathrow Green Gates	505630	176930	5.1	10	10	10
Heathrow Oaks Road	505714	174503	6.8	11	10	10
London Heathrow	508399	176746	3.5	11	11	11
Maximum			**6.8**	**13**	**16**	**13**
Minimum			**2.6**	**10**	**10**	**10**

4.10 Monitored annual-mean PM_{10} concentrations range from 20 µg.m^{-3} to 26 µg.m^{-3} and annual-mean $PM_{2.5}$ concentrations ranges from 10 µg.m^{-3} to 14 µg.m^{-3}.

Defra Mapped Concentrations

4.11 The Defra maps provide estimates of pollution concentrations across the UK at a resolution of 1 km^2.

4.12 Total annual-mean NO_2 concentrations have been collected for the grid square of the automatic monitoring sites and passive monitoring sites within 1.5 km of the proposed development. The background Defra mapped NO_2 concentrations are provided in Table 4.5.

Table 4.5 Defra Mapped Annual-Mean Background NO_2 Concentrations

Site Name	Distance to Site (km)	Concentration (µg.m^{-3})	
		Range of Monitored	Estimated Defra Mapped
Hillingdon Sipson	3.7	35 – 37	50.3
HD41	*1.1*	29	25.6
HD56	*1.4*	35 – 37	33.8
HD80b	*1.2*	36	31.3
HD202	0.6	33	36.7
HD203	*0.5*	48	32.7
HD208	*1.2*	30	29.0
Application site (509740, 180045)	-	-	26.4

4.13 Similarly, the total annual-mean PM_{10} and $PM_{2.5}$ concentrations have been collected for the grid squares of the monitoring sites. The estimated background Defra mapped PM_{10} and $PM_{2.5}$ concentrations are provided in Table 4.6 and 4.7 respectively.

Table 4.6 Defra Mapped Annual-Mean Background PM_{10} Concentrations

Site Name	Distance to Site (km)	Concentration (µg.m^{-3})	
		Range of Monitored	Estimated Defra Mapped
Hillingdon 1	4.9	22 – 24	18.7
Hillingdon 2	3.3	23 – 26	17.0
Hillingdon 3	3.0	20 – 23	18.3
Hillingdon Hayes	1.2	24 – 25	19.8
Application site (509740, 180045)	-	-	17.4

Table 4.7 Defra Mapped Annual-Mean Background $PM_{2.5}$ Concentrations

Site Name	Distance to Site (km)	Concentration (µg.m^{-3})	
		Range of Monitored	Estimated Defra Mapped
London Harlington	2.6	13 – 16	13.0
Heathrow Green Gates	5.1	10	14.5
Heathrow Oaks Road	6.8	10 – 11	14.3
London Heathrow	3.5	11	15.4
Application site (509740, 180045)	-	-	12.5

Discussion of Background Concentrations

4.14 By convention, air quality assessments establish the background concentration at a conservative, though realistic level.

4.15 The estimated Defra-mapped background NO_2 concentrations are neither consistently below nor above the range established by the results of monitoring. Therefore, neither the maps nor the monitoring results can be considered in all cases to represent the worst case. On further review of the data, the closest monitoring site (HD203) to the Application Site measured a very high annual mean NO_2 concentration of 48 µg.m^{-3}. However, the location is very close to the road and as such is heavily influenced by roadside emissions so it is unlikely to be representative of the general background character. In addition monitoring only started at this site in 2012, so the results cannot be compared with previous years to confirm if this result is normal. The next closest monitoring location (HD203) to the Application Site monitored an annual-mean NO_2 concentration of 33 µg.m^{-3}. At this location the Defra mapped estimate is higher than the monitored concentration. Therefore, for a conservative assessment, the background annual-mean NO_2 concentration in the opening year of the development has been derived from the Defra mapped estimated of 36.7 $\mu g.m^{-3}$.

4.16 For PM_{10} the estimated Defra mapped background concentration is consistently below the range established by the results of monitoring. Therefore, the annual-mean PM_{10} concentration concentrations at the Application Site will be derived from the maximum monitored annual-mean PM_{10} concentration (a value of 25 $\mu g.m^{-3}$) from the closest monitoring site (Hillingdon Hayes) to the Application Site.

4.17 For $PM_{2.5}$ the estimated Defra mapped background concentrations are neither consistently below nor above the range established by the results of monitoring. However, the maximum monitored annual-mean $PM_{2.5}$ concentration is recorded at the closest monitoring station to the Application Site. Therefore, for a conservative assessment, the background annual-mean $PM_{2.5}$ concentration in the opening year of the development will be derived from this value of 16 $\mu g.m^{-3}$.

4.18 Historically the view has been that background traffic-related NO_2 concentrations in the UK would reduce over time, due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions. However, the results of recent monitoring across the UK suggest that background annual-mean NO_2 concentrations have not decreased in line with expectations. Inspection of the results of local monitoring presented here indicates that there is no particular trend over time for concentrations of either NO_2, PM_{10} or $PM_{2.5}$ in the vicinity of the Application Site.

4.19 To ensure that the assessment presents the worst-case results, the highest measured annual-mean background NO_2, PM_{10} and $PM_{2.5}$ concentrations have been assumed and no reduction has been applied for future years.

4.20 Table 4.8 summarises the annual-mean background concentrations for NO_2, PM_{10} and $PM_{2.5}$ used in this assessment.

Table 4.8 Summary of Background Annual-Mean (Long-term) Concentrations used in the Assessment

Pollutant	Data Source	Concentration ($\mu g.m^{-3}$)
NO_2	Defra maps	36.7
PM_{10}	Hillingdon Hayes	25
$PM_{2.5}$	London Harlington	16

5 Assessment of Construction Impacts

Construction Dust

5.1 The major influence on air quality throughout the construction phase of the proposed development is likely to be dust-generating activities such as movement of plant vehicles both on and around the development site.

5.2 Whilst no detailed construction phase information is currently available, activities that may cause fugitive dust emissions are as follows:

- earthworks;
- handling and disposal of spoil;
- wind-blown particulate material from stockpiles;
- movement of vehicles, both on and off site; and
- handling of loose construction materials.

5.3 The level and distribution of construction dust emissions will vary according to factors such as the type of dust, duration and location of dust-generating activity, weather conditions and the effectiveness of suppression methods.

5.4 The main effect of any dust emissions, if not mitigated, could be annoyance due to soiling of surfaces, particularly windows, cars and laundry. The effect of the construction phase, if un-mitigated would be minor to moderate adverse in magnitude, temporary and local in scale.

5.5 It is normally possible, by proper control, to ensure that dust deposition does not give rise to nuisance impacts. Routine dust control measures would normally ensure that the risk of long-term impacts is insignificant, although short-term events may occur (for example, due to technical failure or exceptional weather conditions).

Risk of Dust Impacts at Individual Receptors

5.6 Using the criteria adopted for the assessment (in Table 3.1), the source dust emission magnitude is considered to be ‘medium’ due to the extent of the construction works and the likely duration of the construction activities.

5.7 Table 5.1 identifies representative receptors within 350 m of the construction works and identifies the Dust Impact Risk level. The locations of these receptors are shown on Figure 3. There are no residential receptors within 20 m of the development. Between 20 and 100 m away from the development there is a combination of residential and recreational land use. Beyond 100 m there is predominantly dense population of residential receptors and an industrial estate.

5.8 For the purposes of determining whether receptors are up- or downwind, a south-westerly prevailing wind direction has been assumed. The pathway risks, taking into account the distances and directions, are shown in Table 5.1.

5.9 Taking into account the source dust emission magnitude and the pathway risk in the manner described in the methodology (**Error! Reference source not found.**Table 3.3), the Dust Impact Risk at individual receptors has been estimated and is shown in Table 5.1.

5.10 Using professional judgement, drawing on the varying Dust Impact Risk at different receptors, the Dust Impact Risk for the overall development is considered to be 'medium'; this has been used to determine the level of dust mitigation and control to apply to the construction activities.

Table 5.1 Summary of Dust Impact Risk at Individual Representative Receptors

Receptor Name	Receptor Type	Approx Distance to Receptor (m)	Wind Direction*	Pathway Risk	Dust Impact Risk	Significance of Effects	
						Before Mitigation	With IAQM Mitigation measures
Approximate Number of Receptors within 20 m = 0							
Approximate Number of Receptors between 20 m and 100 m = 150							
Holmbury Gardens	Residential	40.7	Downwind	High	Medium	Moderate adverse	Slight Adverse
Tennis Club	Recreation	72.9	Downwind	High	Medium	Moderate adverse	Slight Adverse
Gym, Botwell Green	Recreation	58.7	Downwind	High	Medium	Moderate adverse	Slight Adverse
Church Road	Residential	81.5	Upwind	Medium	Low	Slight adverse	Negligible
Immaculate Heart of Mary Church	Church	59.0	Upwind	Medium	Low	Slight adverse	Negligible
Approximate Number of Receptors between 100 m and 350 m = 500							

Receptor Name	Receptor Type	Approx Distance to Receptor (m)	Wind Direction*	Pathway Risk	Dust Impact Risk	Significance of Effects	
						Before Mitigation	With IAQM Mitigation measures
School	School	104.8	Upwind	Low	Low	Negligible	Negligible
Library	Library	121.8	Upwind	Low	Low		
Industrial Estate	Light and heavy industrial activities	140.7	Upwind	Low	Low		
Lannock Road	Residential	166.8	Upwind	Low	Low		
Green Road	Residential	219.4	Upwind	Low	Low		
St Anselms Road	Residential	182.2	Upwind	Low	Low		
Hayes Town Medical Centre	Clinic	235.7	Upwind	Low	Low		
East Avenue	Residential	208.5	Downwind	Medium	Low		
Moray Avenue	Residential	249.6	Upwind	Low	Low		
Fifth Avenue	Residential	310.2	Downwind	Medium	Low		
Third Avenue	Residential	227.5	Downwind	Medium	Low		
Rostrevor Gardens	Residential	278.0	Upwind	Low	Low		
Golden Crescent	Residential	201.5	Upwind	Low	Low		
Coldharbour Lane	Residential	205.3	Upwind	Low	Low		
Fairdale Gardens	Residential	253.4	Upwind	Low	Low		
Central Avenue	Residential	224.5	Downwind	Medium	Low		
Nield Road	Residential	257.2	Upwind	Low	Low		
Parish Church of St Anselm	Church	327.1	Upwind	Low	Low		

Assessment of Dust Effects and Assignment of Significance

5.11 Using the IAQM framework methodology, the significance of the dust effect is categorised by considering the Dust Impact Risk at individual receptors in conjunction with the absolute dust levels, together with the sensitivities of the receptors and other relevant factors for the area, as was summarised in Table 3.5.

5.12 The area surrounding the development is densely populated; however, there are no residential receptors around the immediate surroundings of the site, the closet receptor being located 40 m away at Holmbury Gardens. Background PM_{10} concentrations for the local area, at around 25 $\mu g.m^{-3}$, are well below the annual the annual-mean objective of 40 $\mu g.m^{-3}$.

5.13 Taking all these factors into account and using professional judgement to apply the significance matrix in Table 3.5, the significance of dust effect before mitigation is ‘slight to moderate-adverse’ for receptors within 100 m, reducing to ‘negligible’ for receptors beyond 100 m.

5.14 Adoption of the IAQM ‘highly-recommended’ dust mitigation measures for a ‘medium’ Dust Impact Risk can be expected to reduce the risk from ‘medium’ to ‘low’ and from ‘low’ to ‘negligible’. (Relevant mitigation measures set out in the IAQM Dust and Air Emissions Mitigation Measures document applicable to a medium risk site are listed in Section 7.)

5.15 The residual significance of effects after adoption of these mitigation measures is ‘negligible to slight-adverse’ for receptors within 100 m, and ‘negligible’ for receptors beyond 100 m.

5.16 This is consistent with the IAQM generic with-mitigation significance matrix in Table 3.6, which predicts an overall residual effect of ‘negligible’ significance.

6 Assessment of Operational Impact

Assessment of Operational Impacts

Nitrogen Dioxide (NO_2)

6.1 Table 6.1 presents the annual-mean NO_2 concentrations predicted at the façades of existing receptors.

Table 6.1 Predicted Annual-Mean NO_2 Impacts at Existing Receptors

Receptor ID	Concentration ($\mu g.m^{-3}$)		With - Without Dev as % of the AQS Objective	Magnitude of Change Descriptor	Impact Descriptor
	Without Development	With Development			
1	37.5	37.7	0.5	Imperceptible	Negligible
2	39.8	39.9	0.1	Imperceptible	Negligible
3	38.3	38.6	0.8	Imperceptible	Negligible
Maximum	39.8	39.9	0.8	-	-
Minimum	37.5	37.7	0.1	-	-

6.2 Predicted annual-mean NO_2 concentrations in the opening year at the façades of the existing receptors are below the AQS objective for NO_2. The magnitude of change at all receptors is ‘imperceptible’. When this change is considered in the context of the absolute concentrations, the impact descriptor is ‘negligible’.

6.3 Overall, the significance of the impacts associated with NO_2 is considered to be ‘negligible’, using the criteria adopted for this assessment and based on professional judgement.

6.4 As all predicted annual-mean NO_2 concentrations are below 60 $\mu g.m^{-3}$, the hourly-mean objective for NO_2 is unlikely to be exceeded and is not considered further within this assessment.

Particulate Matter (PM_{10})

6.5 Table 6.2 presents the annual-mean PM_{10} concentrations predicted at the façades of existing receptors.

Table 6.2 Predicted Annual-Mean PM_{10} Impacts at Existing Receptors

Receptor ID	Concentration (µg.m^{-3})		With - Without Dev as % of the AQS Objective	Magnitude of Change Descriptor	Impact Descriptor
	Without Development	With Development			
1	25.1	25.2	0.1	Imperceptible	Negligible
2	25.6	25.6	<0.05	Imperceptible	Negligible
3	25.3	25.3	<0.05	Imperceptible	Negligible
Maximum	25.6	25.6	0.1	-	-
Minimum	25.1	25.2	<0.05	-	-

6.6 Predicted annual-mean PM_{10} concentrations in the opening year at the façades of the existing receptors are well below the AQS objective for PM_{10}. The magnitude of change at all receptors is 'imperceptible'. When this change is considered in the context of the absolute concentrations, the impact descriptor at all receptors is 'negligible'.

6.7 Overall, the significance of the impacts associated with PM_{10} is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

6.8 As all predicted annual mean PM_{10} concentrations are below 31.5 µg.m^{-3}, the daily-mean PM_{10} objective is expected to be met and is not considered further within this assessment.

Fine Particulate Matter ($PM_{2.5}$)

6.9 Table 6.3 presents the annual-mean $PM_{2.5}$ concentrations predicted at the façades of existing receptors.

Table 6.3 Predicted Annual-Mean $PM_{2.5}$ Impacts at Existing Receptors

Receptor ID	Concentration (µg.m^{-3})		With - Without Dev as % of the AQS Objective	Magnitude of Change Descriptor	Impact Descriptor
	Without Development	With Development			
1	16.1	16.1	0.1	Imperceptible	Negligible
2	16.4	16.4	<0.05	Imperceptible	Negligible
3	16.2	16.2	<0.05	Imperceptible	Negligible
Maximum	16.4	16.4	0.1	-	-
Minimum	16.1	16.1	<0.05	-	-

AQS objective = 25 µg.m^{-3}

6.10 Predicted annual-mean $PM_{2.5}$ concentrations in the opening year at the façades of the existing receptors are below the AQS objective for $PM_{2.5}$ at all receptors.

6.11 Using the EPUK criteria, the magnitude of change is imperceptible to small at all receptors and the impacts are described as ‘negligible’.

6.12 Overall, the significance of the impacts associated with $PM_{2.5}$ is considered to be ‘negligible’, using the criteria adopted for this assessment and based on professional judgement.

6.13 As the maximum predicted annual-mean $PM_{2.5}$ concentration is below 25 $\mu g.m^{-3}$ in the opening year, and concentrations of $PM_{2.5}$ are expected to decrease in future years, the AQS objective for $PM_{2.5}$ is expected to be met by a wide margin by its target date of 2020.

Sensitivity and Uncertainty

6.14 As set out in Sections 3 and 4, vehicle emissions do not appear to be decreasing with time at the pace that was originally expected with the implementation of improved vehicle technologies imposed by the European Commission (EC). Accordingly, the approach used in this assessment has been deliberately conservative through assuming that background concentrations will remain level in future years.

6.15 The results of current research suggest that the introduction of Euro 6 vehicles in 2014 will start to deliver air quality benefits and pollutant concentrations should decrease as Euro 6 vehicles penetrate the fleet. The assumptions in relation to the background concentrations add to the conservatism of the assessment.

6.16 Based on this conservative scenario, the impacts at existing receptors are not deemed significant. Consequently, further sensitivity analysis has not been undertaken and, in practice, the impacts at sensitive receptors are likely to be lower than those reported in this assessment.

Significance of Effects

6.17 As set out in Section 3, it is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively. The EPUK guidance advocates that the *“conclusion as to the overall significance of the air quality impacts should be based on the professional judgement of the person preparing the report.”*

6.18 The results of the modelling indicate that the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at existing receptors are below the relevant long and short-term AQS objectives. When the magnitude of change in annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations is considered in the context of the absolute predictions, the air quality impacts of the development at existing receptors is described as ‘negligible’.

6.19 The AQS objectives for NO_2, PM_{10} and $PM_{2.5}$ are likely to be met at the facades of the proposed development. On that basis, site is deemed suitable for its proposed future use in the context of air quality.

6.20 Using professional judgement, the overall significance of air quality effects is considered to be 'negligible'.

7 Mitigation

Mitigation During Construction

7.1 The IAQM Dust and Air Emissions Mitigation Measures document lists mitigation measures for low, medium and high Dust Impact Risks.

7.2 The measures described as 'highly recommended' for medium Dust Impact Risk are listed below:

Communications

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

Preparing and maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. Use intelligent screening where possible – e.g. locating site offices between potentially dusty activities and the receptors.
- Erect solid screens or barriers around the site boundary.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean.

Operating vehicle/machinery and sustainable travel

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone, where applicable

Operations

- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.

- Use enclosed chutes, conveyors and covered skips, where practicable.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Waste management
- Only use registered waste carriers to take waste off-site
- Avoid bonfires and burning of waste materials.

Measures specific to earthworks

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as soon as practicable any material tracked out of the site. This may require the sweeper being continuously in use.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as practicable;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site).

7.3 With the implementation of the ‘highly recommended’ measures, the risk should be reduced to low.

7.4 The IAQM document also provides measures described as ‘desirable’ for medium Dust Impact Risk. These are also listed below:

- Implement a stakeholder communications plan that includes community engagement before and during work on site.
- Display the head or regional office contact information

- Implement a Dust Management Plan (DMP) (which may include measures to control other emissions), approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures will be required (to ensure compliance with the GLA guidance) including vehicles meeting the LEZ requirements and the GLA non-road mobile machinery (NRMM) requirements). The DMP may include monitoring of dust.

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked.

- When activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions increase the frequency of inspections.

- Carry out regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary.

- Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. A shorter monitoring period or concurrent upwind and downwind monitoring may be agreed by the local authority. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.

- Depending on the duration that stockpiles will be present and their size - cover, seed, fence or water to prevent wind whipping.

- Ensure all vehicles switch off engines when stationary – no idling vehicles.

- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)

- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing)
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. Only remove the cover in a small areas during work and not all at once.
- Avoid scabbling if possible
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
- Avoid dry sweeping of large areas.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits. This can be in the form or a static drive through facility or a manually operated power jet.
- Access gates to be located at least 10m from receptors where possible.

7.5 Adoption of the IAQM ‘highly-recommended’ dust mitigation measures can be expected to reduce the Dust Impact Risk from medium to low; for a low Dust Impact Risk the residual effect is negligible. Application of the with-mitigation significance matrix in Table 3.6 also predicts a negligible residual effect.

Mitigation During Operation

7.6 The predicted air quality effects at sensitive receptors are below the relevant AQS objectives, and are predicted to be negligible. Consequently, no mitigation measures are deemed necessary.

8 Conclusions

8.1 The proposed development is located within the administrative area of London Borough of Hillingdon (LBH). LBH has designated the '*area from the southern boundary north to the border defined by, the A40 corridor from the western borough boundary, east to the intersection with the Yeading Brook north until its intersection with the Chiltern-Marylebone railway line and then east along the railway line to the eastern borough boundary*' an Air Quality Management Area (AQMA) due to high levels of nitrogen dioxide (NO_2) attributable to road traffic emissions. The Application Site is located within this AQMA.

8.2 The assessment has considered dust effects during the construction phase and the air quality effects due to the operation of the proposed development. In addition, the suitability of the proposed development site for its intended use in the context of air quality has also been considered.

8.3 Impacts during the construction of the proposed development, such as dust generation and plant vehicle emissions, are predicted to be of short duration and only relevant during the construction phase. A risk assessment of construction dust impacts has been undertaken using the IAQM guidance, which suggests that without mitigation and controls the significance of dust effect is likely to be 'slight to moderate adverse' for receptors within 100 m, reducing to 'negligible' for receptors beyond this distance. Implementation of the highly recommended mitigation measures for a 'medium' Dust Impact Risk, set out in the IAQM Dust and Air Emissions Mitigation Measures document, should reduce the significance of the dust effects to is 'negligible to slight-adverse' for receptors within 100 m, and 'negligible' for receptors beyond 100 m.

8.4 Detailed atmospheric dispersion modelling has been undertaken for the first year in which the development is expected to be fully operational, 2015. Pollutant concentrations are expected to be below the relevant objectives at the façades of existing receptors. Changes in pollutant concentrations associated with the operation of the Proposed Development at existing receptors are not expected to be significant. Using the significance criteria adopted for this assessment together with professional judgement, the overall significance of effects is considered to be 'negligible'.

8.5 The 'golden thread' running through the NPPF is a presumption in favour of sustainable development. For determining planning applications, this means approving development proposals if they accord with the local development plan, unless material considerations indicate otherwise. If the development plan is absent, silent or the policies are out of date, then planning permission should be granted unless any adverse impacts would significantly outweigh the benefits, or specific policies in the NPPF indicate development should be restricted.

8.6 The Proposed Development does not conflict with national or local policies, or with measures set out in LBH's Unitary Development Plan. There are no constraints to the development in the context of air quality.

Glossary

AADT	Annual Average Daily Traffic Flow
ADMS	Atmospheric Dispersion Modelling
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
BPG	Best Practice Guide
HGV	Heavy Goods Vehicle
LGV	Light Goods Vehicle
R&A	Review and Assessment

Figures

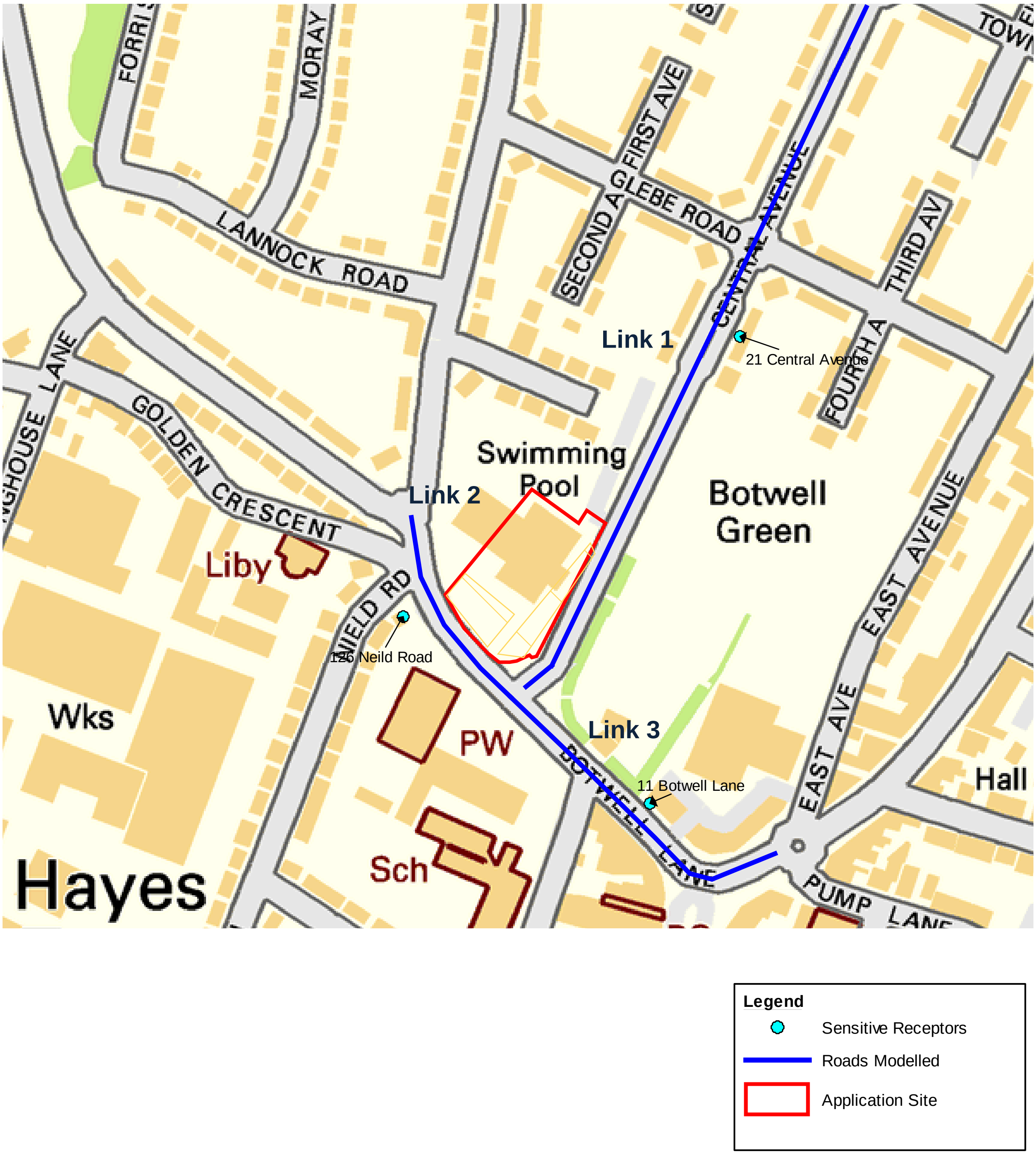


Figure 1: Modelled Roads and Receptors

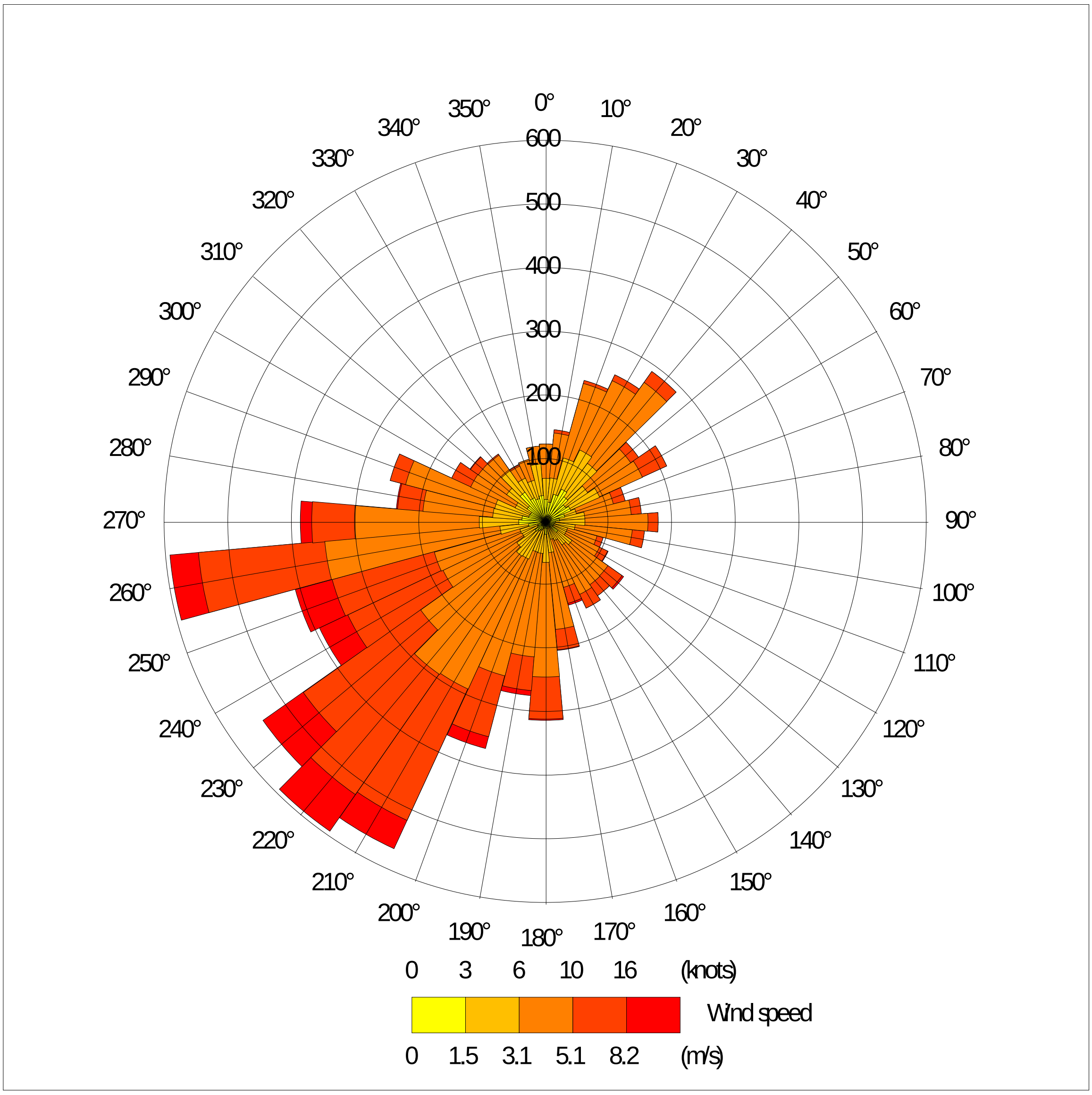
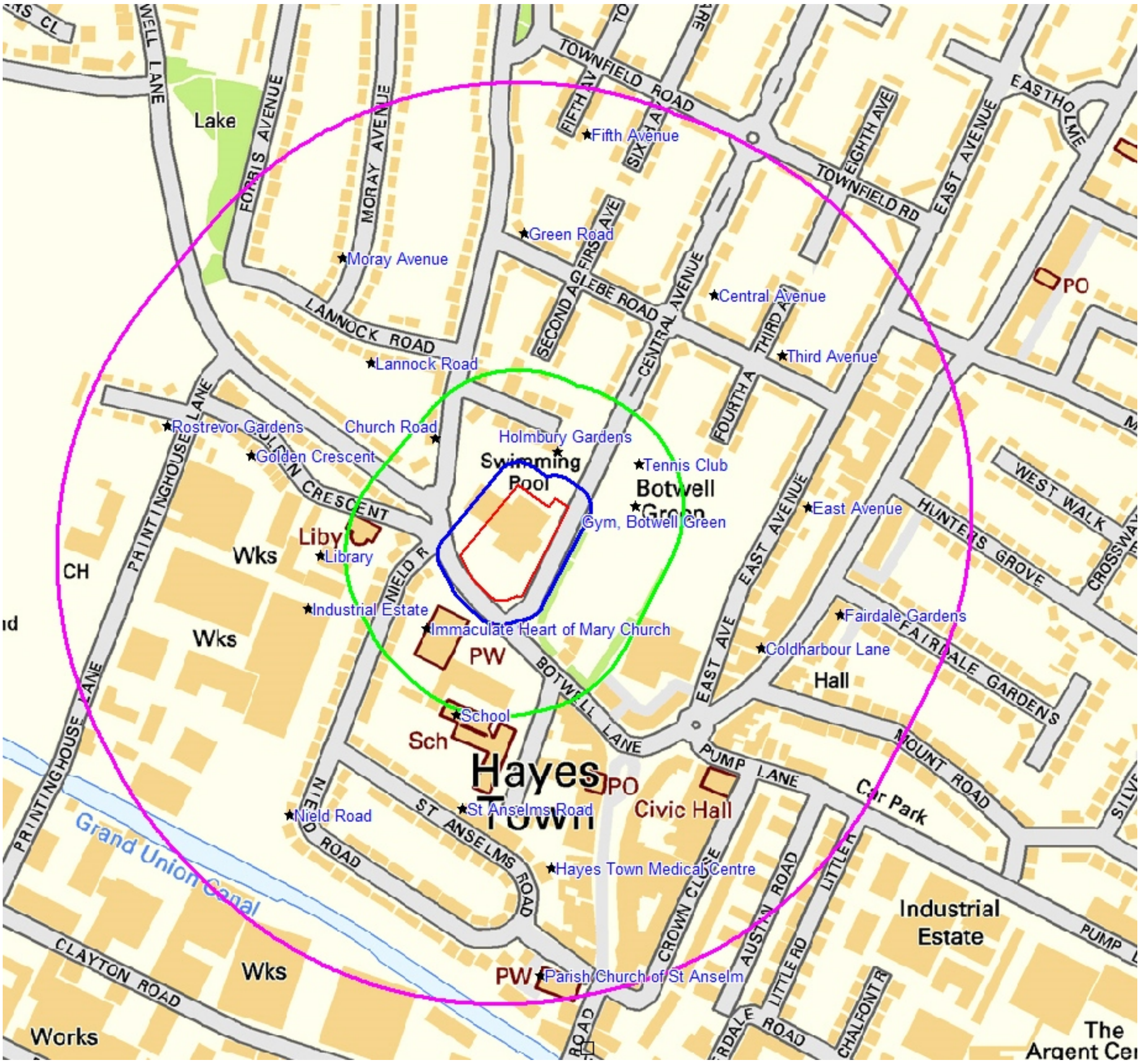
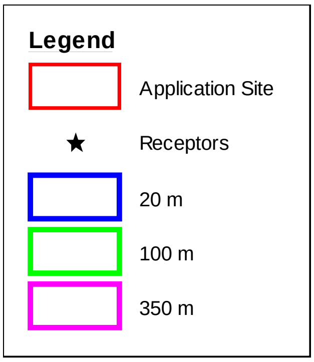


Figure 2: Windrose – London Heathrow, 2011





RPS

Figure 3: Construction Dust Effects

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