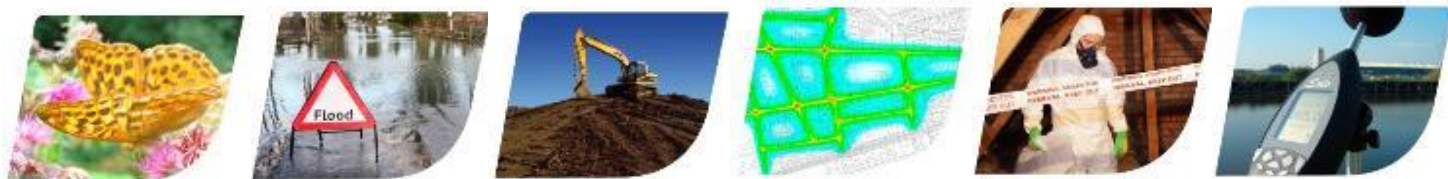


AIR QUALITY ASSESSMENT PARK VIEW, FARRIER CLOSE

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EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd was commissioned by the London Borough of Hillingdon to undertake an Air Quality Assessment in support of a planning application for a residential development at Park View, Farrier Close.

The proposals comprise the redevelopment of the site to provide circa 60 extra-care apartments (C2 use) with associated parking and landscaping.

Like much of London, the site is located within an area experiencing elevated pollutant concentrations, as identified by the London Borough of Hillingdon. Subsequently, mitigation may be required to ensure a supply of clean air for future residents. Additionally, the development has the potential to cause air quality impacts at sensitive locations. These may include fugitive dust emissions from construction works and road vehicle exhaust emissions associated with traffic generated by the site during the operational phase. As such, an Air Quality Assessment was required to quantify pollutant levels across the site, determine the requirement for mitigation and assess potential impacts as a result of the development.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of demolition, earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Dispersion modelling was undertaken in order to predict air quality across the site as a result of emissions from the local highway network. Although the results indicated high pollutant concentrations at the ground floor of the development, concentrations were considered acceptable at the first floor.

In order to protect residents from poor air quality, mechanical ventilation should be included for all habitable rooms in the residential units fronting Stockley Road across the ground floor. The inlet should be positioned at first floor level or above to ensure a supply of clean air. Alternatively, if filtration was included, the inlet may be placed at the ground floor level. This will provide a supply of clean air to rooms affected by high pollution levels. Mitigation of this type is considered suitable for a development of this size and nature.

It should be noted that a significant area of London experiences elevated pollutant concentrations. As such, a presumption against planning consent in these locations may result in large areas of land becoming undevelopable and prevent urban regeneration. The inclusion of suitable mitigation measures to protect future site users is therefore considered a suitable way to progress sustainable schemes in these locations and has been considered within this assessment.

The London Plan states that new developments must be considered Air Quality Neutral. Pollutant emissions associated with development traffic were compared to relevant benchmark. This indicated traffic emissions from the proposals were below the benchmark and as such, no further action is required and the site is considered to be Air Quality Neutral.

Based on the assessment results the site is considered suitable for the proposed use in regards to air quality, subject to the inclusion of relevant mitigation measures.

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1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd was commissioned by the London Borough of Hillingdon (LBoH) to undertake an Air Quality Assessment in support of a planning application for a proposed residential development at Park View, Farrier Close.

The site is located within an area identified by LBoH as experiencing elevated pollutant concentrations and subsequently there are concerns that the proposals will introduce future users to poor air quality. Additionally, the development has the potential to cause air quality impacts at sensitive locations. As such, an Air Quality Assessment was required to quantify baseline conditions, assess suitability for the proposed end-use and consider potential effects in the vicinity of the site.

1.2 Site Location and Context

The site is located off Farrier Close, Uxbridge, at approximate National Grid Reference (NGR): 507350, 181100. Reference should be made to Figure 1 for a location plan and Figure 2 for a site layout.

The proposals comprise the redevelopment of the site to provide circa 60 extra-care apartments (C2 use) with associated parking and landscaping.

The development is located within an Air Quality Management Area (AQMA), declared by LBoH due to exceedences of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO₂). As such, there are concerns that the proposals could expose future site users to elevated pollution concentrations. Additionally, the development has the potential to cause air quality impacts at sensitive receptor locations as a result of emissions associated with the construction and operational phases. An Air Quality Assessment was therefore required to determine baseline conditions, consider location suitability for residential use and provide consideration of potential effects as a result of the proposals. This is detailed in the following report.

1.3 Limitations

This report has been produced in accordance with REC's standard terms of engagement. REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.

2.0 LEGISLATION AND POLICY

2.1 European Legislation

European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than 2.5µm (PM_{2.5}). The consolidated Directives include:

- Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient Air Quality Limit Values (AQLVs) for NO₂, oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

2.2 UK Legislation

The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose the EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 5 pollutants.

Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007¹. The AQS sets out AQOs that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for compliance vary slightly.

Table 1 presents the AQOs for pollutants considered within this assessment.

¹ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM ₁₀	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year

Table 2 summarises the advice provided in DEFRA guidance LAQM.TG(09)² on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objectives Should Apply At	Objectives Should 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 etc	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 building façade), or any other location where public exposure is expected to be short term
24-hour 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 building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

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

2.3 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves considering present and likely future air quality against the AQOs. If it is predicted that levels at sensitive locations where members of the public are regularly present for the relevant averaging period are likely to be exceeded, the LA is required to declare an AQMA. For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 Dust

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2010) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance."

Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practice measures.

2.5 National Planning Policy

2.5.1 National Planning Policy Framework

The National Planning Policy Framework³ (NPPF) was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to this assessment:

"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"

"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

³ National Planning Policy Framework, Department for Communities and Local Government, 2012.

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."

The implications of the NPPF have been considered throughout this assessment.

2.5.2 National Planning Practice Guidance

The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. Why should planning be concerned about air quality?
2. What is the role of Local Plans with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to a planning decision?
6. Where to start if bringing forward a proposal where air quality could be a concern?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?
9. How do considerations about air quality fit into the development management process?

These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.6 Local Planning Policy

2.6.1 The London Plan

The Further Alterations To The London Plan⁵ was published in March 2015 and sets out a fully integrated economic, environmental, transport and social framework for the development of the capital until 2031. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

The London Plan policies relating to air quality are outlined below:

"Policy 5.3 - Sustainable design and construction

Strategic

- The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.

⁴ <http://planningguidance.planningportal.gov.uk/>.

⁵ The London Plan, Further Alterations To The London, Greater London Authority, 2015.

Planning decisions

- Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.
- Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:
- [...]
- Minimising pollution (including noise, air and urban run-off)
- [...]"

"Policy 7.14 - Improving air quality

Strategic

- 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.

Planning decisions

Development proposals should:

- 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).
- 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 Council's 'The control of dust and emissions from construction and demolition'.
- 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)).
- 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."

These policies have been considered throughout the completion of this Air Quality Assessment.

2.6.2 London Borough of Hillingdon Unitary Development Plan

LBoH's Local Development Framework consists of a portfolio of documents, of which the Local Plan is the most significant. The Hillingdon Local Plan consists of two parts. Part 1: Strategic Policies was adopted in November 2012 and Part 2, which is due to replace the existing Unitary Development Plan. The Hillingdon Local Plan - Part 1: Strategic Policies⁶ sets out the spatial vision, objectives, development strategy and a series of key policies that will guide the scale, location and type of development in the borough until 2026. As such, the policies contained within the Local Plan - Part 1 provide the current basis for the determination of planning applications within LBoH's area of jurisdiction.

A review of the Local Plan - Part 1 indicated the following policies in relation to air quality that are relevant to this assessment:

" Policy E2 - Location of Employment Growth

The council will accommodate 9,000 jobs during the plan period. [...] The council will promote development in highly accessible locations that delivers sustainable travel patterns and contributes to the improvements of existing networks to reduce emissions and impacts of air quality. [...]."

and

"Policy EM1 - Climate Change and Adaption and Mitigation

The council will ensure that climate change mitigation is addressed at every stage of the development process by:

[...]

6. targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact the local air quality. Targeting areas of poor air quality for additional emission reductions.

[...]."

and

"Policy EM8 - Land, Water, Air and Noise

[...]

Air Quality

All developments should not cause deterioration to the local air quality levels and should

⁶ Hillingdon Local Plan: Part 1 Strategic Policies, London Borough of Hillingdon, 2012.

ensure the protection of both existing and new sensitive receptors.

All major development within the Air Quality Management Area (AQMA) should demonstrate air quality neutrality (no worsening of impacts) where appropriate; actively contribute to the promotion of sustainable transport measures such as vehicle charging points and the increased provision for vehicles with cleaner transport fuels; deliver increased planting through soft landscaping and living walls and roofs; and provide a management plan for ensuring air quality impacts can be kept to a minimum.

The council seeks to reduce the levels of pollutants referred to in the Government's national Air Quality Strategy and will have regard to the mayor's Air Quality Strategy. London Boroughs should also take account of the findings of the Air Quality Review and Assessments and Action plans, in particular where AQMAs have been designated.

The council has a network of Air Quality Monitoring stations but recognises that this can be widened to improve understanding of air quality impacts. The Council may therefore require new major developments in an AQMA to fund additional air quality monitoring stations to assist in managing air quality improvements.

[...]."

Reference has been made to these policies during the undertaking of this Air Quality Assessment by predicting future air quality at the site and at sensitive receptors.

3.0 METHODOLOGY

The proposed development has the potential to cause air quality impacts during the construction and operational phases in addition to exposing future site users to elevated pollution levels. These issues have been assessed in accordance with the following methodology.

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'⁷.

Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and,
- Trackout.

The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and,
- The risk of health effects due to a significant increase in exposure to PM₁₀.

The assessment steps are detailed below.

3.1.1 Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the site boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should proceed to Step 2. Additionally, should ecological receptors be identified within 50m of the boundary site or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should also proceed to Step 2.

Should sensitive receptors not be present within the relevant distances then **negligible** impacts would be expected and further assessment is not necessary.

3.1.2 Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated to a risk category based on two

⁷ Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2014.

factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and,
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 3.

Table 3 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	• Total building volume greater than 50,000m³ • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities greater than 20m above ground level
	Earthworks	• Total site area greater than 10,000m² • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • More than 10 heavy earth moving vehicles active at any one time • Formation of bunds greater than 8m in height • More than 100,000 tonnes of material moved
	Construction	• Total building volume greater than 100,000m³ • On site concrete batching • Sandblasting
	Trackout	• More than 50 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	Demolition	• Total building volume 20,000m³ to 50,000m³ • Potentially dusty construction material • Demolition activities 10m to 20m above ground level
	Earthworks	• Total site area 2,500m² to 10,000m² • Moderately dusty soil type (e.g. silt) • 5 to 10 heavy earth moving vehicles active at any one time • Formation of bunds 4m to 8m in height • Total material moved 20,000 tonnes to 100,000 tonnes

Magnitude	Activity	Criteria
Small	Construction	- Total building volume 25,000m³ to 100,000m³ - Potentially dusty construction material (e.g. concrete) - On site concrete batching
	Trackout	10 to 50 HDV trips per day - Moderately dusty surface material (e.g. high clay content) - Unpaved road length 50m to 100m
	Demolition	- Total building volume under 20,000m³ - Construction material with low potential for dust release (e.g. metal cladding or timber) - Demolition activities less than 10m above ground level - Demolition during wetter months
	Earthworks	- Total site area less than 2,500m² - Soil type with large grain size (e.g. sand) - Less than 5 heavy earth moving vehicles active at any one time - Formation of bunds less than 4m in height - Total material moved less than 20,000 tonnes - Earthworks during wetter months
	Construction	- Total building volume less than 25,000m³ - Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	- Less than 10 HDV trips per day - Surface material with low potential for dust release - Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development site for demolition, construction, earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table 4.

Table 4 Examples of Factors Defining Sensitivity of an Area

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	- Users expect of high levels of amenity - High aesthetic or value property - People expected to be present continuously for extended periods of time - Locations where members of the public are exposed over a time period relevant to the AQO for PM₁₀ e.g. residential properties, hospitals, schools and residential care homes	Internationally or nationally designated site e.g. Special Area of Conservation

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
Medium	- Users would expect to enjoy a reasonable level of amenity - Aesthetics or value of their property could be diminished by soiling - People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	Nationally designated site e.g. Sites of Special Scientific Interest
Low	- Enjoyment of amenity would not reasonably be expected - Property would not be expected to be diminished in appearance - Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads	Locally designated site e.g. Local Nature Reserve

The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts during the construction phase:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and the receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and,
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

These factors were considered in the undertaking of this assessment.

The sensitivity of the area to dust soiling effects on people and property is shown in Table 5.

Table 5 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Table 6 outlines the sensitivity of the area to human health impacts.

Table 6 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	Greater than 32µg/m ³	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32µg/m ³	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28µg/m ³	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24µg/m ³	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	-	More than 10	High	Medium	Low	Low	Low
	-	1 - 10	Medium	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low	Low

Table 7 outlines the sensitivity of the area to ecological impacts.

Table 7 Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	High	Medium

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
Medium	Medium	Low
Low	Low	Low

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts. Table 8 outlines the risk category from demolition activities.

Table 8 Dust Risk Category from Demolition

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

Table 9 outlines the risk category from earthworks and construction activities.

Table 9 Dust Risk Category from Earthworks and Construction

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

Table 10 outlines the risk category from trackout.

Table 10 Dust Risk Category from Trackout

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

3.1.3 Step 3

Step 3 requires the identification of site specific mitigation measures within the IAQM guidance to

reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

3.1.4 Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'. This has been described as **negligible** within this report to provide continuity between assessment terminologies.

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM⁸ guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix III.

3.2 Operational Phase Assessment

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO₂ and PM₁₀, associated with vehicles travelling to and from the site, as well as expose future users to elevated pollutant levels. Potential impacts have been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2014 Verification;
- Opening year do-minimum (DM) (predicted traffic flows in 2017 should the proposals not proceed); and,
- Opening year do-something (DS) (predicted traffic flows in 2017 should the proposals be completed).

Reference should be made to Appendix II for assessment input data and details of the verification process.

Receptors potentially sensitive to changes in NO₂ and PM₁₀ concentrations were identified within 200m of the affected highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)⁹ on the likely limits of pollutant dispersion from road sources. LAQM.TG(09)¹⁰ provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;
- Hospitals; and,
- Care homes.

⁸ Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2014.

⁹ Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

¹⁰ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 11. These are based upon the guidance provided within the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance 'Land-Use Planning and Development Control: Planning for Air Quality'¹¹.

Table 11 Operational Traffic Exhaust Emissions - Significance of Impact

Long Term Average Concentration	% Change in Concentration Relative to AQO			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

The criteria shown in Table 11 is adapted from the EPUK and IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality'¹² with sensitivity descriptors included to allow comparisons of various air quality impacts. It should be noted that changes of 0%, i.e. less than 0.5%, will be described as negligible in accordance with the EPUK and IAQM guidance.

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 11, the EPUK and IAQM¹³ document states that this framework is to be used as a starting point to make a judgement on significance of effect but other influences might need to be accounted for. Whilst impacts might be determined as 'slight', 'moderate' or 'substantial' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances. The following factors may provide some assistance in determining the overall significance of a development:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- Whether or not an exceedence of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease; and,
- The extent to which an objective is exceeded e.g. an annual mean NO₂ concentration of 41µg/m³ should attract less significance than an annual mean of 51µg/m³.

¹¹ Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and Institute of Air Quality Management, 2015.

¹² Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and Institute of Air Quality Management, 2015.

¹³ Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and Institute of Air Quality Management, 2015.

These factors were considered and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that the determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts.

3.3 Impact Assessment

The proposals include sensitive land use, as defined in Table 2, and as such there is the potential to introduce new receptors into an area of existing poor air quality. Detailed dispersion modelling was therefore undertaken to quantify NO₂ and PM₁₀ concentrations across the site. The results of the dispersion modelling assessment were compared against the Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance¹⁴ from the London Air Pollution Planning and the Local Environment (APPLE) working group. These are outlined in Table 12.

Table 12 Air Pollution Exposure Criteria

Category	Applicable Range	Recommendation
APEC - A	Below 5% of the annual mean AQO	No air quality grounds for refusal; however mitigation of any emissions should be considered
APEC - B	Between 5% below or above the annual mean AQO	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g. maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised
APEC - C	Above 5% of the annual mean AQO	Refusal on air quality grounds should be anticipated, unless the LA has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures

It should be noted that a significant area of London would fall under APEC - C due to high NO₂ concentrations throughout the city. As such, a presumption against planning consent in these locations may result in large areas of land becoming undevelopable and prevent urban regeneration. The inclusion of suitable mitigation measures to protect future site users is therefore considered a suitable way to progress sustainable schemes in these locations and has been considered within this assessment.

3.4 Air Quality Neutral

An assessment was undertaken to compare benchmark emissions with the proposed site use emissions in accordance with the methodology outlined within the Greater London Authority (GLA)

¹⁴ London Councils Air Quality and Planning Guidance, London Councils, 2007.

'Air Quality Neutral Planning Support GLA 80371'¹⁵. The methodology is summarised in the following Sections.

The following scenario has been considered within the assessment:

- Operational phase.

The following emission sources were considered during the assessment;

- Road vehicles travelling to and from the site.

It has not been possible to test the Energy Emissions for this scheme against the Benchmarks as sufficient data was unavailable.

3.4.1 Road Vehicle Exhaust Emissions

The proposed development has the potential to cause variations in exhaust emissions associated with vehicles travelling to and from the site. These were assessed by calculating annual emissions based on the anticipated traffic generated by the site and standard emission factors provided in the Air Quality Neutral Planning Support GLA 80371¹⁶, as shown in Table 13.

Table 13 Air Quality Neutral Road Transport Emission Factors

Pollutant	g/vehicle-km in Outer London
NO _x	0.3530
PM ₁₀	0.0606

¹⁵ Air Quality Neutral Planning Support: GLA 80371, Air Quality Consultants Ltd in association with ENVIRON UK Ltd, 2014.

¹⁶ Air Quality Neutral Planning Support: GLA 80371, Air Quality Consultants Ltd in association with ENVIRON UK Ltd, 2014.

4.0 BASELINE

Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for assessment. These are detailed in the following sections.

4.1 Local Air Quality Management

As required by the Environment Act (1995), LBoH has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO₂ are above the AQO within the borough. As such, an AQMA has been declared, described as:

"London Borough of Hillingdon AQMA - 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."

The development is located within the London Borough of Hillingdon AQMA. As such, there is potential for future residents to be exposed to elevated pollutant concentrations as well as cause adverse impacts to air quality within this area. This has been considered within this report.

LBoH has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs and as such no further AQMAs have been designated.

4.2 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by LBoH using continuous and periodic methods throughout their area of jurisdiction. The closest continuous monitor to the proposed development is London Hillingdon at NGR: 506951, 178605. This is approximately 2.5km south of the development boundary at a suburban location within the Hillingdon AQMA. Table 3 provides monitoring results during recent years. Exceedences of the AQO are shown in **bold**.

Table 14 NO₂ Monitoring Results

Pollutant	Type	NGR (m)		Annual Mean Concentration (µg/m ³)		
		X	Y	2012	2013	2014
NO ₂	Suburban	506951	178605	57.1	52.8	57.5

As indicated in Table 14, the annual mean AQO for NO₂ was exceeded at the Hillingdon automatic monitoring site in recent years. This is to be expected due to its location within an AQMA.

LBoH also utilise passive diffusion tubes to monitor NO₂ concentrations throughout the borough. A review of the most recent LAQM Updating and Screening Assessment¹⁷ available indicated that there are ten diffusion tubes in close proximity to the site. Recent monitoring results from these locations are shown in Table 15.

¹⁷ Updating and Screening Assessment, London Borough of Hillingdon, 2015.

Table 15 Diffusion Tube NO₂ Monitoring Results

Site	Type	NGR (m)		Annual Mean NO ₂ Concentration (µg/m ³)		
		X	Y	2012	2013	2014
HD46	Suburban	510837	184917	46.5	45.4	46.2
HD47	Roadside	507617	182506	31.1	32.8	32.1
HD49	Background	508650	182274	25.8	25.2	26.2
HD50A	Roadside	506990	181925	40.7	39.4	42.1
HD51	Background	506334	180266	36.2	34.0	36.3
HD67	Background	505729	180290	29.2	29.5	30.4
HD204	Background	506108	180493	38.7	37.9	39.3
HD205	Background	506503	179510	41.9	39.6	41.5
HD206	Background	507141	179628	29.4	28.9	34.9
HD207	Background	507580	179812	30.5	34.9	37.7 ^a

^a Annual mean concentrations based on diffusion tube data at sites with less than 9 months of data capture have not been annualised.

As indicated in Table 15 the annual mean AQO for NO₂ was exceeded at some diffusion tube locations in recent years. This is to be expected due to their location within an AQMA. Reference should be made to Figure 3 for a graphical representation of the monitoring locations.

4.3 Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR: 507500, 181500. Data for this location was downloaded from the DEFRA website¹⁸ for the purpose of this assessment and is summarised in Table 16.

Table 16 Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m ³)	
	2014	2015
NO _x	40.95	39.97
NO ₂	25.86	25.36
PM ₁₀	20.01	19.68

¹⁸ <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>.

As shown in Table 16, background concentrations in the vicinity of the site do not exceed the relevant AQOs. Comparison with the monitoring results indicates the significant impact that vehicle exhaust emissions from the highway network have on pollutant concentrations at roadside locations.

4.4 Sensitive Receptors

A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for dust and road vehicle exhaust emission impacts in the following Sections.

4.4.1 Construction Phase Sensitive Receptors

Receptors sensitive to potential dust impacts during demolition, earthworks and construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 17.

Table 17 Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Residential Receptors	Approximate Number of Ecological Receptors
Less than 20	1 - 10	0
20 - 50	10 - 100	0
50 - 100	10 - 100	-
100 - 350	More than 100	-

Reference should be made to Figure 4 for a graphical representation of demolition, earthworks and construction dust buffer zones.

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 100m from the road network within 500m of the site access. These are summarised in Table 18. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. However, it was assumed traffic would access the site from the east and west of Stockley Road to ensure the maximum potential trackout distance was considered.

Table 18 Trackout Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Residential Receptors	Approximate Number of Ecological Receptors
Less than 20	10 - 100	0
20 - 50	10 - 100	0
50 - 100	More than 100	-

Reference should be made to Figure 5 for a graphical representation of trackout dust buffer zones. There are no ecological receptors within 50m of the site or trackout boundary. As such, ecological impacts have not been assessed further within this report.

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 19.

Table 19 Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The proposal is located in close proximity to Stockley Park Golf Course. As such, historical dust generation may have occurred as a result of wind-blown emissions from this facility
The likelihood of concurrent dust generating activity on nearby sites.	A review of the LBoH planning portal indicated that there are currently no planning applications for additional major developments in the vicinity of the site. As such, the risk of concurrent dust generating activity is minimal
Pre-existing screening between the source and the receptors	There is a small amount of vegetation located on the north-eastern boundary. If this is retained it may provide a degree of screening for the sensitive receptors located in close proximity to the site
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south-west of the development, as shown in Figure 6. As such, properties to the north-east would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is likely that it will extend over one year
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was considered to be **high**. This was because users would expect to enjoy a reasonable level of amenity, aesthetics or value of their property could be diminished by soiling and people would be expected to be present for extended periods of time e.g. residential properties.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.1.2, is shown in Table 20.

Table 20 Sensitivity of the Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	High
Human Health	Low	Low	Low	Low

4.4.2 Operational Phase Sensitive Receptors

Receptors sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 21.

Table 21 Road Vehicle Exhaust Emission Sensitive Receptors

Receptor		NGR		Height (m)
		X	Y	
R1	Residential - 95 Falling Lane	506374.8	180938.2	1.5
R2	Residential - 143 Falling Lane	506790.9	181008.7	1.5
R3	Education - Stockley Academy	506893.2	181068.1	1.5
R4	Residential - 1 Pinewood Avenue	506992.1	181080.8	1.5
R5	Residential - 29 Park View Road	507242.6	181244.0	1.5
R6	Residential - Colham Manor Primary School	507161.2	181449.0	1.5
R7	Residential - 5 Violet Terrace	507172.7	181528.4	1.5
R8	Residential - 6 Colham Green Road	507086.2	181726.3	1.5
R9	Hillingdon Hospital	506863.5	181964.1	1.5
R10	Residential - 173 Pield Heath Road	506618.4	182093.5	1.5
R11	Residential - 49 Pield Heath Road	506189.5	182028.9	1.5
R12	Residential - 66 Pield Heath Road	507137.3	181899.6	1.5
R13	Residential - 58 Leeds Road	507523.8	182042.2	1.5
R14	Residential - 111 Harlington Road	507362.9	182284.0	1.5
R15	Residential - 63 Harlington Road	507307.1	182396.4	1.5
R16	Education - Hillingdon Manor Lower & Middle School	507686.8	181681.2	1.5
R17	Residential - 20 Lees Road	507669.6	182277.7	1.5
R18	Residential - 939 Uxbridge Road	508261.3	182072.2	1.5
R19	Residential - 1 Rosslyn Villas, Uxbridge Road	508066.8	182175.8	1.5

Receptor		NGR		Height (m)
		X	Y	
R20	Residential - 4 Haig Cottages, Uxbridge Road	507773.8	182418.1	1.5
R21	Education - Hillingdon Primary School	507553.5	182522.5	1.5
R22	Residential - Leederville, Uxbridge Road	507312.3	182715.1	1.5
R23	Education - Bishopshalt School	506988.6	182656.0	1.5
R24	Residential - 107 West Drayton Road	507852.6	181572.2	1.5
R25	Residential - 65 West Drayton Road	508077.8	181578.1	1.5
R26	Residential - 68 West Drayton Road	508236.5	181740.5	1.5

The sensitive receptors identified in Table 21 represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposed development that have not been individually identified above. Reference should be made to Figure 7 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

Receptor sensitivity was defined based upon the methodology outlined in Table 3 and predicted pollutant concentrations for the development opening year of 2017. These are detailed within Table 22.

Table 22 Road Vehicle Exhaust Emission Receptor Sensitivity

Receptor	NO ₂		PM ₁₀	
	Predicted Annual Mean Concentration (µg/m ³)	Long Term Average Concentration	Predicted Annual Mean Concentration (µg/m ³)	Long Term Average Concentration
R1	37.04	76 - 94%	21.55	75% or Less of AQO
R2	42.19	103 - 109%	21.87	75% or Less of AQO
R3	32.65	76 - 94%	20.85	75% or Less of AQO
R4	37.35	76 - 94%	21.55	75% or Less of AQO
R5	42.21	103 - 109%	22.00	75% or Less of AQO
R6	28.70	75% or Less of AQO	20.33	75% or Less of AQO
R7	30.45	76 - 94% of AQO	20.51	75% or Less of AQO
R8	30.44	76 - 94% of AQO	20.50	75% or Less of AQO
R9	32.35	76 - 94% of AQO	20.52	75% or Less of AQO
R10	32.56	76 - 94% of AQO	20.64	75% or Less of AQO

Receptor	NO ₂		PM ₁₀	
	Predicted Annual Mean Concentration (µg/m ³)	Long Term Average Concentration	Predicted Annual Mean Concentration (µg/m ³)	Long Term Average Concentration
R11	30.93	76 - 94% of AQO	20.48	75% or Less of AQO
R12	32.62	76 - 94% of AQO	20.69	75% or Less of AQO
R13	50.36	110% or more of AQO	22.80	75% or Less of AQO
R14	37.73	95 - 102% of AQO	21.61	75% or Less of AQO
R15	39.11	95 - 102% of AQO	21.82	75% or Less of AQO
R16	31.35	76 - 94% of AQO	20.74	75% or Less of AQO
R17	33.08	76 - 94% of AQO	20.83	75% or Less of AQO
R18	37.95	95 - 102% of AQO	21.85	75% or Less of AQO
R19	35.95	76 - 94% of AQO	21.69	75% or Less of AQO
R20	44.15	110% or more of AQO	22.80	75% or Less of AQO
R21	32.21	76 - 94% of AQO	20.88	75% or Less of AQO
R22	38.80	95 - 102% of AQO	22.24	75% or Less of AQO
R23	26.94	75% or Less of AQO	20.14	75% or Less of AQO
R24	39.33	95 - 102% of AQO	21.87	75% or Less of AQO
R25	38.68	95 - 102% of AQO	21.91	75% or Less of AQO
R26	40.17	95 - 102% of AQO	22.15	75% or Less of AQO

5.0 ASSESSMENT

There is the potential for air quality impacts as a result of the construction and operation of the proposed development in addition to the exposure of future site users to elevated pollution levels. These are assessed in the following Sections.

5.1 Construction Phase Assessment

5.1.1 Step 1

The undertaking of activities such as demolition, excavation, ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul road and highway surfaces.

The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

5.1.2 Step 2

Demolition

Demolition will involve the removal of existing buildings on the site. It is anticipated that the volume of buildings to be demolished is likely to be less than 20,000m³. As such, the magnitude of potential dust emissions from demolition activities is **small**, in accordance with the criteria outlined in Table 3.

Table 20 indicates the sensitivity of the area to dust soiling effects on people and property is **medium**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for dust soiling as a result of demolition activities.

Table 20 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **negligible** risk site for human health as a result of demolition activities.

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. Information on soil type was not available for the purpose of this assessment. As such, the soil type was considered to be potentially dusty in order to provide a worst-case scenario.

The proposed development site is estimated to cover an area between 2,500m² and 10,000m². In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **medium**.

Table 20 indicates the sensitivity of the area to dust soiling effects on people and property is **medium**. In accordance with the criteria outlined in Table 9, the development is considered to be a **medium** risk site for dust soiling as a result of earthworks activities.

Table 20 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health as a result of earthwork activities.

Construction

Due to the size of the development site the total building volume is likely to be between 25,000m³ and 100,000m³. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **medium**.

Table 20 indicates the sensitivity of the area to dust soiling effects on people and property is **medium**. In accordance with the criteria outlined in Table 9, the development is considered to be a **medium** risk site for dust soiling as a result of construction activities.

Table 20 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health as a result of construction activities.

Trackout

Information on the number of HDV trips to be generated during the construction phase of the development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project.

Based on the site area, it is anticipated that the unpaved road length is likely to be less than 50m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **small**.

Table 20 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **low** risk site for dust soiling as a result of trackout activities.

Table 20 indicates the sensitivity of the area to human health is **low**. In accordance within the criteria outlined in Table 10, the development is considered to be a **negligible** risk site for human health as a result of trackout activities.

Summary of the Risk of Dust Effects

A summary of the risk from each dust generating activity is provided in Table 23.

Table 23 Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Medium	Medium	Low
Human Health	Negligible	Low	Low	Low

As indicated in Table 23, the potential risk of dust soiling impacts is **medium** from earthworks and construction and **low** from demolition and trackout activities. The potential risk of human health impacts is **low** from earthworks, construction and trackout activities and **negligible** from demolition activities.

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase.

5.1.3 Step 3

The IAQM guidance provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the development site as summarised in Table 24. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the Local Planning Authority.

Table 24 Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	- Develop and implement a Stakeholder Communications Plan that includes community engagement - Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary - Display the head or regional office contact information - Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site Management	- Record all dust and air quality complaints - Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation - Make complaints log available to LA when asked
Monitoring	- Carry out regular site inspections to monitor compliance with the DMP - Increase frequency of site inspections when activities with a high potential to produce dust are being carried out

Issue	Control Measure
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 - Fully enclose site or specific operations where there is a high potential for dust production and the site as active for an extensive period - Avoid site runoff of water or mud - Use water as dust suppressant where applicable - Keep site fencing, barriers and scaffolding clean using wet methods. - Remove materials that have a potential to produce dust from site as soon as possible - Cover, seed or fence stockpiles to prevent wind whipping
Operating Vehicle/ Machinery and Sustainable Travel	- All vehicles to switch off engines - no idling vehicles - Avoid the use of diesel or petrol powered generators where practicable - Produce a Construction Logistics Plan to manage sustainable deliveries
Operations	- Cutting equipment to use water as dust suppressant or suitable local extract ventilation - Use enclosed chutes and covered skips - Minimise drop heights - Ensure equipment is readily available on site to clean any spillages
Demolition	- Ensure effective water suppression is used during demolition operations - Avoid explosive blasting - Remove any biological debris before demolition
Waste Management	No bonfires
Earthworks and Construction	Ensure sand and other aggregates are stored and not able to dry out
Trackout	- Use water-assisted dust sweeper on the access and local roads - Avoid dry sweeping of large areas - Ensure vehicles entering and leaving sites are covered to prevent escape of materials - Inspect on-site routes for integrity, instigate necessary repairs and record in site log book - Install hard surfaced haul routes which are regularly damped down Implement a wheel washing system at a suitable location near site exit - Access gates 10m from receptors where possible - 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

5.1.4 Step 4

Assuming the relevant mitigation measures outlined in Table 24 are implemented, the residual effect from all dust generating activities is predicted to be **negligible**, in accordance with the IAQM

guidance.

5.2 Operational Phase Assessment

Additional vehicle movements associated with the operation of the proposed development will generate exhaust emissions, such as NO₂ and PM₁₀, on the local and regional road networks. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

The assessment considered the following scenarios:

- 2014 Verification;
- 2017 DM; and,
- 2017 DS.

The DM (i.e. without development) scenario is representative of anticipated traffic data for 2017. The DS (i.e. with development) scenarios are representative of anticipated traffic data for 2017 with the addition of predicted variations in traffic flow patterns as a result of the proposals.

For the purpose of this assessment traffic data was supplied for 2017, the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2014 were utilised within the dispersion model. The use of 2017 traffic data and 2014 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Reference should be made to Appendix II for full assessment input details.

5.2.1 Nitrogen Dioxide

Predicted Concentrations at the Development Site

Figure 8 to Figure 10 and Figure 13 to Figure 14 display the contour plots for the predicted annual mean NO₂ concentrations at 1.5m and 4.5m to represent exposure across the ground and first level of the proposed development.

Predicted annual mean NO₂ concentrations across the development site are summarised in Table 25. Exceedences of the annual mean AQO for NO₂ are highlighted in **bold**.

Table 25 Modelling Results - Annual Mean NO₂

Floor	Predicted 2015 Annual Mean NO ₂ Concentration Range (µg/m ³)	APEC Category
Ground (1.5m)	31.46 - 46.88	A - C
First (4.5m)	31.23 – 37.16	A

Figure 8 to Figure 10 display contour plots for predicted annual mean NO₂ concentrations across the site at heights representative of the ground to first floor. These indicate predicted concentrations ranged from APEC - A to APEC - C across the site, in accordance with the London Councils Air Quality

and Planning Guidance¹⁹. Exceedences of the annual mean AQO were predicted at the ground floor of the development.

Based on the dispersion modelling results, the site requires the implementation of mitigation measures in all residential units on the ground floor fronting Stockley Road to protect future residents from poor air quality. These are detailed in Section 6.0.

It should be noted that gardens are not considered as a sensitive receptor for the annual mean NO₂ objective in accordance with the guidance outlined in Table 2. Predictions of 1-hour NO₂ concentrations were not produced as part of the dispersion modelling assessment. However, as stated in DEFRA Guidance LAQM.TG(09)²⁰ if annual mean NO₂ concentrations are below 60µg/m³ then it is unlikely that the 1-hour AQO will be exceeded. Annual mean NO₂ concentrations above 60µg/m³ were not predicted at any location across the site. As such, exceedences of the 1-hour AQO are unlikely and the location of gardens at the development are considered suitable.

Predicted Concentrations at Sensitive Receptors

Annual mean NO₂ concentrations were predicted for the 2017 DM and DS scenarios and are summarised in Table 26. Exceedences of the relevant AQO are highlighted in **bold**.

Table 26 Predicted Annual Mean NO₂ Concentrations

Sensitive Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - 95 Falling Lane	37.01	37.04	0.03
R2	Residential - 143 Falling Lane	42.16	42.19	0.03
R3	Education - Stockley Academy	32.63	32.65	0.02
R4	Residential - 1 Pinewood Avenue	37.33	37.35	0.02
R5	Residential - 29 Park View Road	42.13	42.21	0.08
R6	Residential - Colham Manor Primary School	28.70	28.70	0.00
R7	Residential - 5 Violet Terrace	30.44	30.45	0.01
R8	Residential - 6 Colham Green Road	30.43	30.44	0.01
R9	Hillingdon Hospital	32.29	32.35	0.06
R10	Residential - 173 Pield Heath Road	32.56	32.56	0.00
R11	Residential - 49 Pield Heath Road	30.93	30.93	0.00
R12	Residential - 66 Pield Heath Road	32.54	32.62	0.08

¹⁹ London Council Air Quality and Planning Guidance, London Councils, 2007.

²⁰ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

Sensitive Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R13	Residential - 58 Leeds Road	50.33	50.36	0.03
R14	Residential - 111 Harlington Road	37.71	37.73	0.02
R15	Residential - 63 Harlington Road	39.09	39.11	0.02
R16	Education - Hillingdon Manor Lower & Middle School	31.33	31.35	0.02
R17	Residential - 20 Lees Road	33.06	33.08	0.02
R18	Residential - 939 Uxbridge Road	37.94	37.95	0.01
R19	Residential - 1 Rosslyn Villas, Uxbridge Road	35.93	35.95	0.02
R20	Residential - 4 Haig Cottages, Uxbridge Road	44.13	44.15	0.02
R21	Education - Hillingdon Primary School	32.20	32.21	0.01
R22	Residential - Leederville, Uxbridge Road	38.78	38.80	0.02
R23	Education - Bishopshalt School	26.94	26.94	0.00
R24	Residential - 107 West Drayton Road	39.32	39.33	0.01
R25	Residential - 65 West Drayton Road	38.68	38.68	0.00
R26	Residential - 68 West Drayton Road	40.16	40.17	0.01

As indicated in Table 26, predicted annual mean NO₂ concentrations exceeded the AQO at five sensitive receptor locations for both the DM and DS scenarios. This is to be expected due to their roadside locations within an AQMA. It should be noted that no new exceedences were predicted as a result of the development.

Predicted impacts on annual mean NO₂ concentrations at the sensitive receptor locations are summarised in Table 27.

Table 27 Predicted NO₂ Impacts

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Significance of Impact
R1	Residential - 95 Falling Lane	0.08	76 - 94% of AQO	Negligible
R2	Residential - 143 Falling Lane	0.08	103 - 109% of AQO	Negligible
R3	Education - Stockley Academy	0.05	76 - 94% of AQO	Negligible
R4	Residential - 1 Pinewood Avenue	0.05	76 - 94% of AQO	Negligible

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Significance of Impact
R5	Residential - 29 Park View Road	0.20	103 - 109% of AQO	Negligible
R6	Residential - Colham Manor Primary School	0.00	75% or Less of AQO	Negligible
R7	Residential - 5 Violet Terrace	0.02	76 - 94% of AQO	Negligible
R8	Residential - 6 Colham Green Road	0.03	76 - 94% of AQO	Negligible
R9	Hillingdon Hospital	0.15	76 - 94% of AQO	Negligible
R10	Residential - 173 Pield Heath Road	0.00	76 - 94% of AQO	Negligible
R11	Residential - 49 Pield Heath Road	0.00	76 - 94% of AQO	Negligible
R12	Residential - 66 Pield Heath Road	0.20	76 - 94% of AQO	Negligible
R13	Residential - 58 Leeds Road	0.08	110% or more of AQO	Negligible
R14	Residential - 111 Harlington Road	0.05	95 - 102% of AQO	Negligible
R15	Residential - 63 Harlington Road	0.05	95 - 102% of AQO	Negligible
R16	Education - Hillingdon Manor Lower & Middle School	0.05	76 - 94% of AQO	Negligible
R17	Residential - 20 Lees Road	0.05	76 - 94% of AQO	Negligible
R18	Residential - 939 Uxbridge Road	0.03	95 - 102% of AQO	Negligible
R19	Residential - 1 Rosslyn Villas, Uxbridge Road	0.05	76 - 94% of AQO	Negligible
R20	Residential - 4 Haig Cottages, Uxbridge Road	0.05	110% or more of AQO	Negligible
R21	Education - Hillingdon Primary School	0.02	76 - 94% of AQO	Negligible
R22	Residential - Leederville, Uxbridge Road	0.05	95 - 102% of AQO	Negligible
R23	Education - Bishopshalt School	0.00	75% or Less of AQO	Negligible
R24	Residential - 107 West Drayton Road	0.02	95 - 102% of AQO	Negligible
R25	Residential - 65 West Drayton Road	0.00	95 - 102% of AQO	Negligible
R26	Residential - 68 West Drayton Road	0.03	95 - 102% of AQO	Negligible

As indicated in Table 27, the significance of impacts on annual mean NO₂ concentrations as a result of the development was predicted to be **negligible** at all locations.

5.2.2 Particulate Matter

Predicted Concentrations at the Development Site

Annual mean PM₁₀ concentrations were predicted across the development for the DM and DS scenarios, as shown in Figure 11 and Figure 12. Concentrations were predicted to be below the AQO across the entirety of the site both with and without the proposals in place, with levels ranging from 20.68µg/m³ to 22.75µg/m³ in the DS scenario.

It should be noted that Figures showing predicted annual mean PM₁₀ concentrations at heights above the ground floor were not included as concentrations reduce at increased heights and therefore the relevant AQO will not be exceeded at other levels.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future users from elevated PM₁₀ concentrations.

Predicted Concentrations at Sensitive Receptors

Annual mean PM₁₀ concentrations were predicted for each scenario and are summarised in Table 28.

Table 28 Predicted Annual Mean PM₁₀ Concentrations

Sensitive Receptor		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - 95 Falling Lane	21.55	21.55	0.00
R2	Residential - 143 Falling Lane	21.87	21.87	0.00
R3	Education - Stockley Academy	20.84	20.85	0.01
R4	Residential - 1 Pinewood Avenue	21.55	21.55	0.01
R5	Residential - 29 Park View Road	21.85	22.00	0.15
R6	Residential - Colham Manor Primary School	20.32	20.33	0.01
R7	Residential - 5 Violet Terrace	20.51	20.51	0.00
R8	Residential - 6 Colham Green Road	20.50	20.50	0.00
R9	Hillingdon Hospital	20.52	20.52	0.00
R10	Residential - 173 Pield Heath Road	20.64	20.64	0.00
R11	Residential - 49 Pield Heath Road	20.48	20.48	0.00
R12	Residential - 66 Pield Heath Road	20.69	20.69	0.00
R13	Residential - 58 Leeds Road	22.79	22.80	0.01

Sensitive Receptor		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R14	Residential - 111 Harlington Road	21.61	21.61	0.00
R15	Residential - 63 Harlington Road	21.82	21.82	0.00
R16	Education - Hillingdon Manor Lower & Middle School	20.74	20.74	0.00
R17	Residential - 20 Lees Road	20.83	20.83	0.00
R18	Residential - 939 Uxbridge Road	21.85	21.85	0.00
R19	Residential - 1 Rosslyn Villas, Uxbridge Road	21.69	21.69	0.00
R20	Residential - 4 Haig Cottages, Uxbridge Road	22.80	22.80	0.00
R21	Education - Hillingdon Primary School	20.88	20.88	0.00
R22	Residential - Leederville, Uxbridge Road	22.24	22.24	0.00
R23	Education - Bishopshalt School	20.14	20.14	0.00
R24	Residential - 107 West Drayton Road	21.87	21.87	0.00
R25	Residential - 65 West Drayton Road	21.91	21.91	0.00
R26	Residential - 68 West Drayton Road	22.15	22.15	0.00

As indicated in Table 28, annual mean PM₁₀ concentrations were below the relevant AQO at all sensitive receptor locations for both scenarios considered.

Predicted impacts on annual mean PM₁₀ concentrations are summarised in Table 29.

Table 29 Predicted PM₁₀ Impacts

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Significance of Impact
R1	Residential - 95 Falling Lane	0.00	75% or Less of AQO	Negligible
R2	Residential - 143 Falling Lane	0.00	75% or Less of AQO	Negligible
R3	Education - Stockley Academy	0.03	75% or Less of AQO	Negligible
R4	Residential - 1 Pinewood Avenue	0.03	75% or Less of AQO	Negligible
R5	Residential - 29 Park View Road	0.38	75% or Less of AQO	Negligible
R6	Residential - Colham Manor Primary School	0.03	75% or Less of AQO	Negligible
R7	Residential - 5 Violet Terrace	0.00	75% or Less of AQO	Negligible
R8	Residential - 6 Colham Green Road	0.00	75% or Less of AQO	Negligible

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Significance of Impact
R9	Hillingdon Hospital	0.00	75% or Less of AQO	Negligible
R10	Residential - 173 Pield Heath Road	0.00	75% or Less of AQO	Negligible
R11	Residential - 49 Pield Heath Road	0.00	75% or Less of AQO	Negligible
R12	Residential - 66 Pield Heath Road	0.00	75% or Less of AQO	Negligible
R13	Residential - 58 Leeds Road	0.03	75% or Less of AQO	Negligible
R14	Residential - 111 Harlington Road	0.00	75% or Less of AQO	Negligible
R15	Residential - 63 Harlington Road	0.00	75% or Less of AQO	Negligible
R16	Education - Hillingdon Manor Lower & Middle School	0.00	75% or Less of AQO	Negligible
R17	Residential - 20 Lees Road	0.00	75% or Less of AQO	Negligible
R18	Residential - 939 Uxbridge Road	0.00	75% or Less of AQO	Negligible
R19	Residential - 1 Rosslyn Villas, Uxbridge Road	0.00	75% or Less of AQO	Negligible
R20	Residential - 4 Haig Cottages, Uxbridge Road	0.00	75% or Less of AQO	Negligible
R21	Education - Hillingdon Primary School	0.00	75% or Less of AQO	Negligible
R22	Residential - Leederville, Uxbridge Road	0.00	75% or Less of AQO	Negligible
R23	Education - Bishopshalt School	0.00	75% or Less of AQO	Negligible
R24	Residential - 107 West Drayton Road	0.00	75% or Less of AQO	Negligible
R25	Residential - 65 West Drayton Road	0.00	75% or Less of AQO	Negligible
R26	Residential - 68 West Drayton Road	0.00	75% or Less of AQO	Negligible

As indicated in Table 29, impacts on annual mean PM₁₀ concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all receptor locations.

5.2.3 Impact Significance

The overall significance of operational phase road traffic emission impacts was determined as **negligible**. This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 3. Further justification is provided in Table 30.

Table 30 Overall Road Traffic Exhaust Emission Impact Significance

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	Impacts on NO ₂ and PM ₁₀ concentrations were predicted to be negligible at all sensitive receptors. These represent worst-case locations and therefore it is unlikely that any other receptors would be significantly affected by the proposed development
Where new exposure is 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 proposed development will not result in any new exposure to pollutant concentrations above the AQOs
The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors	The change in concentrations relative to the AQO was predicted to be less than 0.5% at all receptor locations. As such, resultant impacts were negligible at all receptor locations
Whether or not an exceedence of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease	There were exceedences of the annual mean AQO for NO ₂ at sensitive and non-sensitive locations within the modelling extents. The area of exceedence was not predicted to substantially increase or decrease as a result of the development. There were no exceedences of the annual mean AQO for PM ₁₀ at any location within the modelling extents
The extent to which an objective is exceeded e.g. an annual mean NO ₂ concentration of 41µg/m ³ should attract less significance than an annual mean of 51µg/m ³	There were predicted exceedences of the annual mean AQO for NO ₂ at 5 sensitive receptor locations in the DM and DS scenarios. However, impacts were negligible and the magnitude of concentration is therefore not considered relevant in the context of this assessment

5.3 Air Quality Neutral Assessment

The proposed development consists of circa 60 extra-care apartments (C2 use). The site covers a total area of 5,159.1m².

The change of use will impact on the total emissions of the site. These are assessed in the following Sections.

5.3.1 Road Transport

Benchmarks

The Transport Emissions Benchmark (TEB) has been calculated using the GLA Air Quality Neutral Planning Support²¹ guidance document based on the land-use class of the proposed development.

²¹ Air Quality Neutral Planning Support: GLA 80371, Air Quality Consultants Ltd in association with ENVIRON UK Ltd, 2014.

It should be noted that due to insufficient data on extra-care apartments, a TEB for extra-care use (C2) cannot be derived. As such, the TEB considered most representative of extra-care residential apartments was used in the assessment (C3/4). The TEBs are those provided in the GLA Air Quality Neutral Planning Support document and are detailed in Table 31.

Table 31 Transport Emission Benchmarks

Land Use	Quantity (m ² or number of dwellings)	NO _x		PM ₁₀	
		TEB ((NO _x (g/m ² /year) / (g/dwelling/year))	NO _x per Land Use (kg/year)	TEB ((PM ₁₀ (g/m ² /year) / (g/dwelling/year))	PM ₁₀ per Land Use (kg/year)
C3/4 - Residential	60	1,553	93	267	16

As indicated in Table 31, the total annual NO_x emission TEB is 93kg/year and the total annual PM₁₀ emission TEB is 16kg/year.

Development Emissions

Development road transport emissions were calculated using traffic data provided by Cole Easdon Consultants, the Transport Consultants for the project. The number of daily trips was used to calculate annual NO_x and PM₁₀ based on emission factors provided in the GLA Air Quality Neutral Planning Support document, as shown in Table 13. A summary of the traffic data used in the assessment is provided in Table 32.

Table 32 Development Emissions - Traffic Data

Land use	24-hour AADT Flow	HDV Proportion (%)	Road Type	Average Distance (km/m ² /annum) or (km/dwelling/annum)
C3/4 - Residential	223	0	London - Outer	60

The inputs outlined in Table 32 and Table 13 were utilised to calculate development road vehicle exhaust emissions. This is summarised in Table 33.

Table 33 Development Emissions - Road Vehicle Exhaust Emissions

Land Use	NO _x Emission (kg/year)	PM ₁₀ Emission (kg/year)
C3/4 - Residential	4.72	0.81

The TEB and development road traffic exhaust emissions were calculated using the inputs and methodology outlined in Section 3.4.1. These are summarised in Table 34.

Table 34 Development Road Vehicle Exhaust Emissions

Scenario	NO _x Emission (kg/year)	PM ₁₀ Emission (kg/year)
TEB	93.18	16.02
Development Emissions	4.72	0.81
Difference	-88.46	-15.21

As indicated in Table 34, annual development NO_x and PM₁₀ emissions are below the TEB.

5.3.2 Summary

Overall comparison of the TEBs with the development emissions are summarised in Table 34. Annual NO_x and PM₁₀ emissions associated with vehicles travelling to and from the site are predicted to be below the TEBs by 88.46kg/year and 15.21kg/year respectively. As such, no further action is required and the development is considered 'air quality neutral' in terms of development road vehicle exhaust emissions.

6.0 MITIGATION

There are a number of air quality mitigation options available to reduce potential exposure of residents to elevated pollutant concentrations. However, all techniques have financial implications and may therefore affect scheme viability. As such, they should be included if necessary.

Detailed dispersion modelling indicated that annual mean NO₂ concentrations were categorised as APEC - A to APEC - C across the ground floor of the development. The inclusion of appropriate mitigation measures is therefore required in order to reduce the potential for exposure of site users to elevated pollutant concentrations. As such, mechanical ventilation with an air inlet located on the at first floor level or above should be included for all habitable rooms on the ground floor in all residential units fronting Stockley Road. Alternatively, mechanical ventilation with an air inlet may be located at the ground floor level, if the ventilation includes a NO_x filtration system. This should ensure a supply of clean air for residents.

A high specification of air tightness on the windows and doors should also be incorporated within the all residences so, when these are closed, the units would be ventilated by clean air from the mechanical system. This provides freedom of choice over whether natural ventilation is preferable during certain periods. The key to reducing exposure using this method is to ensure occupants are informed over the potential impacts associated with prolonged exposure to elevated pollution levels. As such, it may also be possible to provide development users with a welcome pack containing air quality information which will allow them to follow appropriate advice on protection against high concentrations during certain periods.

These proposed mitigation options are considered a suitable solution for a development of this size and nature.

7.0 CONCLUSION

REC Ltd was commissioned by the London Borough of Hillingdon to undertake an Air Quality Assessment in support of a planning application for a proposed residential development on land off Park View, Farrier Close.

The proposals comprise the redevelopment of the site to provide circa 60 extra-care apartments (C2 use) and associated parking and landscaping.

Like much of London, the site is located within an area experiencing elevated pollutant concentrations, as identified by LBoH. Subsequently, mitigation may be required to ensure a supply of clean air for future residents. Additionally, the development has the potential to cause air quality impacts at sensitive locations. These may include fugitive dust emissions from construction works and road vehicle exhaust emissions associated with traffic generated by the site during the operational phase. As such, an Air Quality Assessment was required to quantify pollutant levels across the site, determine the requirement for mitigation and assess potential impacts as a result of the development.

During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by demolition, earthworks, construction and trackout activities was predicted to be **negligible**.

Dispersion modelling was undertaken in order to quantify pollutant concentrations at the site and to predict air quality impacts as a result of road vehicle exhaust emissions associated with traffic generated by the development. Results were subsequently verified using monitoring results obtained from LBoH.

Although exceedences of the annual mean AQO for NO₂ were predicted at the ground floor of the development, concentrations were considered acceptable at first floor level. Predicted concentrations at the ground floor ranged from APEC - A to APEC - C in accordance with the relevant guidance. The annual mean AQO for PM₁₀ were not exceeded at any location across the site.

In order to protect residents from poor air quality, mechanical ventilation should be included for all habitable rooms in the residential units fronting Stockley Road across the ground floor. The inlet should be positioned at first floor level or above to ensure a supply of clean air. Alternatively, if the mechanical ventilation included a NO_x filtration system, the air inlet may be located at the ground floor level. This will provide a supply of clean air to rooms affected by high pollution levels. Mitigation of this type is considered suitable for a development of this size and nature.

The London Plan states that new developments must be considered Air Quality Neutral. Pollutant emissions associated with traffic emissions from the development were compared to relevant benchmark. This indicated traffic emissions from the proposals were below the benchmark and as such, no further action is required as the site is considered Air Quality Neutral.

Based on the assessment results the site is considered suitable for the proposed use in regards air quality, subject to the inclusion of relevant mitigation measures.

8.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQAP	Air Quality Action Plan
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do Minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DS	Do Something
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
LBoH	London Borough of Hillingdon
NGR	National Grid Reference
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
REC	Resource and Environmental Consultants
TEMPRO	Trip End Model Presentation Program
z ₀	Roughness Length



Legend



Site Boundary

Title

Figure 1
Site Location

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

AQ100098

Client

London Borough of Hillingdon

Contains Ordnance Survey Data
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Legend

Title
Figure 2
Site Layout

Project
Air Quality Assessment
Park View, Farrier Close

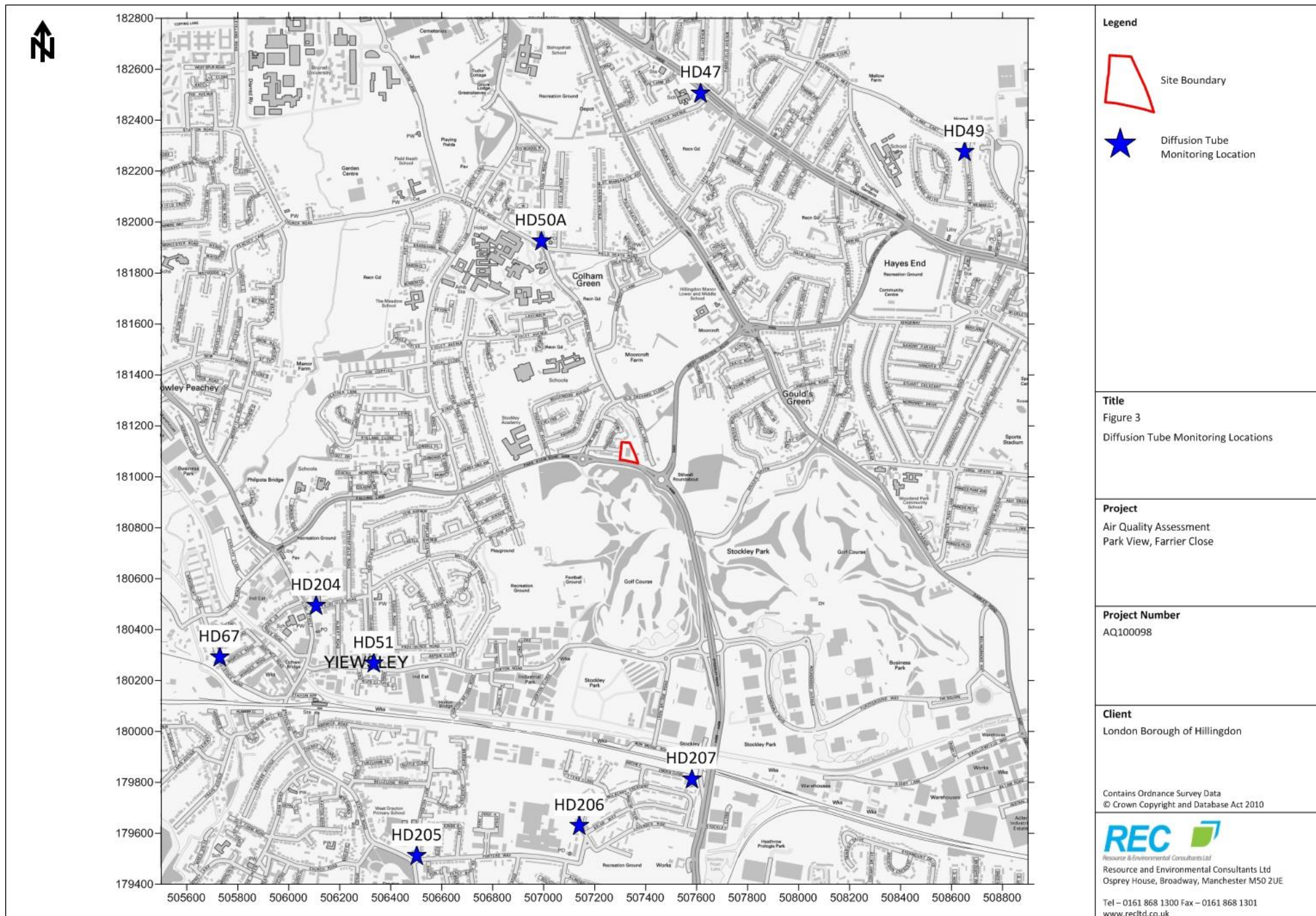
Project Number
AQ100098

Client
London Borough of Hillingdon



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Legend

- Site Boundary
- 20m from Site Boundary
- 50m from Site Boundary
- 100m from Site Boundary
- 350m from Site Boundary

Title

Figure 4
Demolition, Earthworks and Construction
Dust Buffer Zones

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

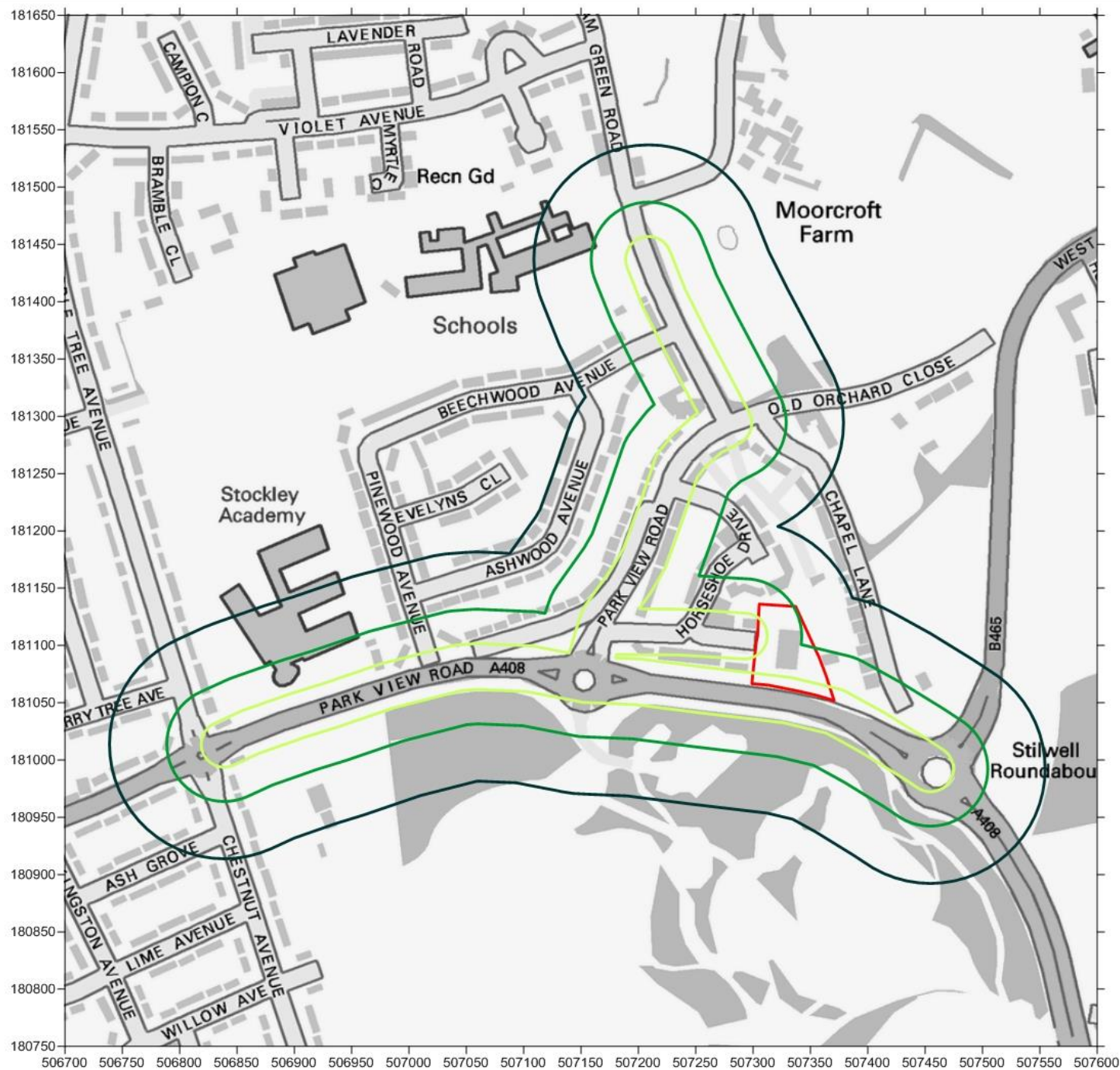
AQ100098

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Legend

-  Site Boundary
-  20m from Site Access Point
-  50m from Site Access Point
-  100m from Site Access Point

Title

Figure 5

Trackout Dust Buffer Zones

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

AQ100098

Client

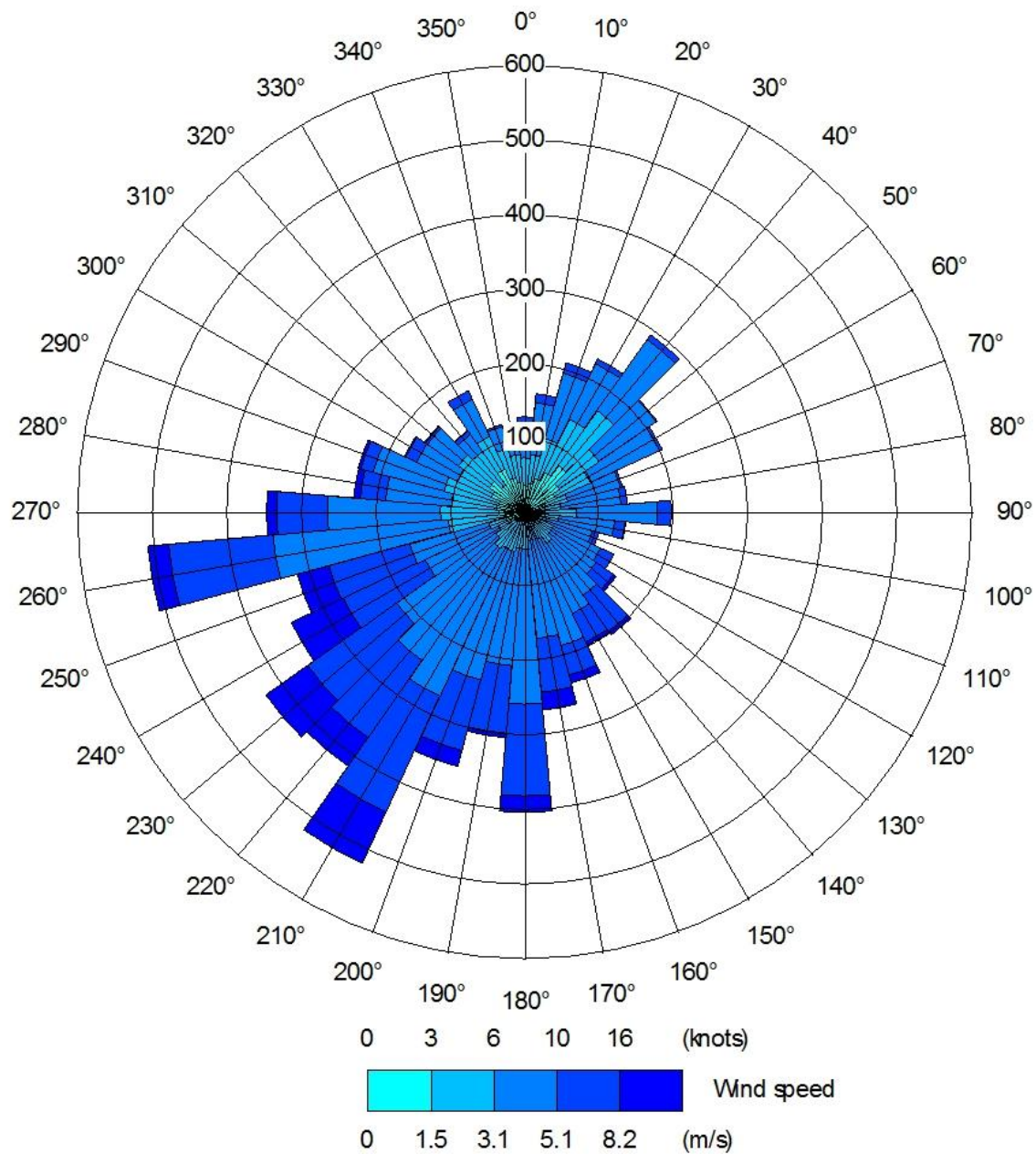
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Legend

Title

Figure 6
Wind Rose of 2014 Heathrow Airport
Meteorological Data

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

AQ100098

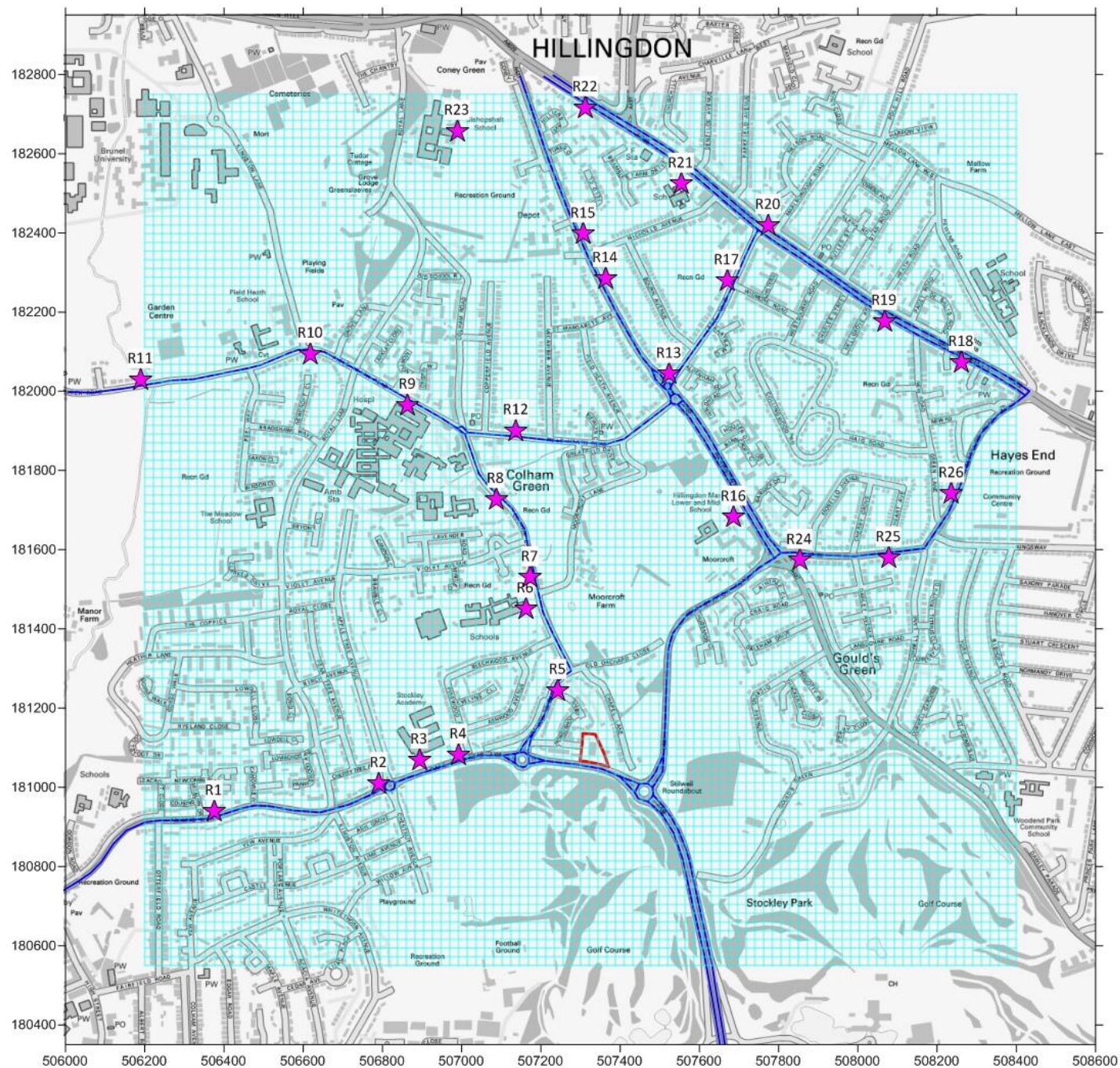
Client

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Legend

-  Site Boundary
-  Modelled Road Link
-  Cartesian Grid
-  Sensitive Receptor Location

Title

Figure 7
ADMS-Roads Input

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

AQ100098

Client

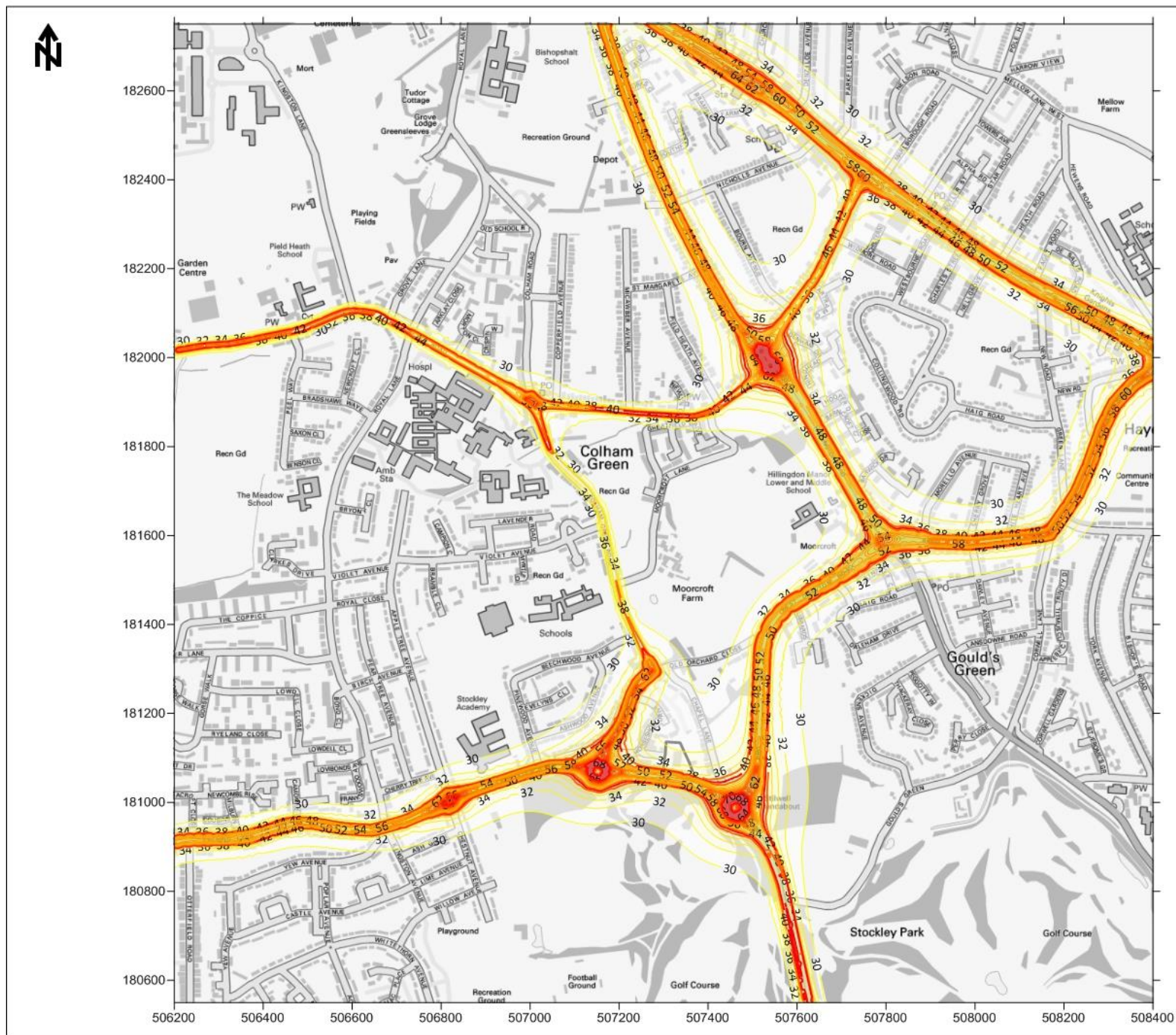
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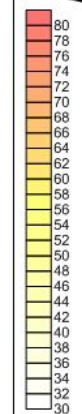
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Legend



Site Boundary



Predicted Annual Mean
NO₂ Concentration (µg/m³)

Title

Figure 8
Predicted Annual Mean NO₂
Concentrations (µg/m³) 2017 DM
z = 1.5

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

AQ100098

Client

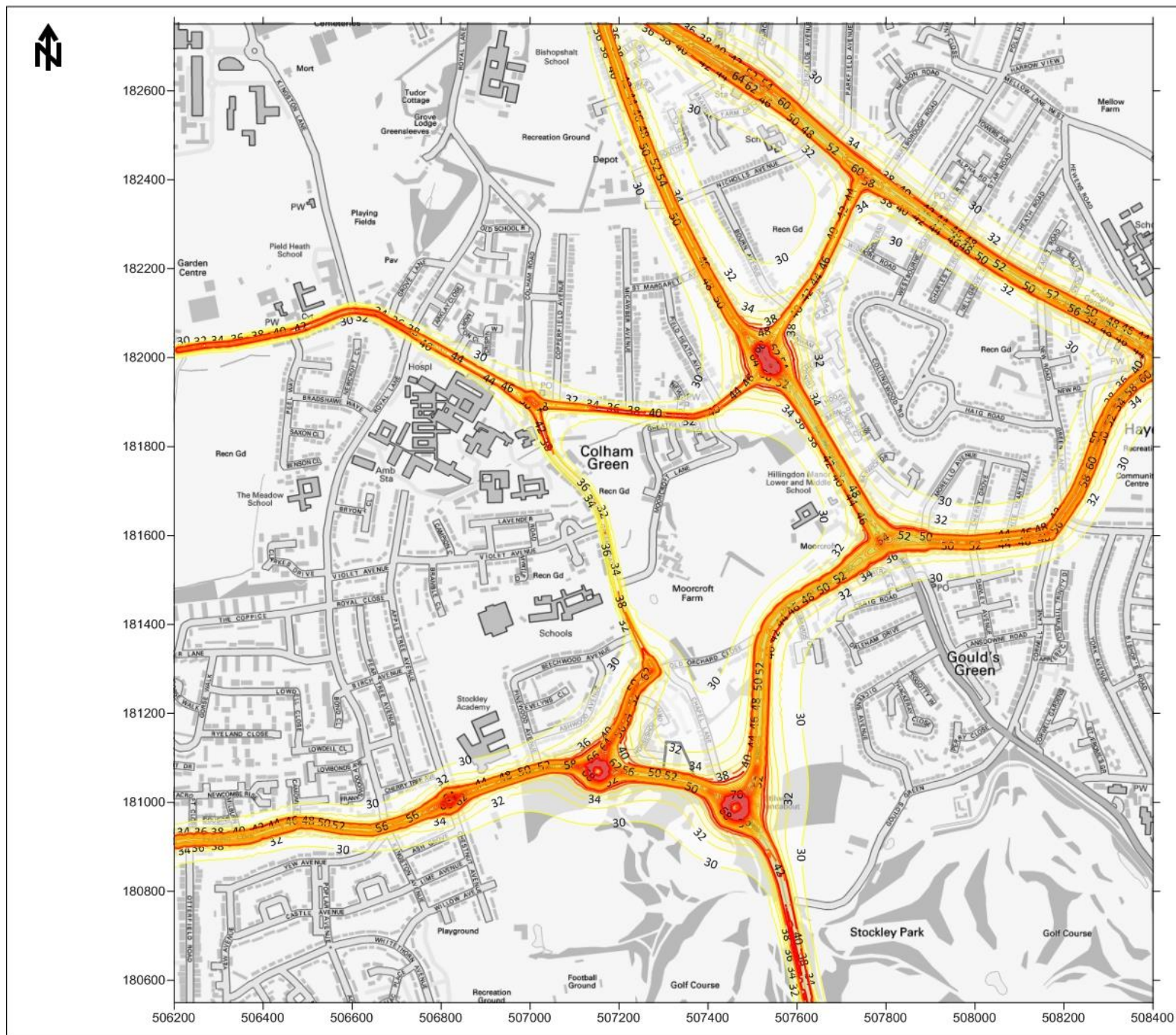
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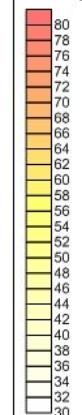
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Legend



Site Boundary



Predicted Annual Mean
NO₂ Concentration (µg/m³)

Title

Figure 9
Predicted Annual Mean NO₂
Concentrations (µg/m³) 2017 DS
z = 1.5m

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

AQ100098

Client

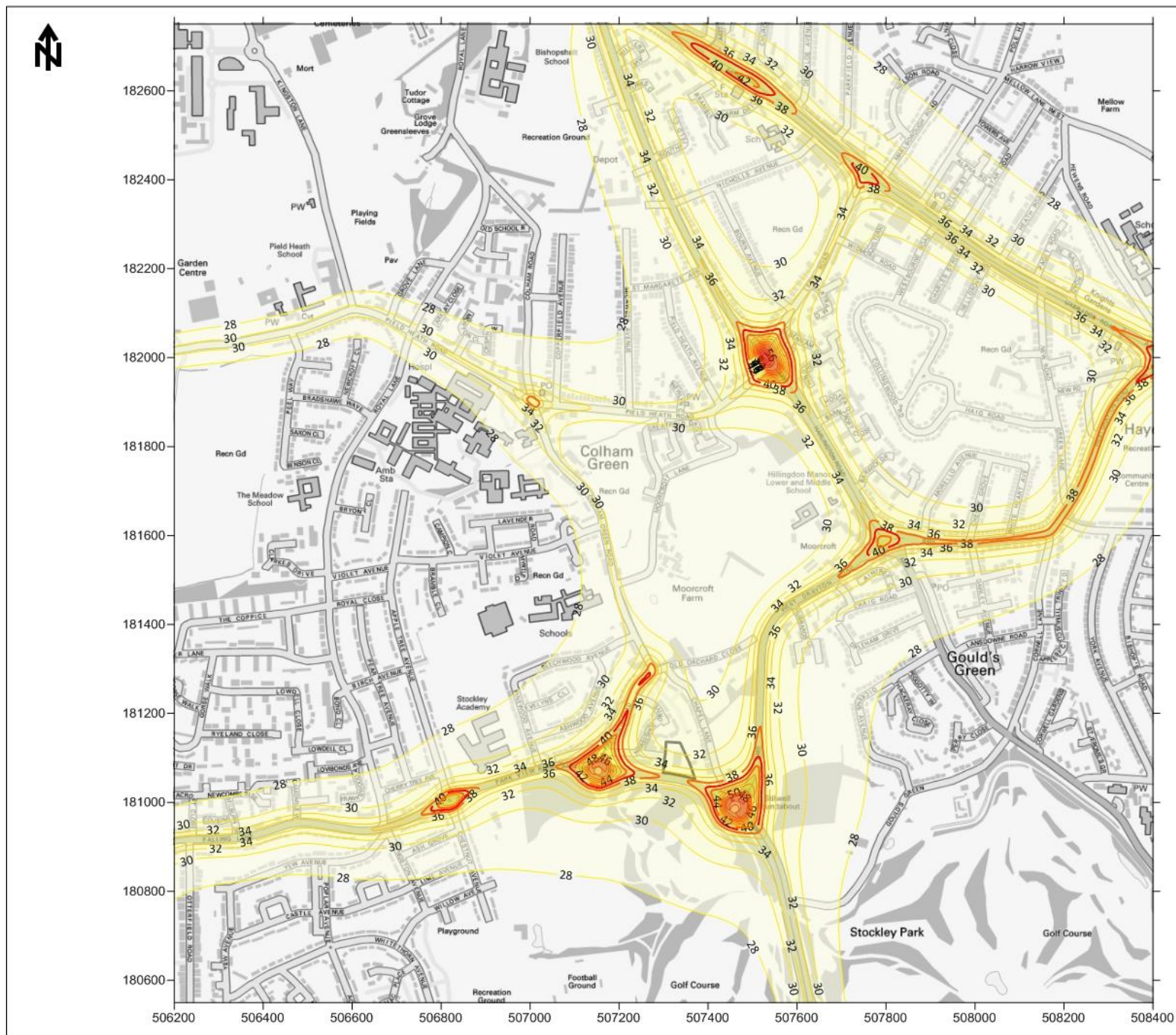
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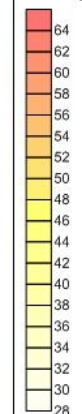
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Legend



Site Boundary



Predicted Annual Mean
NO₂ Concentration (µg/m³)

Title

Figure 10
Predicted Annual Mean NO₂
Concentrations (µg/m³) 2017 DS
z = 4.5m

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

AQ100098

Client

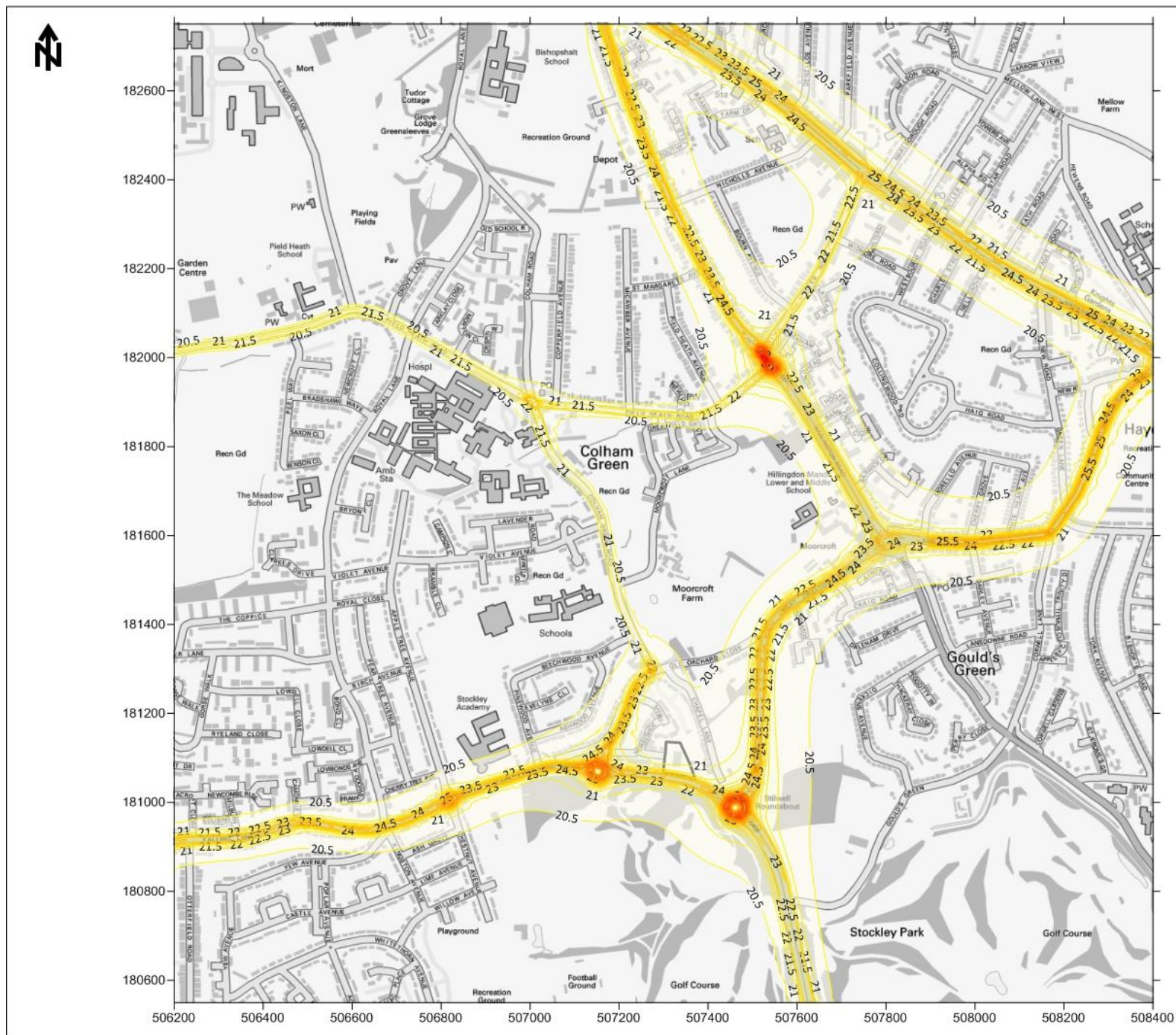
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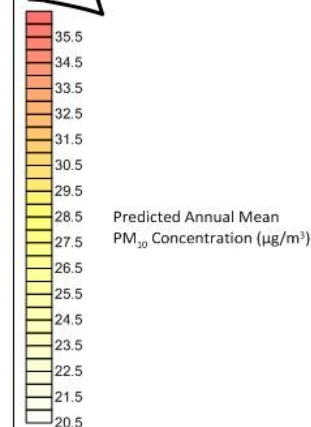
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Legend



Site Boundary



Title
Figure 11
Predicted Annual Mean PM₁₀
Concentrations (µg/m³) 2017 DM

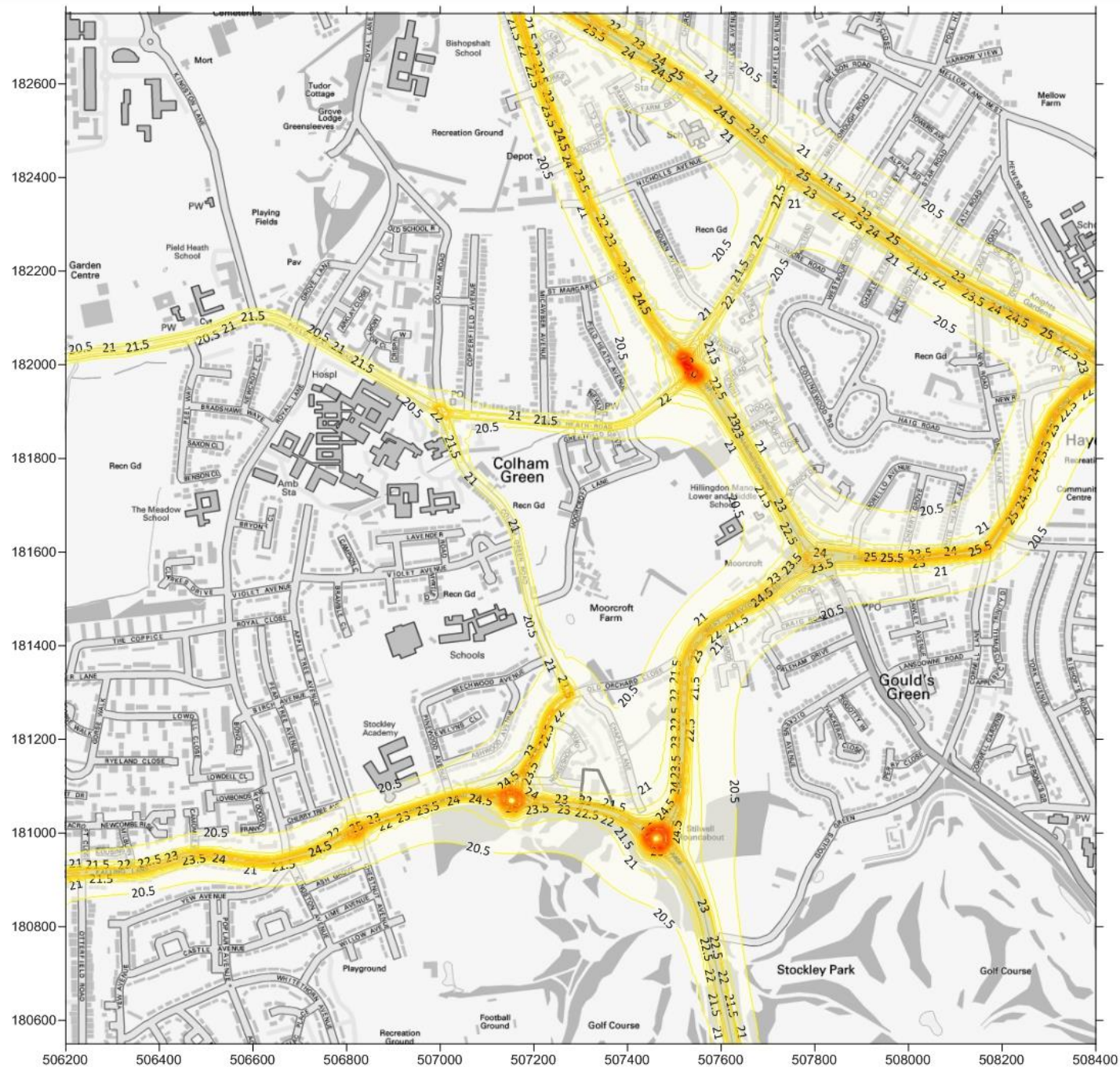
Project
Air Quality Assessment
Park View, Farrier Close
z = 1.5m

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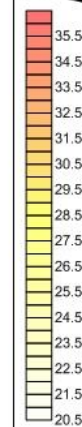
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Site Boundary



Predicted Annual Mean
PM₁₀ Concentration (µg/m³)

Title

Figure 12
Predicted Annual Mean PM₁₀
Concentrations (µg/m³) 2017 DS
z = 1.5m

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

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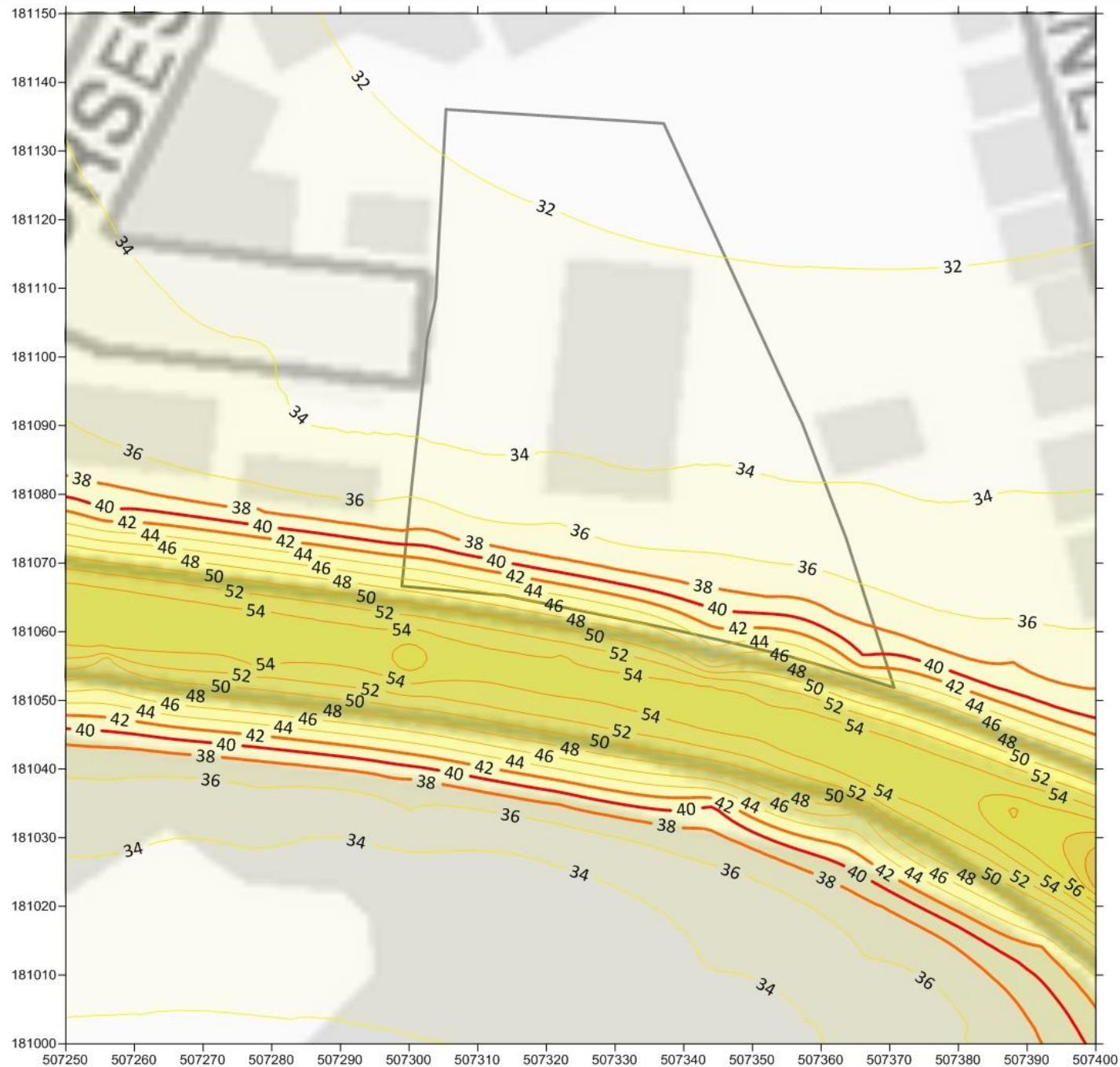
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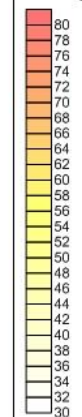
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Legend



Site Boundary



Predicted Annual Mean
NO₂ Concentration (µg/m³)

Title

Figure 13
Predicted Annual Mean NO₂
Concentrations (µg/m³) 2017 DS
z = 1.5m

Project

Air Quality Assessment
Park View, Farrier Close

Project Number

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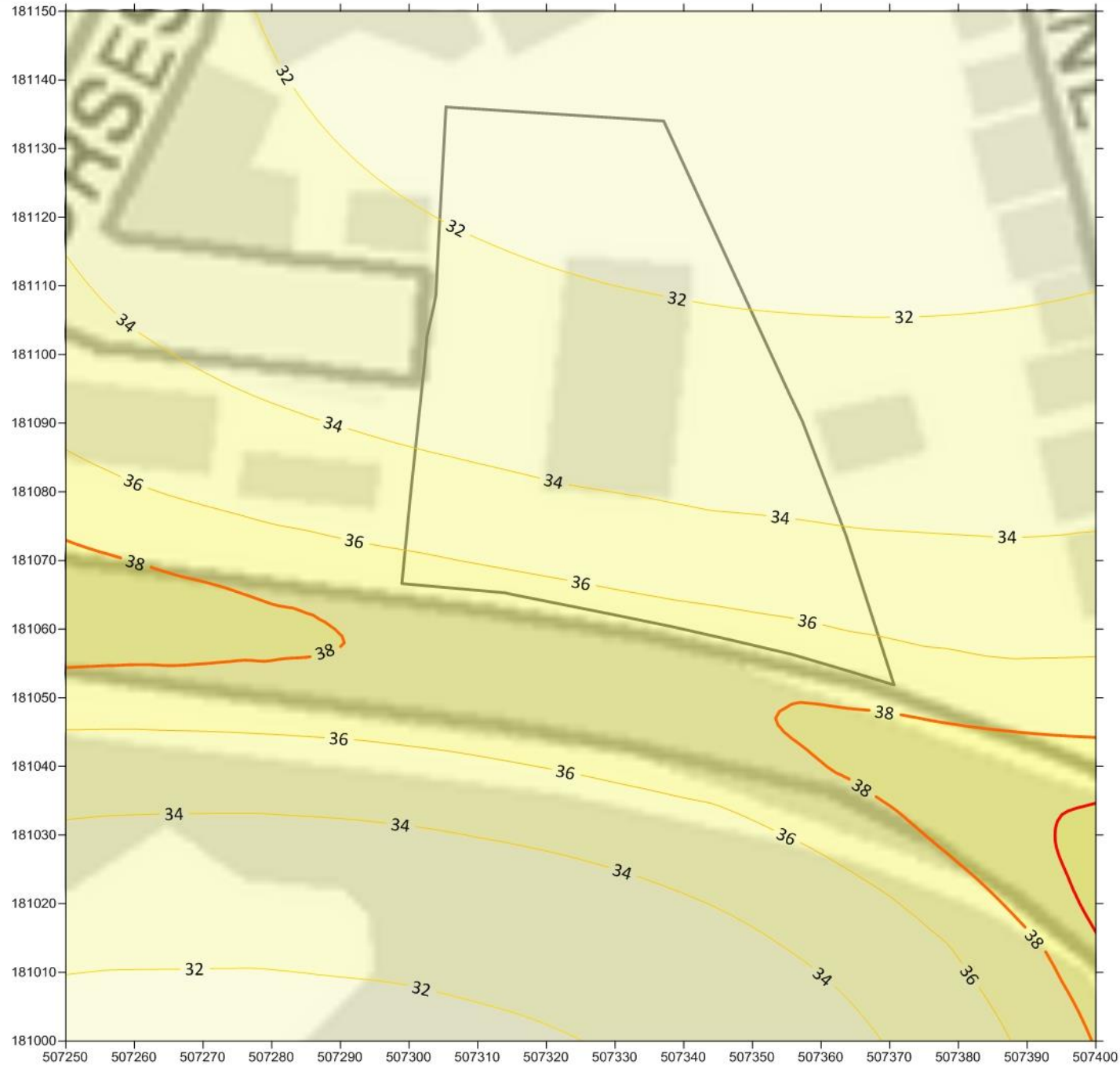
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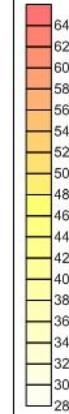
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Site Boundary



Predicted Annual Mean
NO₂ Concentration (µg/m³)

Title

Figure 14
Predicted Annual Mean NO₂
Concentrations (µg/m³) 2017 DS
z = 4.5m

Project

Air Quality Assessment
Park View, Farrier Close

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ASSESSMENT INPUTS

Vehicle trips associated with the development have the potential to result in air quality impacts as a result of increased traffic exhaust emissions. Additionally, the site is located within an AQMA which has the potential to expose future users to elevated pollution levels. Dispersion modelling using ADMS Roads was therefore undertaken to predict NO₂ and PM₁₀ concentrations at sensitive locations both with and without the development in order to consider potential changes as a result of the proposals.

The dispersion model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length; and,
- Monin-Obukhov length.

Assessment inputs are described in the following subsections.

Dispersion Model

Dispersion modelling was undertaken using the ADMS Roads dispersion model (version 3.4). ADMS Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

Assessment Area

Ambient concentrations were predicted over the area NGR: 506200, 180550 to 508400, 182750. One Cartesian grid at a height of 1.5m was used within the model to represent concentrations at ground floor level to produce data suitable for contour plotting using the Surfer software package.

Reference should be made to Figure 7 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment, including development flows, was provided by Cole Easdon Consultants, the Transport Consultants for the project.

The provided data did not include a number of links in the vicinity of the development. As such, 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as HDV proportion, was obtained from the London Atmospheric Emissions Inventory (LAEI). The LAEI (2010) was released by the GLA in 2013 and provides information on emissions from all sources of air pollutants in the Greater London area.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2015 traffic flow year to 2017, which was used to represent the development opening year, and to 2014 which was used for model verification.

Road widths were estimated from aerial photography and UK highway design standards. Reference should be made to Figure 7 for a graphical representation of the road link locations. A summary of the traffic data used in the verification scenarios is provided in Table AII.1.

Table AII.1 2014 Traffic Data

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
1A(i)	Park View Road Southbound South of Horseshoe Drive	5.5	7,129	9.18	15
1A(ii)	Park View Road Northbound South of Horseshoe Drive	4.1	7,129	9.18	15
1B	Park View Road North of Horseshoe Drive	5.6	14,259	9.18	25
1C	Park View Road South of Colham Green Road	7.6	14,259	9.18	20
1D	Colham Green Road South of Moorcroft Lane	5.2	4,382	7.17	30
1E	Colham Green Road North of Moorcroft Lane	5.9	4,382	7.17	30
1F	Colham Green Road South of Pield Heath Road	5.4	4,382	7.17	15
2A	Pield Heath Road West of Harlington Road	4.8	4,070	14.65	30
2B	Pield Heath Road West of Harlington Road Micawber Avenue	4.5	3,688	23.46	25
3A	Pield Heath Road West of Crispin Way	6.2	3,995	22.21	30
3B	Pield Heath Road West of Colham Road	6.3	3,688	23.46	20
3C	Pield Heath Road/Colham Road Slowdown	9.5	3,688	23.46	15
3D	Pield Heath Road/Colham Road Mini Roundabout	4.8	5,879	17.39	15
4A	Falling Lane West of Gordon Road	10.5	17,372	5.19	15
4B	Falling Lane East of Gordon Road	9.8	17,372	5.19	30
4C	Falling Lane East of Camomile Way	6.6	17,372	5.19	30
4D	Falling Lane East of Royal Lane	9.1	17,372	5.19	15
R1	Park View Road/Apple Tree Avenue Roundabout	7.6	17,372	5.19	15
4E	Park View Road East of Apple Tree Avenue	6.9	17,372	5.19	15
4F	Park View Road West of R2	6.5	17,372	5.19	30

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
4F(i)	Park View Road Leaving West of R2	6.2	8,686	5.19	20
R2	Colham Roundabout	10.5	24,502	6.35	15
4G(i)	Park View Road Leaving East of R2	5.1	8,686	5.19	20
4G(ii)	Park View Road Approaching East of R2	8.9	8,686	5.19	15
4H	Park View Road East of R2	9.2	17,372	5.19	30
4I(i)	Park View Road Approaching West of R3	8.2	8,686	5.19	15
4I(ii)	Park View Road Leaving West of R3	7.1	8,686	5.19	20
R3	Stilwell Roundabout	11.5	37,975	4.65	15
5A	Stockley Road Southbound Leaving R3	6.7	8,686	5.19	30
5B	Stockley Road Southbound	6.8	8,686	5.19	60
5C	Stockley Road Northbound Approaching R3	10.0	8,686	5.19	15
5D	Stockley Road Northbound	10.3	8,686	5.19	60
6A(i)	West Drayton Road Northbound Leaving R3	7.0	11,916	3.47	20
6A(ii)	West Drayton Road Southbound Approaching R3	9.4	11,916	3.47	20
6B	West Drayton Road South of Hubbards Close	11.8	23,832	3.47	40
6C	West Drayton Road North of Hubbards Close	11.8	23,832	3.47	40
6D	West Drayton Road/Harlington Road Junction	25.0	23,832	3.47	25
6E	West Drayton Road East of Morello Avenue	7.5	23,832	3.47	30
6F	West Drayton Road/Uxbridge Road Junction	17.0	23,832	3.47	15
7A	Uxbridge Road Westbound West of West Drayton Road	5.5	13,586	6.13	35
7B	Uxbridge Road Westbound West of New Road	9.5	13,586	6.13	50
7C	Uxbridge Road Westbound West of Westbourne Road	9.2	13,586	6.13	50
7D	Uxbridge Road Westbound/Lees Road Junction	8.6	13,586	6.13	20
7E	Uxbridge Road Westbound East of Bramble's Farm Drive	6.1	13,586	6.13	50
7F	Uxbridge Road Westbound West of Bramble's Farm Drive	8.6	13,586	6.13	15
7G	Uxbridge Road Westbound/Long Lane Junction	8.4	13,586	6.13	20
7H	Uxbridge Road Westbound West of Long Lane	5.5	17,527	3.91	50

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
8A	Uxbridge Road Eastbound West of Drayton Road	8.4	13,586	6.13	15
8B	Uxbridge Road Eastbound East of Lees Road	5.8	13,586	6.13	50
8C	Uxbridge Road Eastbound West of Lees Road	7.5	13,586	6.13	50
8D	Uxbridge Road Eastbound West of Denziloe Avenue	6.3	13,586	6.13	20
8E	Uxbridge Road Eastbound/Long Lane Junction	8.5	13,586	6.13	30
8F	Uxbridge Road Eastbound West of Long Lane	6.9	17,527	3.91	50
9A	Harlington Road Northbound North of West Drayton Road Junction	7.3	8,205	5.84	15
9B	Harlington Road Northbound South of Pield Heath Road	6.7	8,205	5.84	35
9C	Harlington Road Northbound Approaching R4	8.3	8,205	5.84	15
9D	Harlington Road Southbound North of West Drayton Road	12.8	8,205	5.84	15
9E	Harlington Road Southbound South of Pield Heath Road	7.0	8,205	5.84	30
9F	Harlington Road Southbound Leaving R4	8.4	8,205	5.84	20
R4	Pield Heath Road/Harlington Road Roundabout	8.4	27,527	6.53	15
R4(i)	Pield Heath Road/Harlington Road Roundabout	8.4	22,236	7.56	15
R5	Harlington Road/Lees Road Roundabout	6.9	27,527	6.53	15
10A(i)	Harlington Road Northbound Leaving R5	7.5	8,205	5.84	15
10A(ii)	Harlington Road Southbound Approaching R5	6.2	8,205	5.84	20
10B	Harlington Road North of R5	6.2	16,409	5.84	30
11A	Lees Road South of Aldenham Drive	11.2	5,827	12.38	15
11B	Lees Road	6.5	5,827	12.38	25
11C	Lees Road Approaching Uxbridge Road	10.7	5,827	12.38	15

The road width and mean vehicle speed shown in Table All.1 remained the same for the DM and DS scenarios. A summary of the 2017 traffic data is shown in Table All.2.

Table AII.2 2017 Traffic Data

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
1A(i)	Park View Road Southbound South of Horseshoe Drive	7,184	9.18	7,242	9.11
1A(ii)	Park View Road Northbound South of Horseshoe Drive	7,184	9.18	7,242	9.11
1B	Park View Road North of Horseshoe Drive	14,367	9.18	14,484	9.11
1C	Park View Road South of Colham Green Road	14,367	9.18	14,484	9.11
1D	Colham Green Road South of Moorcroft Lane	4,415	7.17	4,531	6.99
1E	Colham Green Road North of Moorcroft Lane	4,415	7.17	4,531	6.99
1F	Colham Green Road South of Pield Heath Road	4,415	7.17	4,531	6.99
2A	Pield Heath Road West of Harlington Road	4,101	14.65	4,159	14.45
2B	Pield Heath Road West of Harlington Road Micawber Avenue	3,716	23.46	3,774	23.10
3A	Pield Heath Road West of Crispin Way	4,025	22.21	4,072	21.95
3B	Pield Heath Road West of Colham Road	3,716	23.46	3,763	23.17
3C	Pield Heath Road/Colham Road Slowdown	3,716	23.46	3,763	23.17
3D	Pield Heath Road/Colham Road Mini Roundabout	5,923	17.39	5,970	17.26
4A	Falling Lane West of Gordon Road	17,505	5.19	17,575	5.16
4B	Falling Lane East of Gordon Road	17,505	5.19	17,575	5.16
4C	Falling Lane East of Camomile Way	17,505	5.19	17,575	5.16
4D	Falling Lane East of Royal Lane	17,505	5.19	17,575	5.16
R1	Park View Road/Apple Tree Avenue Roundabout	17,505	5.19	17,563	5.17
4E	Park View Road East of Apple Tree Avenue	17,505	5.19	17,563	5.17
4F	Park View Road West of R2	17,505	5.19	17,563	5.17
4F(i)	Park View Road Leaving West of R2	8,752	5.19	8,811	5.15
R2	Colham Roundabout	24,689	6.35	24,805	6.32
4G(i)	Park View Road Leaving East of R2	8,752	5.19	8,811	5.15
4G(ii)	Park View Road Approaching East of R2	8,752	5.19	8,811	5.15
4H	Park View Road East of R2	17,505	5.19	17,563	5.17

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
4I(i)	Park View Road Approaching West of R3	8,752	5.19	8,811	5.15
4I(ii)	Park View Road Leaving West of R3	8,752	5.19	8,811	5.15
R3	Stilwell Roundabout	38,265	4.65	38,323	4.64
5A	Stockley Road Southbound Leaving R3	8,752	5.19	8,767	5.18
5B	Stockley Road Southbound	8,752	5.19	8,767	5.18
5C	Stockley Road Northbound Approaching R3	8,752	5.19	8,767	5.18
5D	Stockley Road Northbound	8,752	5.19	8,767	5.18
6A(i)	West Drayton Road Northbound Leaving R3	12,007	3.47	12,022	3.47
6A(ii)	West Drayton Road Southbound Approaching R3	12,007	3.47	12,022	3.47
6B	West Drayton Road South of Hubbards Close	24,015	3.47	24,044	3.47
6C	West Drayton Road North of Hubbards Close	24,015	3.47	24,044	3.47
6D	West Drayton Road/Harlington Road Junction	24,015	3.47	24,044	3.47
6E	West Drayton Road East of Morello Avenue	24,015	3.47	24,030	3.47
6F	West Drayton Road/Uxbridge Road Junction	24,015	3.47	24,030	3.47
7A	Uxbridge Road Westbound West of West Drayton Road	13,690	6.13	13,715	6.11
7B	Uxbridge Road Westbound West of New Road	13,690	6.13	13,715	6.11
7C	Uxbridge Road Westbound West of Westbourne Road	13,690	6.13	13,715	6.11
7D	Uxbridge Road Westbound/Lees Road Junction	13,690	6.13	13,715	6.11
7E	Uxbridge Road Westbound East of Bramble's Farm Drive	13,690	6.13	13,715	6.11
7F	Uxbridge Road Westbound West of Bramble's Farm Drive	13,690	6.13	13,715	6.11
7G	Uxbridge Road Westbound/Long Lane Junction	13,690	6.13	13,715	6.11
7H	Uxbridge Road Westbound West of Long Lane	17,660	3.91	17,686	3.91
8A	Uxbridge Road Eastbound West of Drayton Road	13,690	6.13	13,715	6.11
8B	Uxbridge Road Eastbound East of Lees Road	13,690	6.13	13,715	6.11
8C	Uxbridge Road Eastbound West of Lees Road	13,690	6.13	13,715	6.11
8D	Uxbridge Road Eastbound West of Denziloe Avenue	13,690	6.13	13,715	6.11

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
8E	Uxbridge Road Eastbound/Long Lane Junction	13,690	6.13	13,715	6.11
8F	Uxbridge Road Eastbound West of Long Lane	17,660	3.91	17,686	3.91
9A	Harlington Road Northbound North of West Drayton Road Junction	8,267	5.84	8,316	5.81
9B	Harlington Road Northbound South of Pield Heath Road	8,267	5.84	8,316	5.81
9C	Harlington Road Northbound Approaching R4	8,267	5.84	8,316	5.81
9D	Harlington Road Southbound North of West Drayton Road	8,267	5.84	8,316	5.81
9E	Harlington Road Southbound South of Pield Heath Road	8,267	5.84	8,316	5.81
9F	Harlington Road Southbound Leaving R4	8,267	5.84	8,316	5.81
R4	Pield Heath Road/Harlington Road Roundabout	27,736	6.53	27,809	6.52
R4(i)	Pield Heath Road/Harlington Road Roundabout	22,405	7.56	22,478	7.53
R5	Harlington Road/Lees Road Roundabout	27,736	6.53	27,809	6.52
10A(i)	Harlington Road Northbound Leaving R5	8,267	5.84	8,285	5.83
10A(ii)	Harlington Road Southbound Approaching R5	8,267	5.84	8,285	5.83
10B	Harlington Road North of R5	16,534	5.84	16,570	5.83
11A	Lees Road South of Aldenham Drive	5,872	12.38	5,908	12.30
11B	Lees Road	5,872	12.38	5,908	12.30
11C	Lees Road Approaching Uxbridge Road	5,872	12.38	5,908	12.30

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 6.0.2) released in November 2014, which incorporates updated COPERT4v10 vehicle emissions factors for NO_x and vehicle fleet information.

There is current uncertainty over NO₂ concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2014 emission factors have been utilised for the prediction of pollution levels for all scenarios in preference to the development opening year in order to provide a robust assessment.

Meteorological Data

Meteorological data used in this assessment was taken from Heathrow meteorological station over the period 1st January 2014 to 31st December 2014 (inclusive). Heathrow meteorological station is located at approximate NGR: 507500, 175500, which is approximately 4.6km south of the proposed development. DEFRA guidance LAQM.TG(09)²² recommends meteorological stations within 30km of an assessment area as being suitable for detailed modelling.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 6 for a wind rose of utilised meteorological data.

Roughness Length

A roughness length (z_0) of 1m was used in this dispersion modelling study. This value of z_0 is considered appropriate for the morphology of the assessment area and is suggested within ADMS-Roads as being suitable for 'cities, woodlands'.

A z_0 of 0.3m was utilised to represent the morphology of the meteorological station location and is suggested as being suitable for 'agricultural areas (max)'.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used in this dispersion modelling study. This value is considered appropriate for the nature of the assessment area and meteorological station location and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

Background Concentrations

An annual mean NO₂ concentration of 25.86µg/m³ and PM₁₀ concentration of 20.01µg/m³, as predicted by DEFRA, were used to represent background levels in the vicinity of the site.

Similarly to emission factors, background concentrations for 2014 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposal.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO₂ concentrations using the spreadsheet provided by DEFRA, which is the method detailed within LAQM.TG(09)²³.

²² Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

²³ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

Verification

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

For the purpose of this assessment model verification was undertaken for 2014, using traffic data, meteorological data and monitoring results from this year.

LBoH undertakes monitoring of NO₂ concentrations at two roadside locations within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO₂ results for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LAQM.TG(09)²⁴. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table AII.3.

Table AII.3 2014 Monitoring Results

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
HD47	Hillingdon Primary School, Uxbridge Road	32.1	13.5
HD50A	Hillingdon Hospital Monitoring Station, Colham Road	42.1	37.8

The dispersion model was run with the traffic input data previously detailed for 2013 to predict the NO_x concentration at the monitoring locations. The results are shown in Table AII.4.

Table AII.4 Verification Results

Monitoring Location		Modelled Road NO _x Concentration (µg/m ³)
HD47	Hillingdon Primary School, Uxbridge Road	12.8
HD50A	Hillingdon Hospital Monitoring Station, Colham Road	16.5

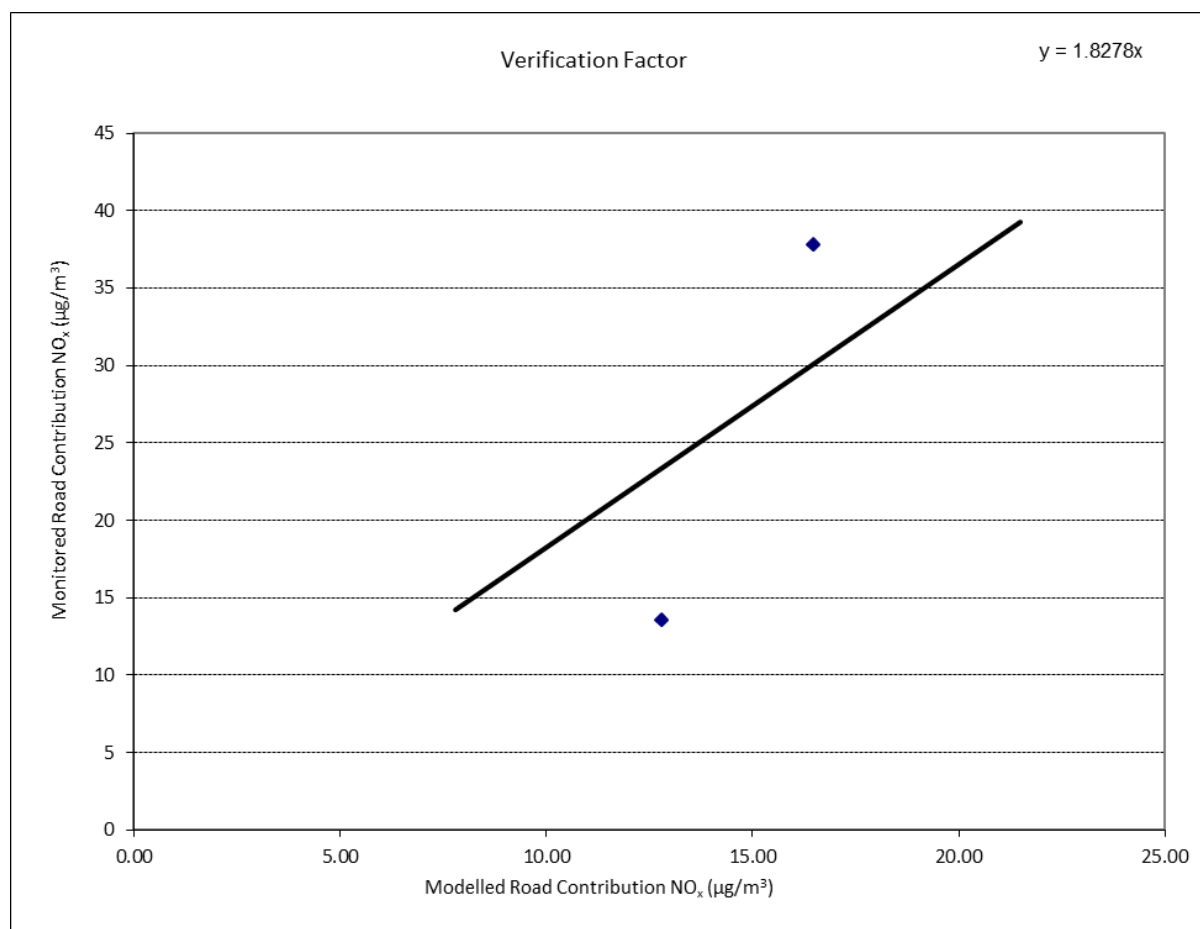
The monitored and modelled NO_x road contribution concentrations were graphed and the equation

²⁴ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

of the trendline based on the linear progression through zero calculated, as shown in Graph 1. This indicated a verification factor of **1.8278** was required to be applied to all modelling results.

As PM₁₀ monitoring is not undertaken within the assessment extents, a verification factor of **1.8278** was also used to adjust model predictions of this pollutant in accordance with the guidance provided within LAQM.TG(09)²⁵.

Graph 1 Verification



²⁵ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

APPENDIX III ASSESSOR'S CURRICULUM VITAE

KEY EXPERIENCE:

Sarah is a Principal Consultant with specialist experience in the air quality and odour sector. Her key capabilities include:

- Advanced atmospheric air dispersion modelling of road vehicle and industrial emissions using ADMS-ROADS, ADMS-5 and AERMOD.
- Preparation of factual and interpretative Air Quality Assessment reports and Air Quality Environmental Statement chapters in the vicinity of proposed schemes and developments in accordance with DEFRA, Environment Agency and Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) methodologies.
- Management and delivery of project work on key, land development and urban regeneration projects.
- Assessment of road vehicle exhaust emissions using the Design Manual for Roads and Bridges (DMRB) calculation spreadsheet.
- Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- Production of air quality mitigation strategies for developments throughout the UK.
- Defining baseline air quality conditions and identification of sensitive areas.

QUALIFICATIONS:

- Bachelor of Science
- Member of IAQM
- Member of the Institute of Environmental Science (IES)

SELECT PROJECTS SUMMARY:

Residential Developments

Wilburn Basin, Salford - AQA undertaken for mixed use scheme.

Lea Bridge Road, London - AQA for residential development in an AQMA in London.

The Haven, Sydenham - AQA for residential development in London.

Land North of Anderton Lane, Tavistock - EIA for residential development.

Mallettsheugh, Newton Mearns - AQA for residential development.

Green Lane Road, Leicester - AQA for mixed-use scheme.

Dalgety Road, Edinburgh - AQA for residential development.

Lower Broughton, Salford - AQA for residential development within an AQMA.

Valentines Kennels, Wildings Lane, Lytham - EIA for residential development.

Leckhampton Farm Lane, Cheltenham - EIA for residential scheme.

Colney Hatch Lane, Barnet - AQ Constraints Assessment.

41 Peckham Road, Peckham - AQA for a mixed-use development within an AQMA.

Stafford Street, Walsall - AQA for a residential development in an AQMA.

Rhinewood Country House Hotel, Warrington - AQA for a residential scheme adjacent to a railway.

Commercial and Retail Developments

Dubai Studio City - EIA for mixed-use development in the Middle East.

Beetham, Milnthorpe - AQA for a proposed crematorium.

Marischal Square, Aberdeen - AQA for urban regeneration scheme in Scotland.

Dernford Farm, Sawston - EIA for proposed holiday park.

Lincolnshire Lakes, Scunthorpe - EIA for proposed mixed-use sports development for Scunthorpe United Football Club.

Roman Way, Crayford - AQA for retail development.

Keir Hardie Health Park, Merthyr Tydfil - Indoor Air Quality Plan in support of a BREEAM Assessment.

Solar Array Generating Facility, West Drayton - AQA within an AQMA.

Industrial Developments

Slade Farm Quarry - AQA for a proposed mineral extraction.

Sedalcol - Environmental Permit Application for Alcohol and Starch production facility.

North Pickenham Airfield AD Plant - AQA and Odour Assessment for proposed Anaerobic Digestion (AD) Facility.

Main Road, Drax - Dispersion Modelling Assessment for biomass boiler.

Eastern Avenue, Southend-on-Sea - Odour Assessment for proposed waste transfer station (WTS).

Land South of Severn Distribution Park, Sharpness - Odour Assessment for site adjacent to Sewage Treatment Works (STWs).

2 Sisters Food Group, Flixton - AQA for proposed AD Plant.

Bowhouse Road, Alloa - Odour Assessment for residential scheme adjacent to a STWs.

Low Fold, East Street, Leeds - AQ and Odour Assessment due to emissions from a glass manufacturing facility.

Broomhill Cube, Glasgow - Dispersion Modelling Assessment for biomass boiler.

Ellesmere Port Transformer Oil Regeneration Plant - Environmental Risk Assessment including a Dioxin Assessment in support of a permit variation.

Clay Lane, High Wycombe - Odour Assessment for a proposed WTS.

Clariant Oil Services Ltd - Dispersion Modelling Assessment of potential emissions from a new chemical stored on site.

Methwold Gas Pipeline - EIA for proposed gas pipeline.