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**HILLINGDON GATEWAY**  
**Air Quality Assessment – Revision A**

# HILLINGDON GARDENS

## Air Quality Assessment

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# HILLINGDON GARDENS

## Air Quality Assessment

### Revision A

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Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By
Rev A 07/05/2020	Table 8.1 updated	PZ	PZ

## 1.0 INTRODUCTION

### Summary

- 1.1 Create Consulting Engineers Ltd was instructed by to undertake an Air Quality Assessment (AQA) for the proposed Hillingdon Gardens development, located off the A40 Western Avenue and adjacent to Hillingdon London Underground station.
- 1.2 The site comprises 2.48 hectares of land and is currently a brownfield site that was formerly occupied by the Master Brewer Motel, Public House, together with associated buildings and infrastructure.
- 1.3 The proposed development includes construction of a residential-led, mixed use development comprising buildings between two and seven storeys to provide 551 residential units, employment floor space, flexible commercial floor space, and associated car and cycle parking, highway improvements, hard and soft landscaping, plant and other associated ancillary development.
- 1.4 The development is bounded to the north by the A40 Western Avenue, to the east by open green belt land, to the south by Freezeland Way and to the west by the A437 Long Lane. The major junction of Hillingdon Circus lies to the immediate southwest of the site. The site location is shown in Figure 1.1.

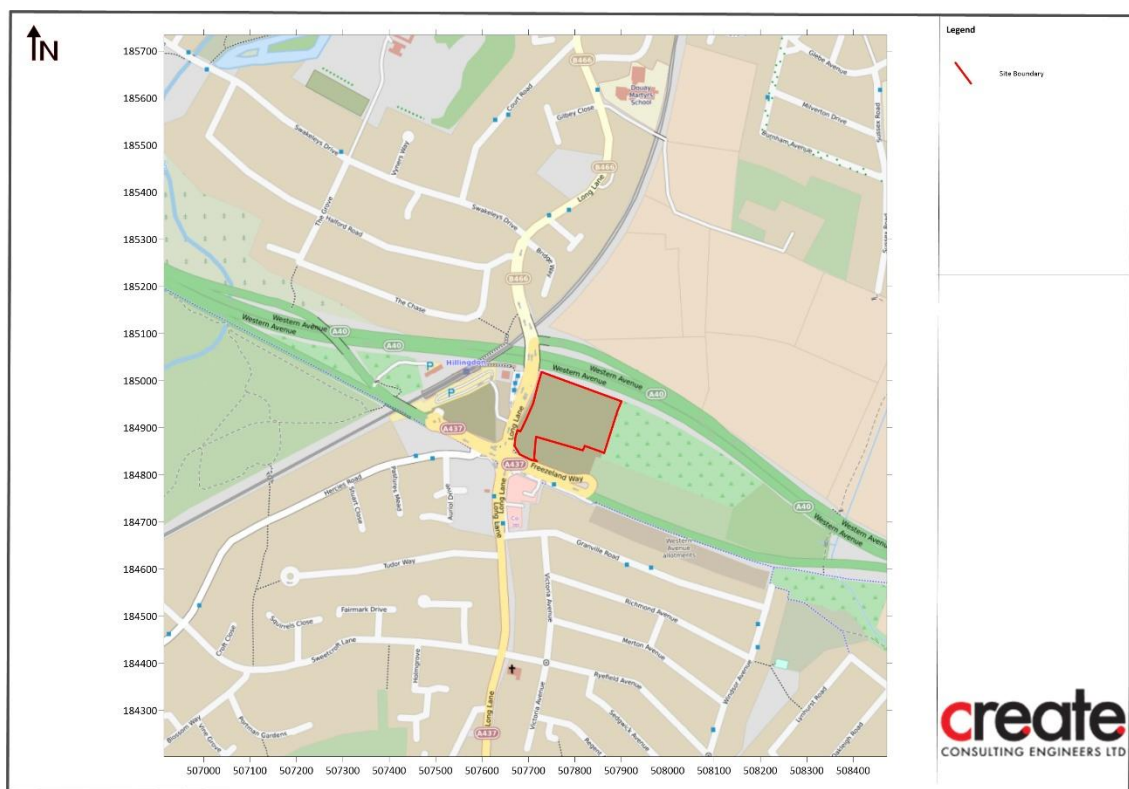


Figure 1.1: Location Of the Development Site

- 1.5 The detailed proposed development plan is illustrated in Figure 1.2.



**Figure 1.2: Proposed Development Layout**

### **Assessment Scope**

- 1.6 This report considers potential air quality impacts associated with both the construction and operation of the development. Likely changes to air quality in the area, as a result of the proposed development, have been considered in relation to the UK Air Quality Objectives (AQO) and EU Air Quality Standards. Also, where required, the air quality assessment considers mitigation measures to reduce the effect of the proposed development upon local air quality.
- 1.7 In terms of the construction impacts, the development proposal will have the potential to generate dust, particulate matter (PM<sub>10</sub>), and oxides of nitrogen (NO<sub>x</sub>) during the demolition and construction phases. These impacts are assessed in accordance with the Institute of Air Quality Management (IAQM) best practice guidance (2014).
- 1.8 The development site is located in an Air Quality Management Area (AQMA) where concentrations of traffic-related pollutants (particulate matters (PM<sub>10</sub>) and nitrogen dioxide (NO<sub>2</sub>)) are breaching the national objectives. Therefore, this assessment considers the exposure of future residents to ambient air quality. Where required the assessment proposes mitigation measures to reduce the impact of poor air quality on future residents.

- 1.9 Vehicle movements generated during the operation of the development will give rise to NO<sub>2</sub> and PM<sub>10</sub> emissions which will have potential impacts on local air quality. The assessment includes a traffic emission dispersion modelling study that predicts traffic-related pollutants at local receptors and at the development site.
- 1.10 The proposed development is wholly based on air source heat pumps. There are no gas systems, or systems with combustion processes being proposed. Therefore, development will not include any NO<sub>x</sub> or PM<sub>10</sub> emissions. Building emissions related to the retail land use will depend on future occupiers and therefore they have not been considered in this assessment, but are considered small aspects of the development.
- 1.11 In addition to the Travel Plan, the Applicant has committed to a significant financial contribution towards public transport linkage and fleet improvements in the Hillingdon area. It is envisaged that the contribution will go towards increased frequency of service or potentially towards a new direct route running north-south along Long Lane towards Ruislip and general fleet improvement.

### Summary of the Past Assessment

#### Site Features

Name	Location		
Former Master Brewers Site	Freezland Way, Hillingdon, off the A40 Western Avenue and adjacent to Hillingdon LUL station		
Land Use	Site Type	Planning Reference	Application Date
A1/ B1/ C3	Brown field	4266/APP/2017/3183	September 2017

#### Description

Outline
Construction of a residential-led, mixed-use development comprising buildings between 4 and 7 storeys to provide <b>359</b> homes (Use Class C3); employment floor space (Use Classes B1(a-c)); flexible commercial floor space (Use Classes A1/A3); associated car and cycle parking, hard and soft landscaping, plant and other associated ancillary development.
Detail

#### Relevant Features

Location
As detailed in Section 6 (Operational Phase)

**Access**

Vehicular access will be provided via the existing site access point on Freezeland Way, with the majority of traffic reaching the development via Hillingdon Circus junction. A new right-turn filter will be introduced on Freezeland Way for traffic arriving from the east via the A40 westbound.

The site location offers accessibility to a wide range of employment types. These include local businesses, retail, office and industrial developments within Hillingdon, Uxbridge and neighbouring boroughs.

The site is located within a convenient walking distance of a range of retail facilities on the A437 Long Lane just south of Hillingdon Circus. This includes Co-op, Boots, a Post Office, and various convenience stores and takeaways. Retail facilities such as into Uxbridge are also accessible via bicycle or local public transport facilities.

There is access from the site to a range of coffee shops, cafes and beauty salons within a five-minute walk on the A437 Long Lane. There is also a performing arts school located further south along Long Lane.

Hillingdon Athletics Stadium, Hillingdon Sports and Leisure Complex and Hillingdon House Farm Sports Grounds are all located on the B483 Park Road to the west of the site. These sports facilities can be reached on foot or by bicycle, and provide opportunities for athletics, tennis, cricket, bowls, football, rugby, squash, badminton, basketball, swimming and a gym.

A number of schools catering for a range of educational needs are located within walking distance of the site. These include:

- Douay Martyrs School;
- Glebe Primary School;
- St Helens College;
- Oak Farm Infant School;
- Vyners School; and
- Uxbridge College.

A number of healthcare facilities are located within walking distance of the site. These include:

- Hillingdon Health Centres;
- Emergency Dentists;
- Eyewise Opticians;
- Campbell House Dental Practice;
- Sweetcroft Dental Practice;
- Oakland Medical Centre;
- Acorn Medical Centre; and
- Oak Farm Clinic.

The nearest hospital is Hillingdon Hospital, located approximately 3km from the site.

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1.12 The main tasks are listed below:

- Identify and describe relevant characteristics and features of the development and its core design;
- Estimate the type and levels of traffic generated by the site through its occupation and use;
- Estimate the associated emissions and health damage caused by this traffic;
- Select and specify appropriate on-site mitigation and estimate both its cost and emission benefits;
- Consider and, if justified, propose a financial contribution for further compensatory measures; and
- Present findings in a summary report, supplemented by more detailed tables and technical notes.

1.13 In undertaking this assessment, efforts have been made to ensure that:

- The approach reflects relevant guidance; and report is concise, transparent and of good quality;
- Report addresses the comments and time to time remarks passed by EHO team at the London Borough of Hillingdon;
- Baseline scenario is well described and reflects good environmental design principles;
- Estimated fleet activity and impacts are based on reasonable and realistic assumptions;
- Appropriate effort has been made to identify, assess and propose mitigation;
- Balance of mitigation reflects the mitigation hierarchy and also local site characteristics; and
- Scale of mitigation (including any financial contribution) is commensurate to the emissions harm.

1.14 This Assessment is a complete submission updating all necessary sections to reflect all discussion and policy changes which have taken place since the original application. Reference should be made to the original Air Quality Assessment Ref: MR/JEB/P19/1773/01 Revision A. However this Assessment effectively supersedes the previous document going forward.



## 2.0 LEGISLATION AND POLICY CONTEXT

- 2.1 The Environment Act 1995 placed a responsibility on the UK Government to prepare an Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland. The most recent version of the strategy (2007) sets out the current UK framework for air quality management and includes a number of AQOs for specific pollutants.
- 2.2 The 1995 Act also requires that Local Authorities “review and assess” air quality in their areas, following a prescribed timetable. The Review and Assessment process is intended to locate and spatially define areas where the UK AQOs are not being met. In such instances, the Local Authority is required to declare an AQMA, carry out a Further Assessment of air quality, and develop an Air Quality Action Plan (AQAP), which should include measures to improve air quality so that the objectives may be achieved in the future. The timetables and methodologies for carrying out Review and Assessment studies are prescribed in Defra Technical Guidance – Local Air Quality Management Technical Guidance (LAQM.TG, 2016) and London specific LAQM.TG (16).
- 2.3 Table 2.1 lists the objectives relevant to this assessment that are included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purposes of LAQM.

Pollutant	Air Quality Objective	
	Concentration	Measured as
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg/m <sup>3</sup>	1-hour mean not to be exceeded more than 18 times per year
	40 µg/m <sup>3</sup>	Annual mean
Particulate Matter (PM <sub>10</sub> )	50 µg/m <sup>3</sup>	24-hour mean not to be exceeded more than 35 times per year
	40 µg/m <sup>3</sup>	Annual mean

**Table 2.1: Air Quality Objectives (England)**

- 2.4 The National Planning Policy Framework (NPPF) (Feb 2019) paragraph 181 notes that Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.
- 2.5 The National Planning Practise Guidance (NPPG) (Reference ID: 32-008-20140306), states that air quality assessments and resulting mitigation measures must be location specific and

proportionate to the nature/ scale of development proposed and the level of concern about air quality.

### **Dust**

- 2.6 The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) 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."*

- 2.7 Enforcement of the Act, in regard to nuisance, is currently under the administration 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.

### **Regional Planning Policy**

#### The London Plan (2016)

- 2.8 Policy 7.14 of The London Plan (2016) updated in 2017 (improving Air Quality), contains additional guidance for air quality in relation to planning decisions:

*Development proposals should:*

- a- minimize increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAS) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3)*
- b- promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'*
- c- be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAS)).*
- d- ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site*

*provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches*

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

### London Environment Strategy

- 2.9 The most recent London Environment Strategy which replaced Mayor's Air Quality Strategy (MAQS) for London was published in August 2017. The overarching aim of the Strategy is to reduce pollution concentrations and tackle the most urgent environmental challenges facing our city, as well as safeguard London's environment over the longer term. We need to ensure that London is greener, cleaner and ready for the future. The Strategy commits to the continuation of measures identified in the 2010 MAQS and sets out a series of additional measures.

**Policy 4.1.1** *Make sure that London and its communities, particularly the most disadvantaged and those in priority locations, are empowered to reduce their exposure to poor air quality;*

**Policy 4.1.2** *Improve the understanding of air quality health impacts to better target policies and action;*

**Policy 4.2.3** *Reduce emissions from non-transport sources, including by phasing out fossil fuels;*

**Policy 4.2.4** *The Mayor will work with the government, the London boroughs and other partners to accelerate the achievement of legal limits in Greater London and improve air quality;*

**Policy 4.2.5** *The Mayor will work with other cities (here and internationally), global city and industry networks to share best practice, lead action and support evidence-based steps to improve air quality;*

**Policy 4.3.2** *The Mayor will encourage the take up of ultra-low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines;*

**Policy 4.3.3** *Phase out the use of fossil fuels to heat, cool and maintain London's buildings, homes and urban spaces, and reduce the impact of building emissions on air quality.*

### **Local Planning Policy**

#### Hillingdon Local Plan Part 1

- 2.10 Hillingdon Council adopted its strategic policies Local Plan Part-I, in November 2012. This is an important document which contains the planning vision and strategy for the Borough. It identifies how the borough will guide future development in terms of the right amount and choice of housing, jobs and supporting infrastructure such as schools, health, leisure and community facilities, and ensuring that our town centres become vibrant, safe and welcoming places.
- 2.11 The Local Plan Part 1 - Strategic policies sets out the overall level and broad locations of growth up to 2026.

***Policy E2: Location of Employment Growth***

*{....} The Council will promote development in highly accessible locations that delivers sustainable travel patterns and contributes to the improvement of existing networks to reduce emissions and impacts on air quality. {....}*

***Policy BE1: Built Environment***

*{...}*

*Maximise the opportunities for all new homes to contribute to tackling and adapting to climate change and reducing emissions of local air quality pollutants.*

*{...}*

***Policy EM1: Climate Change Adaptation and Mitigation***

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

*{.....}*

*5. Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.*

*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 on local air quality. Targeting areas of poor air quality for additional emissions reductions.*

*{....}*

***Policy EM8: Land, Water, Air and Noise***

*{...}*

***Air Quality*** *All development should not cause deterioration in the local air quality levels and should 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 Actions plans, in particular where Air Quality Management Areas 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 development in an AQMA to fund additional air quality monitoring stations to assist in managing air quality improvements.*

{...}

## Hillingdon Local Plan Part 2

- 2.12 Once adopted it will deliver the detail of the strategic policies set out in the Local Plan Part 1: Strategic Policies (2012). Together they will form a comprehensive development strategy for the borough up to 2026. Part 2 has been through its final consultation process and is anticipated to be adopted in 2019.

### ***POLICY DMEI3: Decentralised Energy***

{...}

*The Council will support the development of decentralised energy networks and energy centres in principle, subject to meeting the wider policy requirements of this plan and in particular on design and air quality.*

### ***Policy DMEI18: Air Quality Development proposals should as a minimum be at least "air quality neutral".***

*Where air quality levels are above national and European regulated levels, proposals will be required to demonstrate appropriate reductions in emissions to ensure that local air quality levels for both proposed and existing receptors are met in accordance with the relevant European Union (EU) limit values.*

***POLICY DMT2: Highways impacts***

*(A) Development proposals must be compatible with the safe and efficient movement of the highway and therefore must ensure that:*

*{...}*

*(ii) they do not contribute to the deterioration of air quality, noise or local amenity or safety of all road users and residents.*

*{...}*

- 2.13 Reference has been made to these policies during the preparation of this Air Quality Assessment by assessing potential pollutant exposure across the site, and potential air quality impacts associated with the proposed development.

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### 3.0 METHODOLOGY

3.1 This section is in addition to the Air Quality Assessment issued by Create Consulting Engineers Ltd (Ref: MR/JEB/P19/1773/01 Revision A). This section outlines the assessment methodology and the criteria used to assess the significance of risk associated with the proposed development.

3.2 Additionally, this report addresses the observations raised by LBH in regard to the potential impact of additional road vehicle exhaust emissions generated by the development.

3.3 These have been assessed in accordance with the following methodology:

#### **Construction Phase Assessment**

3.4 There is the potential for fugitive dust emissions to occur as a result of construction phase activities.

3.5 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'<sup>1</sup>.

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

- Earthworks;
- Construction; and
- Trackout.

3.7 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 PM<sub>10</sub> and PM<sub>2.5</sub>.

3.8 The assessment steps are detailed below.

#### **Step 1**

3.9 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

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1 Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2016.

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.

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

## Step 2

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

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

- 3.13 Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 3.1.

Magnitude	Activity	Criteria
Large	Earthworks	<ul style="list-style-type: none"> <li>• Total site area greater than 10,000m<sup>2</sup></li> <li>• Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size)</li> <li>• More than 10 heavy earth moving vehicles active at any one time</li> <li>• Formation of bunds greater than 8m in height</li> <li>• More than 100,000 tonnes of material moved</li> </ul>
	Construction	<ul style="list-style-type: none"> <li>• Total building volume greater than 100,000m<sup>3</sup></li> <li>• On site concrete batching</li> <li>• Sandblasting</li> </ul>
	Trackout	<ul style="list-style-type: none"> <li>• More than 50 Heavy Duty Vehicle (HDV) trips per day</li> <li>• Potentially dusty surface material (e.g. high clay content)</li> <li>• Unpaved road length greater than 100m</li> </ul>
Medium	Earthworks	<ul style="list-style-type: none"> <li>• Total site area 2,500m<sup>2</sup> to 10,000m<sup>2</sup></li> <li>• Moderately dusty soil type (e.g. silt)</li> <li>• 5 to 10 heavy earth moving vehicles active at any one time</li> <li>• Formation of bunds 4m to 8m in height</li> <li>• Total material moved 20,000 tonnes to 100,000 tonnes</li> </ul>



Magnitude	Activity	Criteria
Small	Construction	<ul style="list-style-type: none"> <li>• Total building volume 25,000m<sup>3</sup> to 100,000m<sup>3</sup></li> <li>• Potentially dusty construction material (e.g. concrete)</li> <li>• On site concrete batching</li> </ul>
	Trackout	<ul style="list-style-type: none"> <li>• 10 to 50 HDV trips per day</li> <li>• Moderately dusty surface material (e.g. high clay content)</li> <li>• Unpaved road length 50m to 100m</li> </ul>
	Earthworks	<ul style="list-style-type: none"> <li>• Total site area less than 2,500m<sup>2</sup></li> <li>• Soil type with large grain size (e.g. sand)</li> <li>• Less than 5 heavy earth moving vehicles active at any one time</li> <li>• Formation of bunds less than 4m in height</li> <li>• Total material moved less than 20,000 tonnes</li> <li>• Earthworks during wetter months</li> </ul>
	Construction	<ul style="list-style-type: none"> <li>• Total building volume less than 25,000m<sup>3</sup></li> <li>• Construction material with low potential for dust release (e.g. metal cladding or timber)</li> </ul>
	Trackout	<ul style="list-style-type: none"> <li>• Less than 10 HDV trips per day</li> <li>• Surface material with low potential for dust release</li> <li>• Unpaved road length less than 50m</li> </ul>

**Table 3.1 Construction Dust Magnitude**

3.14 Step 2B defines the sensitivity of the area around the development site for construction, earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table 3.2.

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	<ul style="list-style-type: none"> <li>• Users expect of high levels of amenity</li> <li>• High aesthetic or value property</li> <li>• People expected to be present continuously for extended periods of time</li> <li>• Locations where members of the public are exposed over a time period relevant to the AQO for PM<sub>10</sub> e.g. residential properties, hospitals, schools and residential care homes</li> </ul>	<ul style="list-style-type: none"> <li>• Internationally or nationally designated site e.g. Special Area of Conservation</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• Users would expect to enjoy a reasonable level of amenity</li> <li>• Aesthetics or value of their property could be diminished by soiling</li> <li>• 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</li> </ul>	<ul style="list-style-type: none"> <li>• Nationally designated site e.g. Sites of Special Scientific Interest</li> </ul>

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
Low	<ul style="list-style-type: none"> <li>• Enjoyment of amenity would not reasonably be expected</li> <li>• Property would not be expected to be diminished in appearance</li> <li>• 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</li> </ul>	<ul style="list-style-type: none"> <li>• Locally designated site e.g. Local Nature Reserve</li> </ul>

**Table 3.2 Examples of Factors Defining Sensitivity of an Area**

3.15 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.

3.16 These factors were considered in the undertaking of this Assessment.

3.17 The sensitivity of the area to dust soiling effects on people and property is shown in Table 3.3.

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
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

**Table 3.3 Area Sensitivity to Dust Soiling Effects on People and Property**

3.18 Table 3.4 outlines the sensitivity of the area to human health impacts.

Receptor Sensitivity	Annual Mean PM <sub>10</sub> 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 <sup>3</sup>	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 <sup>3</sup>	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 <sup>3</sup>	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 <sup>3</sup>	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	Greater than 32µg/m <sup>3</sup>	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32µg/m <sup>3</sup>	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m <sup>3</sup>	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	Less than 24µg/m <sup>3</sup>	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	-	More than 1	Low	Low	Low	Low	Low

**Table 3.4 Sensitivity of the area to Human Health Impacts**

3.19 Table 3.5 outlines the sensitivity of the area to ecological impacts.

Receptor Sensitivity	Annual Mean PM <sub>10</sub> 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 <sup>3</sup>	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 <sup>3</sup>	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low

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

Table 3.5 Area Sensitivity to Ecological Impacts

3.20 Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts. Table 3.6 outlines the risk category from earthworks and construction activities.

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

Table 3.6 Dust Category from Earth works and Construction

3.21 Table 3.7 outlines the 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

**Table 3.7 Dust Risk Category from Trackout****Step 3**

- 3.22 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.

**Step 4**

- 3.23 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.
- 3.24 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.

**Operational Phase Assessment**

- 3.25 The proposed development includes sensitive land uses and is located within AQMA. As such, the proposals have the potential to introduce the poor quality of air in the area and worsen the current local air quality.
- 3.26 Detailed dispersion modelling is therefore to be undertaken to quantify NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations across the site and determine suitability for the proposed use, using the following scenarios:
- 2017 Verification; as agreed with EHO Hillingdon Team, verification model was used from the previous AQA report, submitted to LBH.
  - Opening year do-minimum (DM) (predicted traffic flows in 2025 should the proposals not proceed); and

- Opening year do-something (DS) (predicted traffic flows in 2025 should the proposals be completed, with the addition of traffic generated by the proposed development).
- 3.27 The DM (i.e. without development) scenario is representative of anticipated traffic data for 2025 based on information received from the Transport Consultant.
- 3.28 The DS (i.e. with development) scenario is representative of anticipated traffic data for 2025 with the addition of predicted variations in traffic flow patterns as a result of the proposals and committed flows from the community have been taken into account.
- 3.29 It should be noted that air quality is predicted to improve in the future. However, in order to provide a robust assessment, **emission factors for 2017** were utilised within the dispersion model as agreed with the EHO.
- 3.30 The use of 2025 traffic data and 2017 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.
- 3.31 Receptors potentially sensitive to changes in NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations were identified within 200m of the affected highway network in accordance with the guidance provided within the IAQM guidance on the likely limits of pollutant dispersion from road sources. LAQM (TG16) provides the following examples of where annual mean AQOs should apply:
- Residential properties;
  - Schools;
  - Hospitals; and
  - Care homes.
- 3.32 The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 3.8.
- 3.33 Criteria 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'<sup>2</sup>.

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

<sup>2</sup> Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and Institute of Air Quality Management, 2017.

Long Term Average Concentration	% Change in Concentration Relative to AQO			
	1	2-5	6-10	>10
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

**Table 3.8 Operational Traffic Exhaust Emissions – Assessment of Impacts**

- 3.34 The criteria shown in Table 3.8, is adapted from the EPUK and IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality with sensitivity descriptors included to allow comparisons of various air quality impacts.
- 3.35 It should be noted that changes of up to 0.5% will be described as negligible in accordance with the EPUK and IAQM guidance.
- 3.36 Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 3.1, the EPUK and IAQM 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.
- 3.37 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.
- 3.38 The descriptors of impact significance for the annual mean concentration for both NO<sub>2</sub> and PM<sub>10</sub> that take account of the magnitude of changes for the proposed development based on guidance from EPUK are shown in Table 3.9 below.

Total Concentration Related to Objective/Limit Value	Change in Concentration		
	Small	Medium	Large
<b>Increase With Scheme</b>			
<b>Above Objective/Limit Value with Scheme (&gt;40 µg m<sup>-3</sup>)</b>	Minor Adverse	Moderate Adverse	Major Adverse
<b>Just Below Objective/Limit Value with Scheme (36-40 µg m<sup>-3</sup>)</b>	Minor Adverse	Moderate Adverse	Moderate Adverse
<b>Below Objective/Limit Value with Scheme (30-36 µg m<sup>-3</sup>)</b>	Negligible	Minor Adverse	Minor Adverse
<b>Well Below Objective/Limit Value with Scheme (&lt;30 µg m<sup>-3</sup>)</b>	Negligible	Negligible	Minor Adverse
<b>Decrease With Scheme</b>			
<b>Above Objective/Limit Value with Scheme (&gt; 40 µg m<sup>-3</sup>)</b>	Minor Beneficial	Moderate Beneficial	Major Beneficial
<b>Just Below Objective/Limit Value with Scheme (36-40 µg m<sup>-3</sup>)</b>	Minor Beneficial	Moderate Beneficial	Moderate Beneficial

Total Concentration Related to Objective/Limit Value	Change in Concentration		
	Small	Medium	Large
<b>Below Objective/Limit Value with Scheme (30-36 <math>\mu\text{g m}^{-3}</math>)</b>	Negligible	Minor Beneficial	Minor Beneficial
<b>Well Below Objective/Limit Value with Scheme (&lt; 30 <math>\mu\text{g m}^{-3}</math>)</b>	Negligible	Negligible	Minor Beneficial

**Table 3.9: Impact Descriptors for Changes to Annual Mean Concentration of NO<sub>2</sub> and PM<sub>10</sub>**

- 3.39 Once the magnitude of the change has been established, the impact at each relevant receptor needs to be described. The impact magnitude at each receptor location can be described using the changes stated above as Negligible, Minor, Moderate or Major, as either Adverse or Beneficial, and either Temporary or Permanent.
- 3.40 The overall significance should be described separately for both the impact of emissions related to the proposed development on existing receptors, and for the impacts of emissions from existing source(s) on new exposure being introduced from the proposed development.
- 3.41 A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that require specific consideration during the assessment.
- 3.42 These were modelled at various heights from (1.5m to 81m) different floor levels are summarised in Table 3.10 below.

Building		NGR (m)		Height (m)
		X- Axis	Y-Axis	
R1	34 Freezeland Way	507835.5	184727.6	1.5
R2	15 Freezeland Way	507732.7	184775.6	1.5
R3	1 Western Parade	507671.1	184799.5	4.5
R4	31A Long Lane	507619.9	184740.9	4.5
R5	346 Chevron House	507657.9	184661	1.5
R6	2a Sweetcroft Lane	507629.4	184437.6	1.5
R7	1A Bridge Way	507700.6	185277.7	1.5
R8	Douay Martyr School	507829.6	185420.1	1.5
R9	121 Turnstone Close	507744.3	185327.4	1.5
R10	60A The Chase	507611.7	185106.3	1.5

**Table 3.10 Existing Human Sensitive Receptors**

- 3.43 The sensitive receptors identified in Table 3.10, 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, however using the worst case locations is considered acceptable and agreed with the EHO.

3.44 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 exceedance 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 NO<sub>2</sub> concentration of 41µg/m<sup>3</sup> should attract less significance than an annual mean of 51µg/m<sup>3</sup>.

3.45 These factors were considered, and an overall significance determined for the impact of operational phase road traffic emissions.

3.46 Furthermore, in accordance with London Plan Policy 7.14 and The Mayor's Air Quality Strategy Policy 7, an Air Quality Neutral Assessment is provided.

3.47 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.

## 4.0 BASELINE CONDITIONS

4.1 Baseline data was gathered from the following sources:

- Hillingdon AQ Progress Report 2018 FINAL;
- Air Quality England website ([www.airqualityengland.co.uk](http://www.airqualityengland.co.uk));
- DEFRA's national air quality background maps 2017 (<http://uk-air.defra.gov.uk/data>);
- LAEI's 2016 modelling and Focus map;
- 2019 Air Quality Monitored data

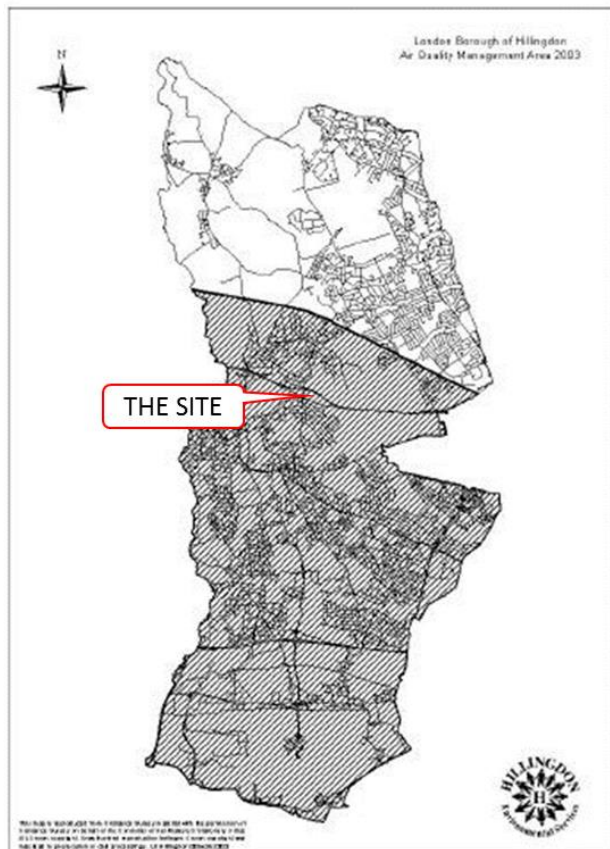
### Local Air Quality Management

4.2 As required by the Environment Act (1995), LBH has undertaken a review and assessment of air quality within their administrative area. This process concluded that annual mean concentrations of NO<sub>2</sub> is above the relevant AQO. As such, an Air Quality Management Area (AQMA) has been declared as:

- **"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.*"

4.3 The site is located within Hillingdon AQMA as shown in Figure 4.1, as a result there is the potential for the development to introduce future site users to elevated pollutant concentrations as well as cause impacts to air quality within this area.

4.4 This has been considered within this assessment.



**Figure 4.1 Hillingdon Borough of London and AQMA Location**

- 4.5 LBH 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 designated.
- 4.6 Annual reviews of air quality have shown that levels of NO<sub>2</sub> have not changed significantly over recent years. There is however a good record of implementation of the AQAP measures in areas for which the Council has control. An obvious problem arises because the most important sources in the Borough (the airport and the major road network) are not under the control of the Council and instead managed independently by Transport for London and Heathrow.

### **Air Quality Monitoring Data**

#### Automatic Monitoring Locations

- 4.7 LBH operates ten continuous automatic monitoring stations throughout the administrative boundary. The nearest automatic monitoring location is approximately 3.8km to the north east of the proposed development as shown in Figures 4.2 and HG-1 within Appendix C.
- 4.8 Monitoring results from 2015 to 2017 are illustrated below in Table 4.1. Exceedances are shown in **bold**.

Site Name/ID	NGR		Site Type	Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> )		
	X	Y		2015	2016	2017
Hillingdon 1 (HL1)	510857	184917	Roadside	<b>51.9</b>	<b>51.2</b>	<b>53(47.2)</b>

**Table 4.1 NO<sub>2</sub> Automatic Monitor Results**

*\*Means (in brackets) were "corrected for relevant exposure" in accordance with LLAQM Technical Guidance*

- 4.9 As indicated in Table 4.1, NO<sub>2</sub> monitoring exceeded the annual mean national objective of 40µg/m<sup>3</sup> during the recent years. This was due to the exhaust road emissions with the area contained within the AQMA.
- 4.10 LBH also carry out passive NO<sub>2</sub> monitoring using diffusion tubes at numerous locations. The nearest monitoring sites to the proposed development are listed in Table 4.2.

Site ID	X (m)	Y (m)	Site Type	Annual Mean NO <sub>2</sub> Concentrations µg/m <sup>3</sup>		
				2015	2016	2017
HD46	510821	184923	Roadside	<b>43.2</b>	<b>40.2</b>	<b>46.7</b>
HD210	507649	184611	Roadside	<b>43.3</b>	<b>42.5</b>	<b>45.5 *</b>
HD401	507730	184623	Background	30.0	27.6	29.4

**Table 4.2: Details of Diffusion Tubes Monitoring Locations for NO<sub>2</sub>**

- 4.11 Table 4.2 indicates that there were exceedances of AQO at HD46 and HD210 locations. This is due to monitoring locations within AQMA.
- 4.12 We assume that diffusion tubes HD46, HD210 and HL1 (Automatic monitoring station) are representative of the site. Monitoring data for diffusion tubes HD46, HD210 and HL1 have been used for the verification of model as they are located closest to the development site and are considered representative of conditions within the model domain.
- 4.13 In addition data collected by the Applicant from December 2019 to February 2020 has been used to support the findings within this assessment and modelling completed. The result of which are provided in Appendix A, this has been used within the assessment to cross reference and verify the data and modelling source applied.

### Air Quality Modelling

- 4.14 In 2013 the GLA updated to (2016) produced air quality modelling maps showing NO<sub>2</sub> and PM<sub>10</sub> concentrations for each London Borough. These maps are based upon emissions data collected through the 2016 London Atmospheric Emission Inventory (LAEI).
- 4.15 The map provided as Figures 4.2 indicates that the site is located in an area where the annual mean NO<sub>2</sub> concentrations ranges from approximately 34 µg/m<sup>3</sup> to 38µg/m<sup>3</sup> at busy roads and junctions and therefore below the annual mean objective (40 µg/m<sup>3</sup>).



Figure 4.2 Modelled 2016 annual mean NO<sub>2</sub>

### Mapped Background Pollution

- 4.16 The Defra website includes estimated background air pollution data for NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> for each 1km by 1km OS grid square. Background pollutant concentrations are modelled from the base year of 2017 and based on ambient monitoring, meteorological data from 2017 and then includes projections for future years. Projected pollutant concentrations for the year 2017 and covering the OS grid square in which the proposed development site lies, (origin 507750 & 184950) are shown in Table 4.3. Annual mean concentrations are within the relevant objective limits for NO<sub>2</sub> and PM<sub>10</sub>. There are no ambient air quality limits for NO<sub>x</sub> and PM<sub>2.5</sub>.

Pollutant	2017 Annual Mean (µg/m <sup>3</sup> )
NO <sub>x</sub>	33.84
NO <sub>2</sub>	22.27
PM <sub>10</sub>	16.34
PM <sub>2.5</sub>	11.37

Table 4.3 2017 Annual Mean Background Concentrations of NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>



### Air Quality Focus Area

- 4.17 The GLA has identified 187 Air Quality Focus Areas (AQFA) within London. These are locations where the annual mean NO<sub>2</sub> concentrations breach the national air quality objective (40µg/m<sup>3</sup>), and where human exposure to air pollution is high. Seventeen of these focus areas are located within Hillingdon Borough of London. AQFA's are tools to help London Boroughs to target action in the most problematic areas.
- 4.18 In this case, the development site located between south of Western Avenue, Long Lane (A40) in east and north west of Freeze land Way AQFAs. Figure 4.3 shows the development site in relation to AQFAs.

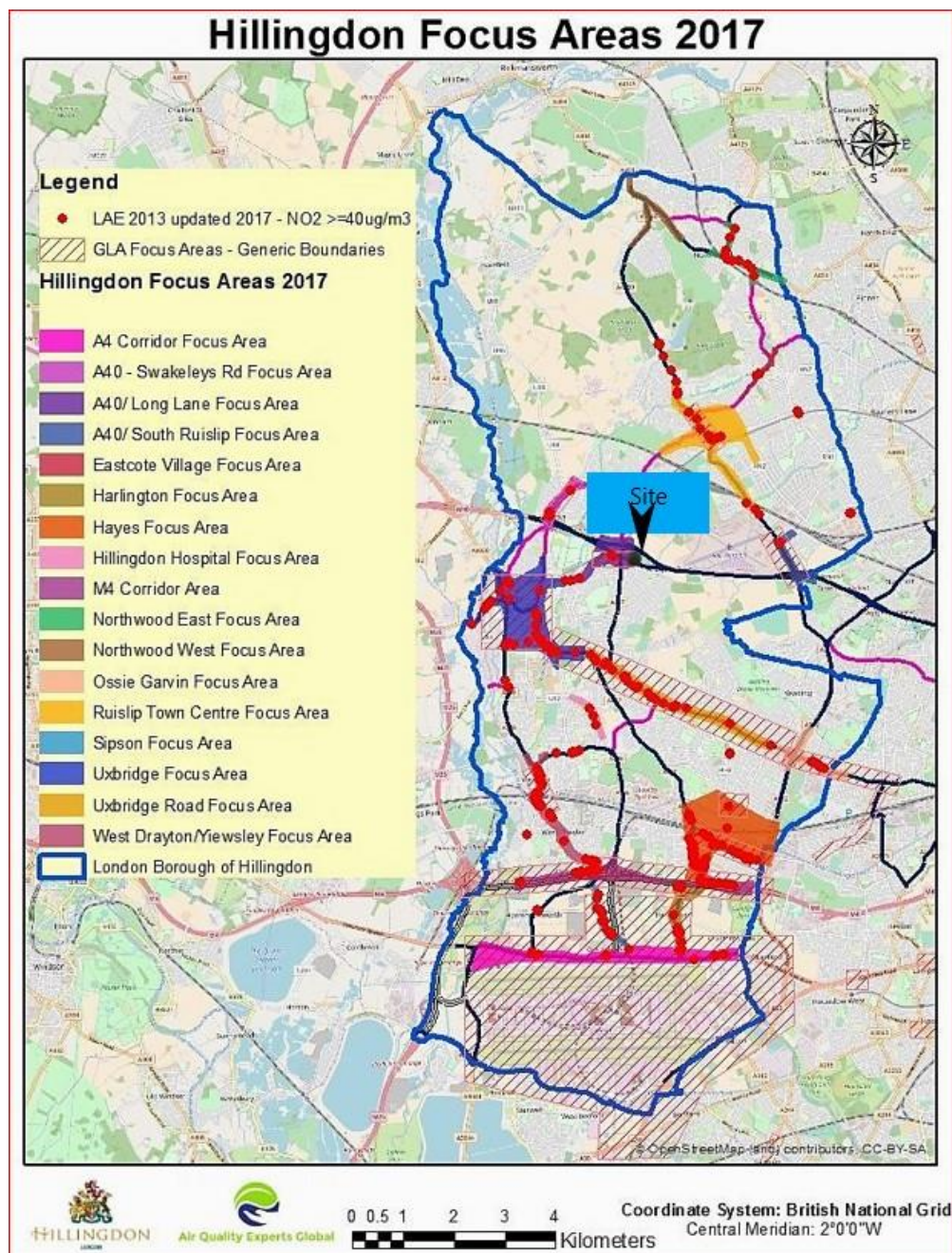


Figure 4.3 LBH Air Quality Focus Area 2017 in relation to the development site

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## 5.0 ASSESSMENT INPUTS

### Assessment Inputs

- 5.1 The built and occupied development has the potential to expose future site users to elevated pollutant levels. In order to assess NO<sub>2</sub> and PM<sub>10</sub> concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology. As agreed with EHO.

### Dispersion Model

- 5.2 Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.1.1.0). 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.

### Input Data

- 5.3 The model requires input data that details the following parameters:

- Emission Factors
- Meteorological data;
- Roughness length; and
- Monin-Obukhov length.

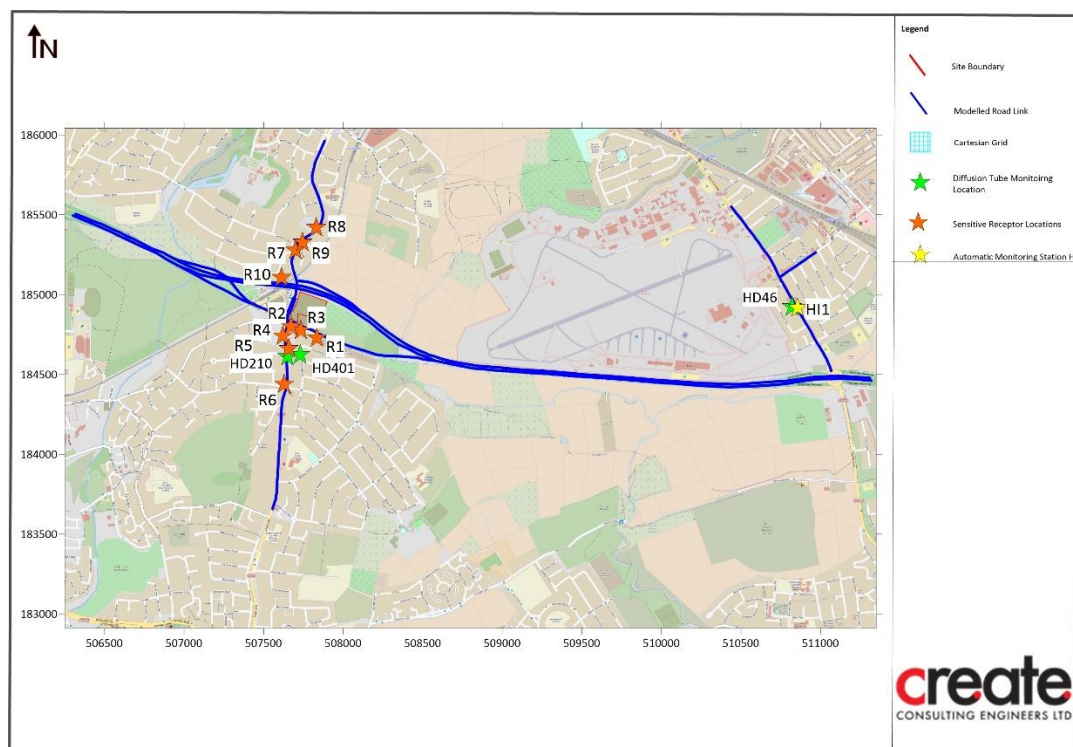
### Emission Factors

- 5.4 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 9.0) released in May 2019, which incorporates updated COPERT5 vehicle emissions factors for NO<sub>x</sub> and vehicle fleet information.
- 5.5 There is current uncertainty over NO<sub>2</sub> concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2017 emission factors have been utilised for the prediction of pollution levels for all scenarios in preference to the development opening year (2020) in order to provide a robust assessment.

### Traffic Flow Data

- 5.6 Traffic data for this scheme including baseline and future years was provided by WSP Transport Planners, the assigned Transport Consultant for this project.

- 5.7 Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, was obtained from the Department for Transport (DfT).
- 5.8 The DfT Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2019. It should be noted that the DfT matrix is referenced in DEFRA guidance LAQM (TG16) as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.
- 5.9 Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2017 traffic flow year to 2025, which was used to represent the development opening year.
- 5.10 Vehicle speeds were estimated based on the free flow 'potential' of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards.
- 5.11 Reference should be made to Figure 5.1 for a graphical representation of the road link locations used with the ADMS model.



**Figure 5.1 ADMS Input for the Model**

- 5.12 A summary of the 2017 traffic data used in the verification scenarios is provided in Table 5.1.



Link ID	Road Links	Road Width (m)	24-hour AADT Flow	HDV Prop (%)	Mean Vehicle Speed (km/h)
L1	West End Road North	7.8	15,763	7.46	40
L2	West End Road/ Station Approach	9.2	15,763	7.46	30
L3	West End Road	7.5	15,763	7.46	25
L4	WEST End Road/ Wingfield Way	7.4	15,763	7.46	20
L5	West End Road/ Polish WM	8.2	15,763	7.46	15
L6	Station Approach/ West End Road	6.5	12,874	7.46	30
L7	Station approach	7.1	12,874	7.46	25
L8	Western Avenue Eastbound	12.5	30,300	10.78	60
L9	Western Avenue	13.8	30,300	10.78	80
L10	Western Avenue Road Westbound	13.5	30,300	10.78	60
L11	Westbound Western Avenue	12.5	30,300	10.78	75
L12	Western Avenue West end EB	12.5	30,300	10.78	80
L13	Western Avenue	12.6	30,300	10.78	75
L14	Western Avenue Eastbound	9.5	8,258	9.52	40
L15	West Avenue Westbound Slip	9.8	7,947	9.52	80
L16	Western Avenue Eastbound	12.6	22,874	10.78	85
L17	West Avenue Westbound	17.5	22,874	10.78	80
L18	Slip Merged West Avenue	17.8	30,300	10.78	65
L19	Slip West Avenue	10.2	7,426	9.91	40
L20	Long Lane/ West Avenue Slip	9.2	7,426	9.91	60
L21	South West Avenue Slip	10.5	7,458	10.78	50
L22	West Avenue Slowdown	9.5	7,458	10.78	40
L23	Freezland Way Eastbound	15.5	7,658	10.63	20
L24	Freezland Way	22.5	7,658	10.63	10
L25	Freezland Way Westbound	24.5	16,401	9.91	10
L26	Freezland Way	18	16,401	9.91	25
L27	Long Lane/ Freeze Land Way	25	21,725	8.88	20
L28	Long Lane	22.5	21,725	8.88	30
L29	Long Lane over Motorway	17.8	21,725	8.88	35
L30	Long Lane Northbound	12.8	21,725	8.88	30
L31	Long Lane North	12.2	21,725	8.88	35
L32	Long Lane/ Freeze Land	22.2	19,642	7.46	15
L33	Long Lane/ Granville Lane	18.5	19,642	7.46	20
L34	Long Lane Southbound	14.5	19,642	7.46	35
L35	Long Lane	9.5	19,642	7.46	40

**Table 5.1 2017 Traffic Data**

- 5.13 The road width and mean vehicle speed shown in Table 5.1, remained the same for development opening year scenario (2025). A summary of the 2025 traffic data is shown in Table 5.2.
- 5.14 In accordance with the modelling methodology, different links have been used for the base plus development traffic approaching at busy junctions and delays during peak/off peak.

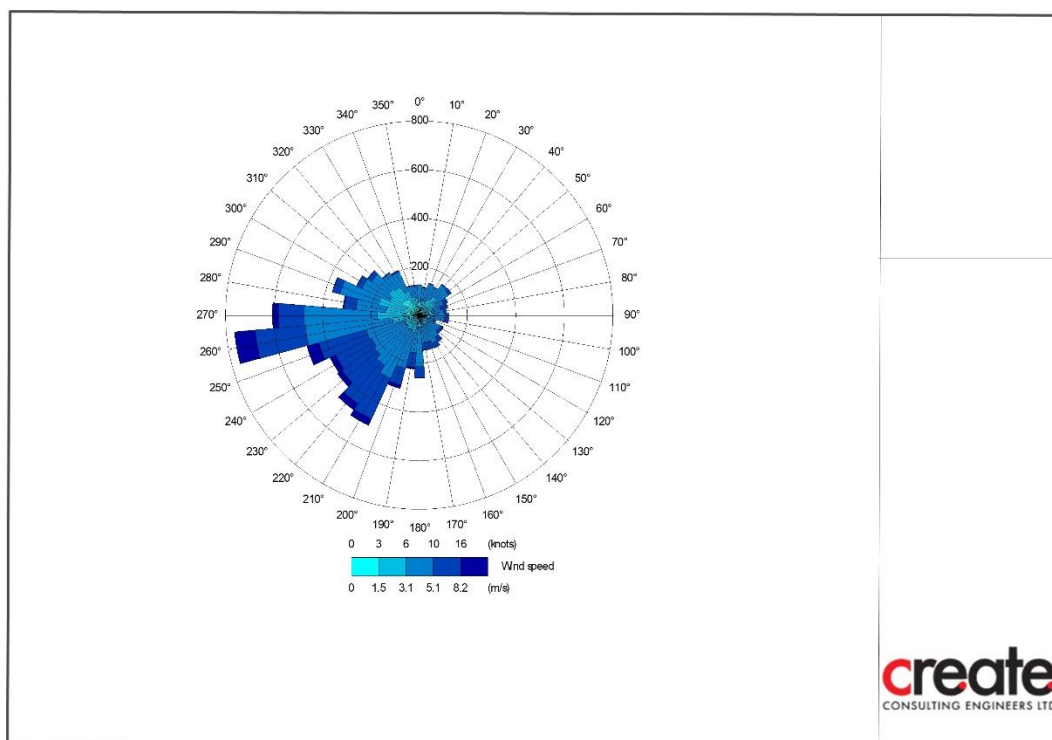
Site ID	Road Link	24-hours AADT Flow	HDV Prop: (%)	24-hours AADT Flow	HDV Prop: (%)
L1	West End Road North	15,764	7.46	16,017	7.46
L2	West End Road/ Station Approach	15,764	7.46	16,017	7.46
L3	West End Road	15,764	7.46	16,017	7.46
L4	WEST End Road/ Wingfield Way	15,764	7.46	16,017	7.46
L5	West End Road/ Polish WM	15,764	7.46	16,017	7.46
L6	Station Approach/ West End Road	12,876	7.46	13,129	7.46
L7	Station approach	12,876	7.46	13,129	7.46
L8	Western Avenue Eastbound	30,301	10.78	30,554	10.78
L9	Western Avenue	30,301	10.78	30,554	10.78
L10	Western Avenue Road Westbound	30,301	10.78	30,554	10.78
L11	Westbound Western Avenue	30,301	10.78	30,554	10.78
L12	Western Avenue West end EB	30,301	10.78	30,554	10.78
L13	Western Avenue to westbound	30,301	10.78	30,554	10.78
L14	Western Avenue Eastbound Slip	8,259	9.52	8,512	9.52
L15	West Avenue Westbound Slip	7,948	9.52	8,201	9.38
L16	Western Avenue Eastbound	22,875	10.78	23,128	10.78
L17	West Avenue Westbound	22,875	10.78	23,128	10.78
L18	Slip Merged West Avenue	30,301	10.78	30,554	10.78
L19	Slip West Avenue	9,049	9.91	9,302	9.91
L20	Long Lane/ West Avenue Slip	9,049	9.91	9,302	9.91
L21	South West Avenue Slip	7,585	8.70	7,756	8.60
L22	West Avenue Slowdown	7,585	8.70	7,756	8.60
L23	Freezland Way Eastbound	7,785	8.65	8,291	8.26
L24	Freezland Way	7,785	8.65	8,291	8.26
L25	Freezland Way Westbound	19,667	9.12	20,256	8.92
L26	Freezland Way	19,667	9.12	20,256	8.92
L27	Long Lane/ Freeze Land Way	25,677	9.52	25,930	9.44
L28	Long Lane	25,677	9.52	25,930	9.44
L29	Long Lane over Motorway	25,677	9.52	25,930	9.44
L30	Long Lane Northbound Slowdown	25,677	9.52	25,930	9.44
L31	Long Lane North	25,677	9.52	25,930	9.44
L32	Long Lane/ Freeze Land	21,431	6.80	21,600	6.77
L33	Long Lane/ Granvile Lane	21,431	6.80	21,600	6.77
L34	Long Lane Southbound	21,431	6.80	21,600	6.77

Site ID	Road Link	24-hours AADT Flow	HDV Prop: (%)	24-hours AADT Flow	HDV Prop: (%)
L35	Long Lane	21,431	6.80	21,600	6.77

**Table 5.2 2025 Base plus Development Traffic Data**

### Meteorological Data

- 5.15 Meteorological data used in this assessment was taken from Heathrow Airport meteorological station over the period 1<sup>st</sup> January 2017 to 31<sup>st</sup> December 2017 (inclusive) as shown in Figure 5.1. Heathrow Airport meteorological station is located approximately 14.5km south west of the proposed development.



**Figure 5.1 Wind Rose for Meteorological Data 2017**

- 5.16 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.

### Roughness Length

- 5.17 A roughness length ( $z_0$ ) of 1m was used within the dispersion model and for morphology of meteorological station. 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 and Woodland'.

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### **Monin-Obukhov Length**

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

### **Background Concentrations**

- 5.19 NO<sub>2</sub> concentration (29.40µg/m<sup>3</sup>) used within assessment extent of diffusion tube (HD401), due to higher levels than DEFRA background and PM<sub>10</sub> concentration of 16.34µg/m<sup>3</sup> as predicted by DEFRA, was used in the dispersion modelling assessment to represent annual mean PM levels in the vicinity of the site.
- 5.20 Similar to emission factors, background concentrations for 2017 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operational phase of the proposals.

### **NO<sub>x</sub> to NO<sub>2</sub> Conversion**

- 5.21 Predicted annual mean NO<sub>x</sub> concentrations from the dispersion model were converted to NO<sub>2</sub> concentrations using the spreadsheet provided by DEFRA, which is the method detailed within LAQM (TG16).

### **Verification**

- 5.22 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.
- 5.23 For the purpose of this assessment the model verification was undertaken for 2017, this was agreed with EHO Hillingdon Team on 31st January 2020 via phone, using traffic data, meteorological data and monitoring results from this year.
- 5.24 The dispersion model was run with the traffic input data previously detailed for 2017 to predict the NO<sub>x</sub> concentration at the monitoring locations. The results are shown in Table 5.3.

Site ID Name	Monitored Road NO <sub>x</sub> Concentration (µg/m <sup>3</sup> )	Modelled Road NO <sub>x</sub> Concentration (µg/m <sup>3</sup> )
HL1	37.16	9.76
HD46	38.88	21.33
HD201	35.95	22.71

**Table 5.3 NO<sub>2</sub> Verification Results**

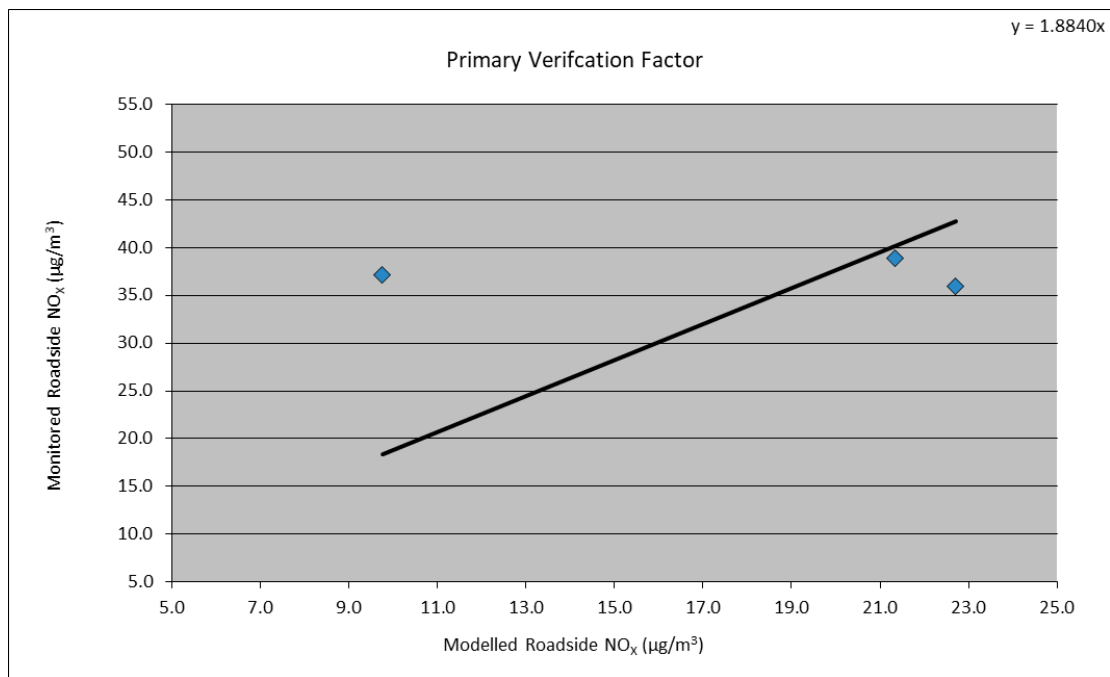
5.25 The monitored and modelled NO<sub>x</sub> road contribution concentrations were graphed below and the equation of the trend line based on the linear progression through zero was calculated. This indicated that a verification factor of **1.8840** was required to be applied to all NO<sub>x</sub> modelling results, showing the model has a slight tendency to underestimate pollutant concentrations throughout the assessment extents.

5.26 Table 5.4 presents the monitored annual mean NO<sub>2</sub> concentrations and the adjusted modelled total NO<sub>2</sub> concentration based on the above verification factor.

Site ID Monitoring Location	Monitored NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )	Adjusted Modelled Total NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )	Difference (%)
HL1	<b>46.00</b>	37.98	17.43%
HD46	<b>46.70</b>	<b>47.23</b>	-1.13%
HD201	<b>45.50</b>	<b>48.28</b>	-6.11%

**Table 5.4 2017 NO<sub>2</sub> Monitoring Results**

5.27 As PM<sub>10</sub> monitoring was not undertaken within the assessment extents, a factor of **1.8840** was utilised to adjust model predictions of particulate matter in accordance with the guidance provided within LAQM (TG16) and confirmed in Graph 5.1 below.



**Graph 5.1 - Monitored and Modelled NO<sub>x</sub> Ratio**

## 6.0 ASSESSMENT

6.1 Following the methodology, assessment was divided into two main phases, as:

- Construction Phase
- Operational Phase

### Construction Phase Sensitive Receptors

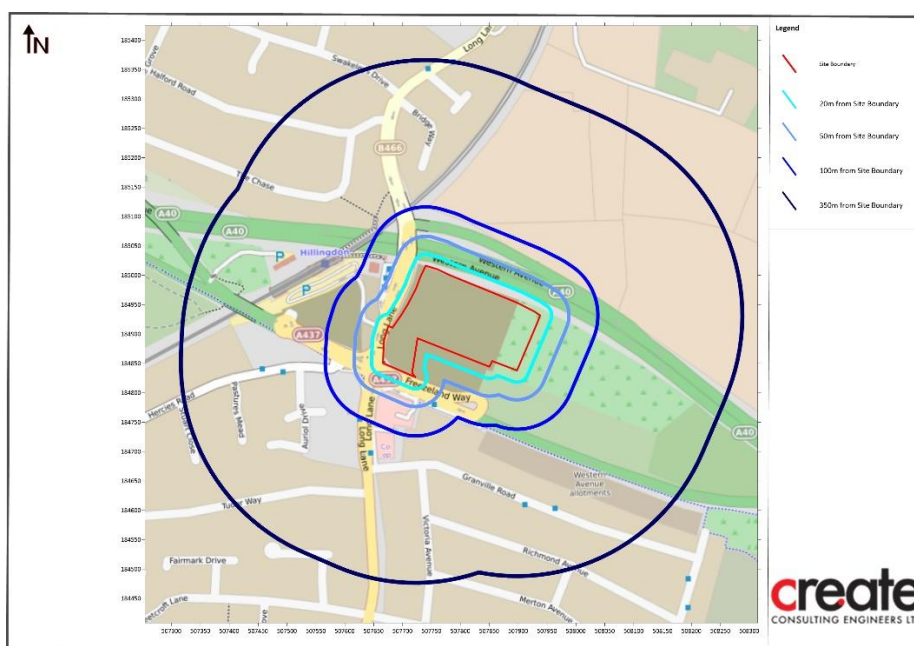
6.2 A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for construction dust impacts in the following Sections.

6.3 Receptors sensitive to potential dust impacts during 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 6.1.

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	-

**Table 6.1 Earthworks and Construction Dust Sensitive Receptors**

6.4 Reference should be made to Figure 6.1 for a graphical representation of earthworks and construction dust buffer zones.



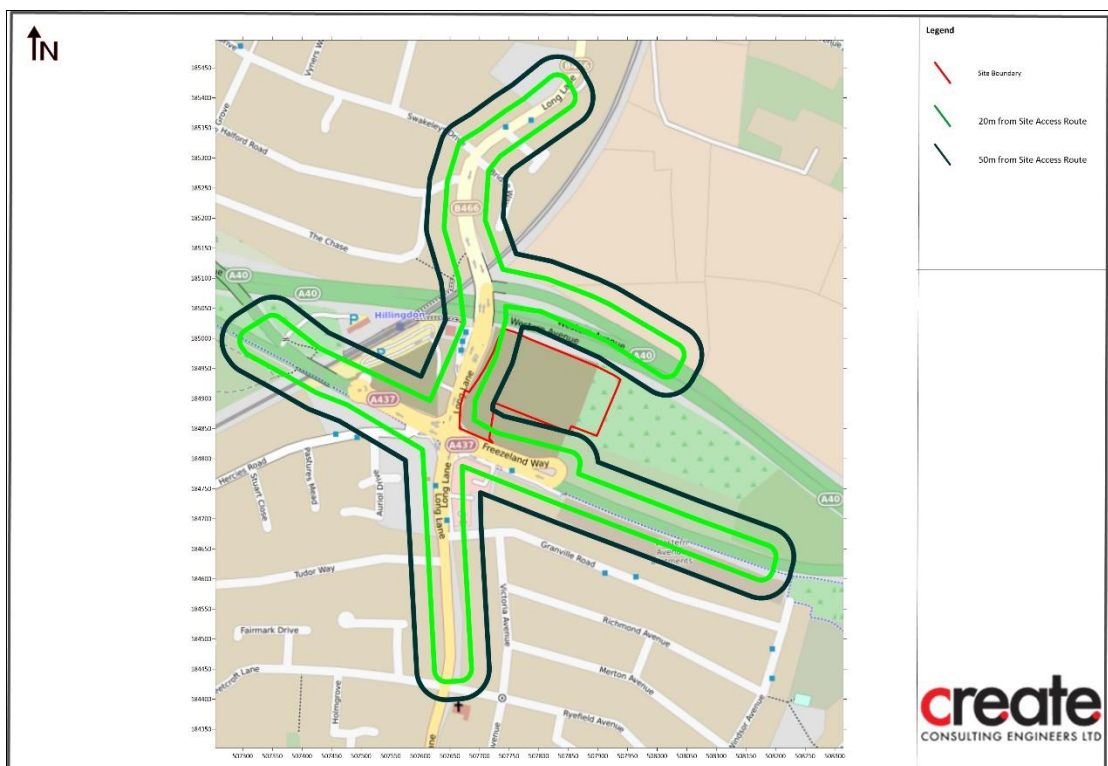
**Figure 6.1 Buffer Zone for Dust and Construction**

- 6.5 Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access route. These are summarised in Table 6.2.
- 6.6 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 that construction traffic would access the site from Western Road to ensure the maximum potential trackout distance was considered.

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

**Table 6.2 Trackout Dust Sensitive Receptors**

- 6.7 Reference should be made to Figure 6.2 for a graphical representation of trackout dust buffer zones.



**Figure 6.2 Trackout Dust Buffers**

- 6.8 There are no ecological receptors within 50m of the site or trackout boundary. As such, ecological impacts have not been assessed further within this assessment.
- 6.9 A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 6.3.



Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located in a predominantly urban location. As such, history of dust generation may have occurred as a result of windblown emissions from road vehicles and regeneration
Pre-existing screening between the source and the receptors	The proposed site has substantial vegetation to all boundaries as such natural protective screening is provided to all receptors surrounding 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 HG-4 within Appendix C. As such, properties to the north east of the site 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	The development opening year of 2025 suggests the duration of the construction phase is unlikely to extend over two years. As such potential impacts to receptors are low
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

**Table 6.3 Additional Area Sensitivity Factors**

- 6.10 Based on the criteria shown in Table 6.3, 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.
- 6.11 The sensitivity of the receiving environment to specific potential dust impacts, is shown in Table 6.4.

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

**Table 6.4 Sensitivity of the Surrounding Area**

### Step 3

- 6.12 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 6.6. The mitigation measures outlined in Table 6.5 can be reviewed prior to the commencement of construction works incorporated into the existing the strategies as applicable.

Issue	Control Measure
Communications	<ul style="list-style-type: none"> <li>• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary</li> <li>• Develop and implement a stakeholder communications plan that includes community engagement</li> <li>• Display the head or regional office contact information</li> <li>• Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA</li> </ul>
Site Management	<ul style="list-style-type: none"> <li>• Record all dusty and air quality complaints and make the complaints log available to the LA when asked</li> <li>• Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation</li> <li>• Make complaints log available to LA when asked</li> <li>• Hold regular liaison meetings with other construction sites that are within 500m of the site boundary. Ensuring plans are co-ordinated and dust and particulate matter emission are minimised</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Undertake daily on-site and off-site inspection where receptors are nearby to monitor dust</li> <li>• Carry out regular site inspections to monitor compliance with the DMP</li> <li>• Increase frequency of site inspections when activities with a high potential to produce dust are being carried out</li> </ul>
Preparing and Maintaining the Site	<ul style="list-style-type: none"> <li>• Plan site layout so that machinery and dust causing activities are located away from receptors</li> <li>• Fully enclose site or specific operations where there is a high potential for dust production and the site as active for an extensive period</li> <li>• Avoid site runoff of water or mud</li> <li>• Keep site fencing, barriers and scaffolding clean using wet methods</li> <li>• Remove materials that have a potential to produce dust from site as soon as possible</li> <li>• Cover, seed or fence stockpiles to prevent wind whipping Use water as dust suppressant where applicable</li> </ul>
Operating Vehicle/ Machinery and Sustainable Travel	<ul style="list-style-type: none"> <li>• All vehicles to switch off engines - no idling vehicles</li> <li>• Avoid the use of diesel or petrol powered generators where practicable</li> <li>• Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph in unsurfaced haul roads</li> <li>• Produce a Construction Logistics Plan to manage sustainable deliveries</li> <li>• Implement a Travel Plan that supports and encourages sustainable travel</li> </ul>

Issue	Control Measure
Operations	<ul style="list-style-type: none"> <li>• Cutting equipment to use water as dust suppressant or suitable local extract ventilation</li> <li>• Ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation</li> <li>• Use enclosed chutes and covered skips</li> <li>• Minimise drop heights</li> <li>• Ensure equipment is readily available on site to clean any spillages</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>• No bonfires or burning of waste materials</li> </ul>
Earthworks and Construction	<ul style="list-style-type: none"> <li>• Re-vegetate earthworks and exposed areas</li> <li>• Use Hessian, mulches or trackifiers where it is not possible to re-vegetate</li> <li>• Only remove the cover in small areas during work and not all at once</li> <li>• Avoid scabbling</li> <li>• Ensure sand and other aggregates are stored and not able to dry out, unless it is required for a specific process</li> <li>• Ensure bulk cement and other fine powder materials are delivered and stored to prevent escape</li> </ul>
Trackout	<ul style="list-style-type: none"> <li>• Use water-assisted dust sweeper on the access and local roads</li> <li>• Avoid dry sweeping of large areas</li> <li>• Ensure vehicles entering and leaving sites are covered to prevent escape of materials</li> <li>• Inspect on-site routes for integrity, instigate necessary repairs and record in site log book</li> <li>• Install hard surfaced haul routes which are regularly damped down</li> <li>• Implement a wheel washing system at a suitable location near site exit</li> <li>• 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</li> <li>• Access gates to be located at least 10m from receptors, where possible</li> </ul>

**Table 6.5 Fugitive Dust Mitigation Measures**

## Nitrogen Dioxide

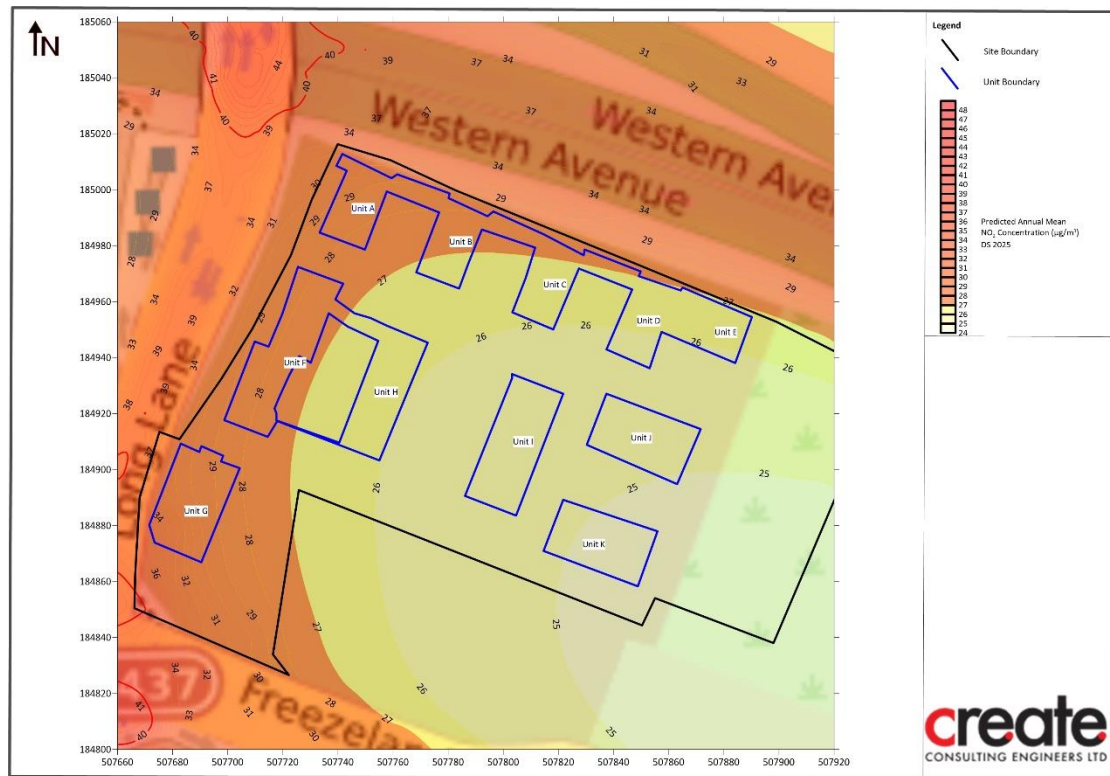
### Predicted Concentrations at the Development Site

- 6.13 Annual mean NO<sub>2</sub> concentrations were predicted across the development for the DS scenario at a height of 1.5m to represent exposure across the ground floor level. Predicted annual mean NO<sub>2</sub> concentrations across the development site during the DS scenario are summarised in Table 6.6 and shown in Figure 6.3.

Elevation (m)	Predicted 2025 Annual Mean NO <sub>2</sub> Concentration Range (µg/m <sup>3</sup> )
Ground (1.5m)	24.06 - <b>40.52</b>

**Table 6.6 Modelling Results - Annual Mean NO<sub>2</sub>**

- 6.14 The predicted concentrations shown in Table 6.6 indicates that there were exceedances of the AQO but this should be noted that concentration exceeded only at the outer boundary with **40.52 $\mu\text{g}/\text{m}^3$**  whilst  $\text{NO}_2$  concentration at the nearest residential (unit G) was predicted to be **35.25 $\mu\text{g}/\text{m}^3$** .
- 6.15 As such, elevated concentrations do not exceed the AQO levels for sensitive uses, it is considered that  $\text{NO}_2$  levels at the development site should not be viewed as a constraint to development.



**Figure 6.3 Predicted  $\text{NO}_2$  Concentration for Future Year (2025)**

- 6.16 Predictions of 1-hour  $\text{NO}_2$  concentrations were not produced as part of the dispersion modelling assessment. However, as stated in LAQM (TG16) if annual mean  $\text{NO}_2$  concentrations are below  $60\mu\text{g}/\text{m}^3$  then it is unlikely that the 1-hour AQO will be exceeded. As such based on the results in Table 6.7 it is not predicted that concentrations will exceed the 1-hour mean AQO for  $\text{NO}_2$  across the development site in the 2025 opening year scenario.
- 6.17 It should also be noted that background  $\text{NO}_2$  levels are likely to be lower at elevated heights due to increased distance from emission sources, such as the local road network. Therefore, predicted concentrations at heights above ground floor level are considered to be acceptable in regard to pollutant exposure and have not been assessed further.
- 6.18 Based on the results of the dispersion modelling assessment, the site is considered to be suitable for the proposed use without the implementation of mitigation techniques to protect future site users from elevated  $\text{NO}_2$  concentrations.

### Predicted Concentrations at Sensitive Receptors

- 6.19 In accordance with the assessment criteria the annual mean NO<sub>2</sub> concentrations were predicted for the 2025 DM and DS scenarios and are summarised in Table 6.7.

Sensitive Receptor		Predicted Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )		
		DM	DS	Change
R1	34 Freezeland Way	31.97	32.03	0.06
R2	15 Freezeland Way	33.96	34.08	0.12
R3	1 Western Parade	37.40	37.51	0.11
R4	31A Long Lane	33.03	33.07	0.04
R5	346 Chevron House	35.99	36.04	0.05
R6	2a Sweetcroft Lane	32.55	32.58	0.03
R7	1A Bridge Way	37.08	37.15	0.07
R8	Douay Martyr School	36.14	36.20	0.06
R9	121 Turnstone Close	37.55	37.62	0.07
R10	60A The Chase	33.72	33.77	0.05

**Table 6.7 Predicted Annual Mean NO<sub>2</sub> Concentrations**

- 6.20 As indicated in Table 6.7, predicted annual mean NO<sub>2</sub> concentrations has not exceeded the annual mean AQO at any sensitive receptor locations.
- 6.21 Predicted impacts on annual mean NO<sub>2</sub> concentrations at the sensitive receptor locations are summarised in Table 6.8.

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	34 Freezeland Way	0.15	76-94% of the AQO	Negligible
R2	15 Freezeland Way	0.30	76-94% of the AQO	Negligible
R3	1 Western Parade	0.27	76-94% of the AQO	Negligible
R4	31A Long Lane	0.10	76-94% of the AQO	Negligible
R5	346 Chevron House	0.12	76-94% of the AQO	Negligible
R6	2a Sweetcroft Lane	0.08	76-94% of the AQO	Negligible
R7	1A Bridge Way	0.18	76-94% of the AQO	Negligible
R8	Douay Martyr School	0.15	76-94% of the AQO	Negligible
R9	121 Turnstone Close	0.18	95-102% of the AQO	Negligible
R10	60A The Chase	0.13	76-94% of the AQO	Negligible

**Table 6.8 Predicted NO<sub>2</sub> Impacts**

- 6.22 As indicated in Table 6.8, the significance of impacts on annual mean NO<sub>2</sub> concentrations as a result of the development was predicted to be **negligible** at all receptor locations.

- 6.23 It is therefore considered that the overall impacts as a result of the proposed development on NO<sub>2</sub> concentration are **not significant**.

### Particulate Matter (PM<sub>10</sub>)

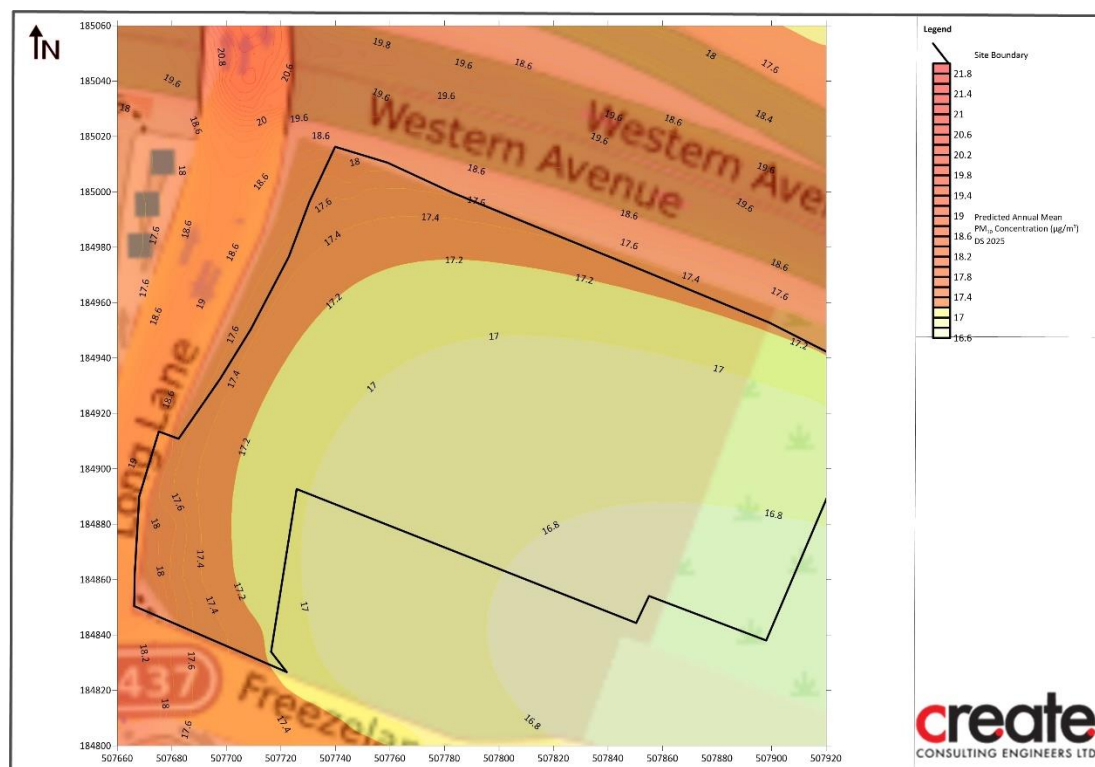
#### Predicted Concentrations at the Development Site

- 6.24 Annual mean PM<sub>10</sub> concentrations were predicted across the development for the DS scenario at a height of 1.5m to represent exposure across the ground floor level, Predicted annual mean PM<sub>10</sub> concentrations across the development site during the DS scenario are summarised in Table 6.9 as shown in Figure 6.4.

Elevation (m)	Predicted 2025 Annual Mean PM <sub>10</sub> Concentration Range (µg/m <sup>3</sup> )
Ground (1.5m)	16.73 – 18.68

**Table 6.9 Modelling Results - Annual Mean PM<sub>10</sub>**

- 6.25 The predicted concentrations shown in Table 6.10 indicate that there were no exceedances of the AQO throughout the modelling area. As such, it is considered that annual mean PM<sub>10</sub> levels at the development site should not be viewed as a constraint to development.



**Figure 6.4 Predicted PM<sub>10</sub> for Future Year (2025)**

- 6.26 Similar to NO<sub>2</sub> concentrations, background PM<sub>10</sub> levels are likely to be lower at elevated heights due to increased distance from emission sources, such as roads. Therefore, predicted concentrations at heights above ground floor level across the residential aspects of the

developments are considered acceptable in regard to future exposure and have not been assessed further.

- 6.27 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 site users from elevated PM<sub>10</sub> concentrations.

#### Predicted Concentrations at Sensitive Receptors

- 6.28 Annual mean PM<sub>10</sub> concentrations were predicted for 2025 DM and DS scenarios and are summarised in Table 6.10.

Sensitive Receptor		Predicted Annual Mean PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )		
		DM	DS	Change
R1	34 Freezeland Way	17.11	17.13	0.02
R2	15 Freezeland Way	17.52	17.55	0.03
R3	1 Western Parade	18.24	18.27	0.03
R4	31A Long Lane	17.17	17.18	0.01
R5	346 Chevron House	18.17	18.18	0.02
R6	2a Sweetcroft Lane	17.37	17.37	0.04
R7	1A Bridge Way	18.64	18.66	0.02
R8	Douay Martyr School	17.63	17.65	0.02
R9	121 Turnstone Close	18.28	18.30	0.02
R10	60A The Chase	17.24	17.26	0.02

**Table 6.10 Predicted Annual Mean PM<sub>10</sub> Concentrations**

- 6.29 As indicated in Table 6.10, annual mean PM<sub>10</sub> concentrations were below the relevant AQO at all sensitive receptor locations for both scenarios considered.
- 6.30 Predicted impacts on annual mean PM<sub>10</sub> concentrations are summarised in Table 6.11.

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	34 Freezeland Way	0.04	75% or Less of the AQO	Negligible
R2	15 Freezeland Way	0.07	75% or Less of the AQO	Negligible
R3	1 Western Parade	0.07	75% or Less of the AQO	Negligible
R4	31A Long Lane	0.03	75% or Less of the AQO	Negligible
R5	346 Chevron House	0.04	75% or Less of the AQO	Negligible
R6	2a Sweetcroft Lane	0.10	75% or Less of the AQO	Negligible
R7	1A Bridge Way	0.05	75% or Less of the AQO	Negligible

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R8	Douay Martyr School	0.05	75% or Less of the AQO	Negligible
R9	121 Turnstone Close	0.05	75% or Less of the AQO	Negligible
R10	60A The Chase	0.05	75% or Less of the AQO	Negligible

**Table 6.11 Predicted PM<sub>10</sub> Impacts**

- 6.31 As indicated in Table 6.11, impacts on annual mean PM<sub>10</sub> concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all receptor locations. It is therefore considered that the overall impacts as a result of the proposed development are **not significant**.

#### **PM<sub>2.5</sub> Impacts**

- 6.32 It should be noted that as per guideline mentioned in TG(16) that if concentration level of PM<sub>10</sub> is between 20-25ug/m<sup>3</sup>, it is unlikely that PM<sub>2.5</sub> exceeds. This was why PM<sub>2.5</sub> was not further considered within the assessment.



## 7.0 AIR QUALITY NEUTRAL ASSESSMENT

- 7.1 London Plan Policy 6.14 requires development proposals within Greater London to be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (e.g. developments situated within an AQMA). A method for assessing this is outlined in the Sustainable Design and Construction SPG (April 2014).

### Building Emissions Assessment

- 7.2 The Guidance sets out Building Emissions Benchmarks (BEB) based upon the Gross Internal Area (GIA m<sup>2</sup>) and on-site emissions of NO<sub>x</sub>. Developments that do not exceed these benchmarks will be considered to avoid any increase in NO<sub>x</sub> emissions and be air quality neutral. BEB for NO<sub>x</sub> for all land use classes are presented in Table 7.1.

Land Use Class	NO <sub>x</sub> (g/m <sup>2</sup> )
Class A1	22.6
Class A3 - A5	75.2
Class A2 and Class B1	30.8
Class B2 - B7	36.6
Class B8	23.6
Class C1	70.9
Class C2	68.5
Class C3	26.2
D1 (a)	43.0
D1 (b)	75.0
Class D1 (c -h)	31.0
Class D2 (a-d)	90.3
Class D2 (e)	284

**Table 7.1 Building Emissions Benchmarks (BEBs) Emissions for Different Land Use Classes**

\*Source: Air Quality Neutral Planning Support Update: GLA 80371, April 2014

- 7.3 The proposed development is wholly based on air source heat pumps. There are no gas systems, or systems with combustion processes being proposed. Therefore, development will not include any NO<sub>x</sub> or PM<sub>10</sub> emissions. Therefore, they have not been considered in this assessment.
- 7.4 Table 7.2 sets out the benchmark mass emissions of NO<sub>x</sub> against which the building emissions from the development have been compared.

	GIA (m <sup>2</sup> )	BEB (g/m <sup>2</sup> /annum)	kg/annum
Mixed use	4200	1553	860.7

**Table 7.2 Building Emission Benchmarks (BEB) Calculations**

- 7.5 Table 7.3 provides a comparison of the development building emissions with the benchmark.

	Total Development Building Emissions	Total Benchmarked Building Emissions	Total Development – Benchmarked Building Emissions
NO <sub>x</sub> (kg/annum)	556.8	860.68	-306.55

**Table 7.3 Summary of Building Emissions Results**

- 7.6 For NO<sub>x</sub>, the Total Development Building Emissions are -306.55kg/annum below the Total Benchmarked Building Emissions.
- 7.7 As the building is wholly based on air and heat source pumps. Therefore, no NO<sub>x</sub> will be emitted and only building emissions were calculated.

### Transport Emissions Assessment

- 7.8 For each land-use class, the number of vehicle movements generated by the operation of the development has been provided by the Transport Consultants.
- 7.9 The average trip length (km) for each land-use class could not be provided; however, consistent with the examples provided in the Air Quality Neutral Planning Support Update, the average London distances driven per annum for the different development categories have been obtained.
- 7.10 The number of vehicle movements has been multiplied by the average distances driven for each land use class to derive the vehicle km term. The total vehicle km for the development has then been multiplied by the NO<sub>x</sub> and PM<sub>10</sub> emission factors (in kg/annum) provided in the SPG to determine the 'Total Development Transport Emissions'.
- 7.11 The SPG provides Transport Emissions Benchmark (TEB) factors for NO<sub>x</sub> and PM<sub>10</sub> as mass emissions per dwelling, per annum for residential properties and mass emissions per floor space, per annum for all other land- use classes. A separate TEB for each pollutant (NO<sub>x</sub> and PM<sub>10</sub>) has been calculated for each land-use class. A 'Total TEB' has been calculated as the total of the individual TEBs for each land-use class and for each pollutant.
- 7.12 For each pollutant, the 'Total Development Transport Emissions' have been compared with the 'Total TEB'. Where the 'Total Development Transport Emissions' exceeds the 'Total TEB', the need for on or off-site mitigation has been identified.
- 7.13 Table 7.4 and 7.5 set out the annual mass of NO<sub>x</sub> and PM<sub>10</sub> emitted by the proposed development per annum, respectively.

Land Use Classes	Development Trip Rate (# vehicles/ day)	Average Trip Length (km)	Vehicle km/ annum	Development Emissions NOx (kg/annum)
<b>Mixed use (Residential and Retail)</b>	506	11.4	0.0606	376.02

**Table 7.4 Total Development Transport Emissions NOx**

Average Trip is the average of a standard residential (3.7km) and B1 (7.7km) land use trip in line with the guidance  
NOx emission factor for inner London = 0.370 g/km

Land Use Classes	Development Trip Rate (# vehicles/ day)	Average Trip Length (km)	Vehicle km/ annum	Development Emissions PM <sub>10</sub> (kg/annum)
<b>Mixed use</b>	506	267	0.353	64.55

**Table 7.5 Total Development Transport Emissions PM<sub>10</sub>**

Average Trip is the average of a standard residential (3.7km) and B1 (7.7km) land use trip in line with the guidance  
PM<sub>10</sub> emissions factor for inner London = 0.0665 g/vehicle.km

- 7.14 Table 7.6 and 7.7 set out the benchmark mass emissions of NO<sub>x</sub> and PM<sub>10</sub> against which the transport emissions from the development have been compared.

Land Use Classes	Gross Internal Area (m <sup>2</sup> )	Number of Dwellings	NOx TEB (g/m <sup>2</sup> /annum or g/dwelling/annum)	Benchmarked NOx Emissions (kg/annum)
<b>Mixed use</b>	42800	551	1553	<b>-360.55</b>

**Table 7.6 Total Benchmark Transport Emissions NOx**

Land Use Classes	Gross Internal Area (m <sup>2</sup> )	Number of Dwellings	PM <sub>10</sub> TEB (g/m <sup>2</sup> /annum or g/dwelling/annum)	Benchmarked PM <sub>10</sub> Emissions (kg/annum)
<b>Mixed use</b>	42800	551	267.0	<b>-83.34</b>

**Table 7.7 Total Benchmark Transport Emissions PM<sub>10</sub>**

- 7.15 Table 7.8 provides a comparison of the development transport emissions with the benchmark.

	Total Development Transport Emissions	Total Benchmark Transport Emissions	Total Development – Benchmark Transport Emissions
<b>NOx (kg/annum)</b>	912.4	556.8	-355.5
<b>PM10 (kg/annum)</b>	148	64.6	-83.3

**Table 7.8 Summary of Transport Results**

- 7.16 For NO<sub>x</sub>, the Total Development Transport Emissions are **-355.5kg/annum** below the Total Benchmark Transport Emissions.

- 7.17 For PM<sub>10</sub>, the Total Development Transport Emissions are **-83.3kg/annum** below the Total Benchmarked Transport Emissions.
- 7.18 Based on above, there is no need for the any mitigation or financial contribution towards future Borough wide potential mitigation measures for offset the potential air quality impacts.

### Future Exposure

- 7.19 The results of the dispersion modelling assessment will be compared against the Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance from the London Air Pollution Planning and the Local Environment (APPLE) working group. These are outlined in Table 7.9.

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.

**Table 67.9 Air Pollution Exposure Criteria**

- 7.20 It should be noted that a significant area of London would fall under APEC – “A and B”.
- 7.21 This is due to high NO<sub>2</sub> concentrations throughout the city. However, to achieve the confidence level a robust approach has been made where possible and using worst case traffic data.
- 7.22 The inclusion of suitable mitigation measures to protect future users is therefore considered a suitable way to progress sustainable schemes in locations as this site.

## 8.0 BEST PRACTICE MEASURES

### Construction Phase

- 8.1 The IAQM guidance provides a number of potential mitigation measures to reduce impacts from the construction phase. As a low risk of dust impacts from construction, earthworks and trackout activities was identified, mitigation measures are required. These have been adapted for the development site as summarised in Section 6.
- 8.2 These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by LBH.

### Operation Phase

- 8.3 Whilst there is not a requirement to mitigate operational impacts the proposed development as set out in Section 6 and 7 the Applicant is looking to comply with the LBH Air Quality Planning Guidance and IAQM Planning Guidance. The guidance recommends minimum best practice techniques for all developments in locations as this.
- 8.4 Potential best practice mitigation options are listed below, which will be supported by the development. viability.
- 1 Electric Vehicle Charging Point per dwelling with dedicated parking, or 1 charging point per 10 spaces (unallocated) - This shall be based on the best technology available at the time of planning approval
  - Travel plan (where required) including mechanisms for discouraging high emission vehicle use and encouraging the uptake of low emission fuels and technologies
  - A Welcome Pack available to all new residents online and as a booklet, containing information and incentives to encourage the use of sustainable transport modes from new occupiers
  - Car club provision within development or support given to local car club/eV car clubs
  - Green infrastructure/landscaping, such as additional planting or green walls utilising species that would aid absorption of pollutants; (Field Maple (*Acer campestre*), Crab Apple and Rowan) where necessary.
- 8.5 If the above techniques are appropriate and can be implemented into the scheme, this will **further** reduce potential air quality impacts associated with the proposed development.

### General Measures and Quantification

- 8.6 The majority of measures presented in this section have been taken from the Hillingdon Gateway Residential Travel Plan, with the exception of the contribution to improving public

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transportation links to the development. Please refer to the list of measures below, in Table 8.1.

- 8.7 For many of the below measures, in line with standard planning application practice, a 10% reduction in emissions is associated with the full implementation of a travel plan should be achievable.
- 8.8 With respect to emissions reductions resulting from investment in public transport (Measure No. 15), this will lead to a reduction in emissions of approximately 5% overall.

M-ID	Short Title	Physical Description	Target Sub-Fleet	Benefit Description	Cost (£)	Dist. %	I-NOx%	Notes
1	Electric Vehicle Charging Points	Encouraging sustainable travel, EV charging points will be provided up and beyond the London Plan standards (2016). 20% of parking bays will have EV charging points, with additional 40% having capacity for future conversion. Anticipate installing over 40 charging points initially.	1 / 3 / 5 / 7	EV charging points encourage vehicle owners to purchase low emission hybrid or full electric vehicles, reducing the overall impact of emissions from development related vehicular movements.	£100,000	0%	0%	This is a default measure and benefits on reducing emissions not possible to quantify at this stage / nor over the 5 year policy period
2	New/ Improved Walking and Cycling Routes	Significant improvements are proposed to the highway network immediately surrounding the site that will benefit pedestrians and cyclists.	1 & 5	Measures designed to enhance pedestrian/ cycle access and support a sustainable travel approach include: - The entrance to the site at the south eastern corner of the site takes the form of a gateway action as an extension of the high street, with landscaped public; - Widening/ modernising pedestrian islands across north, east and south arms of the junction to enhance safety and to provide additional space for wheelchair users, pedestrians with pushchairs, and cyclists; - Southbound approach from Long Lane North will be re-aligned to allow for the widening of the pedestrian crossing islands on the north and south junction arms; - Footway at the X90 / Oxford Tube bus stop along Freezeland Way will be widened to allow for a suitable bus shelter. Dropped kerbs will also be provided to allow for improved mobility impaired access.	N/A	0%	0%	This measure will not achieve a reduction of 3% of total NOx emissions and its quantification is not possible at this stage / over the period of 5 years
3	Improved Bus Stop	To be confirmed by the Transport Consultant			£10,000	0%	0%	It is not possible to quantify at this stage / nor over the 5 year policy period the reduction of NOx emissions associated with this measure
4	Up to 4 Car Club Bays	Proposed that four car club cars and provided within the site to support the development. It is envisaged that one car will be provided upon initial occupancy, with usage monitored and reported prior to implementation of a second vehicle.	5	Benefits of the car club include: - Reduced cost of owning a car, insuring a car, taxing a car etc.; - Convenience of booking car at short notice; - Those involved in the scheme choose walking, cycling and public transport as their mode of travel, using the car club when it is the best option.	£30,000	0%	0%	Minor reduction of total NOx emissions
5	Over 950 High Quality Cycle Parking Spaces	Cycle parking will meet the minimum standards set out within the London Plan - 1 space for 1 bedroom unit, 2 spaces for 2+ bedroom units Total of 657 cycle parking spaces will be provided.	5	Cycling measures will add to the measures of LBH Go Cycle Programme, which is being implemented to try and encourage more people to cycle and improve safety while providing better streets/ environment for everyone.	£70,000	0%	0%	This is a default measure and benefits on reducing emissions not possible to quantify at this stage / nor over the 5 year policy period

M-ID	Short Title	Physical Description	Target Sub-Fleet	Benefit Description	Cost (£)	Dist. %	I-NOx%	Notes
6	New Cycle Superhub On-site	The Hillingdon 'Cycle Hub' will include high quality, viable and conveniently located visitor cycle parking; In form of accessible stands; Include cycle/ Brompton hire facilities; Have CCTV; Repair and maintenance facilities; and Signage linking all sustainable travel routes.	1 / 3 / 5 / 7	The 'Cycle Hub' will benefit both new and existing local residents, and contribute to the Mayors Transport Strategy, which aims to increase cycling mode share across London from 1% (2001) to 5% (2026). MTS aims for 80% for Londoners trips to be by foot, cycle or public transport by 2041; Implementation will contribute towards: Increase number of residents cycling within the local area; Raise awareness and increase the visibility and appeal of cycling as mode of travel; Improve cycle security; Improve customer satisfaction with station and interchange facilities in the area.	£60,000	0%	0%	It is not possible to quantify at this stage / nor over the 5 year policy period the reduction of Nox emissions associated with this measure
7	Brompton/ Traditional Bike Hire Facilities	Traditional/ Brompton bike hire facilities to be provided in order to give residents and future residents access to 24/7 automated bike hire.	1 & 5	The Brompton Bike Hire station will target different journeys to the Central London cycle hire scheme, due to offering more flexibility in journey type and duration, at one simple low price. Docks allow people to take out bikes and use them for rolling 24hour period, as opposed to the sub-30 minute journeys with the Santander bicycle hire schemes. People can take bikes with them treating the bikes as if they were their own, taking them places of work etc. Traditional bike hire will also be provided. There will be a 50:50 split between Brompton and Traditional bikes.	£20,000	0%	0%	It is not possible to quantify at this stage / nor over the 5 year policy period the reduction of Nox emissions associated with this measure
8	Travel Plan Coordinator	Travel Plan Coordinator will be appointed prior to first occupation and will be responsible for managing and implementing the Travel Plan.	1 to 8	The TPC role will focus on: Day to day liaison with necessary stakeholders; Implementation of TP measures; Managing travel information; Distribution of a welcome pack to new residents; Promoting non-car travel through TP measures; Reporting progress to any TP stakeholders, including LBH; Managing the monitoring and progress of the Travel Plan targets.	£82,000	0%	0%	
9	3 years free car club membership		5		£45,000	0%	0%	



M-ID	Short Title	Physical Description	Target Sub-Fleet	Benefit Description	Cost (£)	Dist. %	I-NOx%	Notes
10	Oyster Card Credit	One Oyster Card per dwelling with credit of £40 will be distributed on occupation of each unit.	5	Measure is aimed at encouraging future residents to travel via sustainable means for localised trips. Assumed that future residents commuting to central London will be travelling via sustainable means regardless of this measure, due to impracticalities of travelling by private vehicle.	£45,000	0%	0%	
11	Monitoring Plan (TRICS/ iTRACE compliant)				£88,000	0%	0%	
12	Residential Travel Pack	Every household will be provided with a Residential Travel Pack promoting sustainable modes of transport and key services provided through the Travel Plan.	5	The RTP will contain information on the facilities within the development and nearby. The RTP will also include information on: - Access Initiatives; - Journey Planner Tools; - Key Services and Facilities; - Health Benefits of Sustainable Travel; - Working from home; and - How to join car clubs etc.	£40,000	0%	0%	Like other planning applications, a 10% reduction in emissions is associated with the full implementation of a travel plan (included in the final S106 sheet)
13	London Cycling Campaign Promotion	LCC promotes cycling locally, improves conditions for cyclists in their borough, organises leisure rides and social events.	1 / 3 / 5 / 7	Benefits include discounts at bike shops, exclusive cycle theft insurance packages, free third party insurance for damage or injury up to the value of £1m, access to local LCC borough groups with free legal advice.	£0	0%	0%	
14	Community Notice Boards	Provide travel and community information as well as events in the area. Boards will be placed in prominent locations across the site. Such events will provided future residents with: - Free bike checks from bicycle mechanics; - Overview of new route designs and plans and future consultation opportunities; - Advice from experts about different cycling opportunities available in the borough; and - Cycle skills training (on different bikes etc.).	5		£0	0%	0%	
15	Financial Contribution to Public Transport	Proposed that the developer will make a financial contribution towards bus improvements in the Hillingdon area. It is envisaged that the contribution will go towards increased frequency of service or potentially towards a new direct route running north-south along Long Lane towards Ruislip.	1 / 3 / 5 / 7	A significant bus contribution will significantly enhance local residents' access to local bus services and will enhance the feeling of a focal transport hub at Hillingdon Underground Station, nearby the site boundary. The service will be highly accessible to those living and working across the site and wider local area.	£1,365,000	5%	5%	

M-ID	Short Title	Physical Description	Target Sub-Fleet	Benefit Description	Cost (£)	Dist. %	I-NOx%	Notes
16	Selective Vehicle Detection (SVD)	Selective Vehicle Detection (SVD) measures will be put in place at the Hillingdon Circus junction.		SVD is a method of bus priority that allows buses to be progressed through traffic signals by selectively favouring buses' movement and changing traffic light sequences as buses approach. This helps to reduce bus journey times and improves reliability for passengers.	£30,000	5%	5%	

Table 8.1 List of Measures Aimed at Reducing Emissions from Hillingdon Gateway

## 9.0 CONCLUSIONS

- 9.1 Create Consulting Engineers Ltd was instructed by MB Hillingdon Ltd to undertake an Air Quality Assessment (AQA) for the Hillingdon Gardens development, in support of the proposed development comprising buildings between two and seven storeys to provide 551 residential units with other associated ancillary development.
- 9.2 Following the comments and remarks passed by the EHO Team from the LBH at different times, a revised Air Quality Assessment was undertaken to quantify pollutant levels across the site, consider its suitability for the proposed end-use and consider potential effects in the vicinity of the site.
- 9.3 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 earthworks, construction and trackout activities was predicted to be **negligible**.
- 9.4 The dispersion modelling results indicated that pollutant levels at sensitive locations across the site were below the relevant AQOs. The location is therefore considered suitable for residential use without the inclusion of mitigation methods to protect future users from poor air quality. However, due to exceedance at site boundary few best practice measures have been advised to improve the air quality.
- 9.5 The proposed development is wholly based on air source heat pumps. There are no gas systems, or systems with combustion processes being proposed. Therefore, development will not include any NO<sub>x</sub> or PM<sub>10</sub> emissions. However, for building emissions the proposed development has been predicted as Air Quality Neutral.
- 9.6 Predicted impacts on NO<sub>2</sub> and PM<sub>10</sub> concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at all sensitive receptor locations considered.
- 9.7 Following the proposed development within London, dispersion modelling results were compared with Air Pollution Exposure Criteria (APEC) contained within the London Councils Air Quality and Planning Guidance from the London Air Pollution Planning and the Local Environment (APPLE) working group, this showed that site falls under “**Category-B**” and the best practice measures have been considered within section 8.8.
- 9.8 The overall significance of potential impacts was therefore determined to be **not significant**, in accordance with the EPUK and IAQM guidance.

- 
- 9.9 Based on the assessment results based on the assessment results and implementation of best practice techniques, air quality is not considered a constraint to planning consent for the proposed development.

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## 11.0 REFERENCES

- i. *Holman et al. IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. 2014.*
- ii. *Moorcroft, Barrowcliffe. et al. Land-use Planning & Development Control: Planning for Air Quality. Institute of Air Quality Management, London. 2017.*
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[http://www.breeam.org/BREEAMInt2013SchemeDocument/content/12\\_pollution/po1\\_02.htm](http://www.breeam.org/BREEAMInt2013SchemeDocument/content/12_pollution/po1_02.htm)
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- v. *Moorcroft, Barrowcliffe. et al. Land-use Planning & Development Control: Planning for Air Quality. Institute of Air Quality Management, London. 2015.*
- vi. *Control of dust and emissions from construction and demolition: Best Guidance Practice. Greater London Authority and London Councils (2006).*
- vii. *Sustainable Design and Construction Supplementary Planning Guidance. Greater London Authority, 2014.*
- viii. *National Planning Policy Framework. Department of Communities and Local Government, 2019.*
- ix. *EPUK & IAQM Land-Use Planning and Development Control: Planning for Air Quality, London, 2017.*
- x. *Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and Institute of Air Quality Management, 2017*

## **APPENDICES**

## **APPENDIX A**



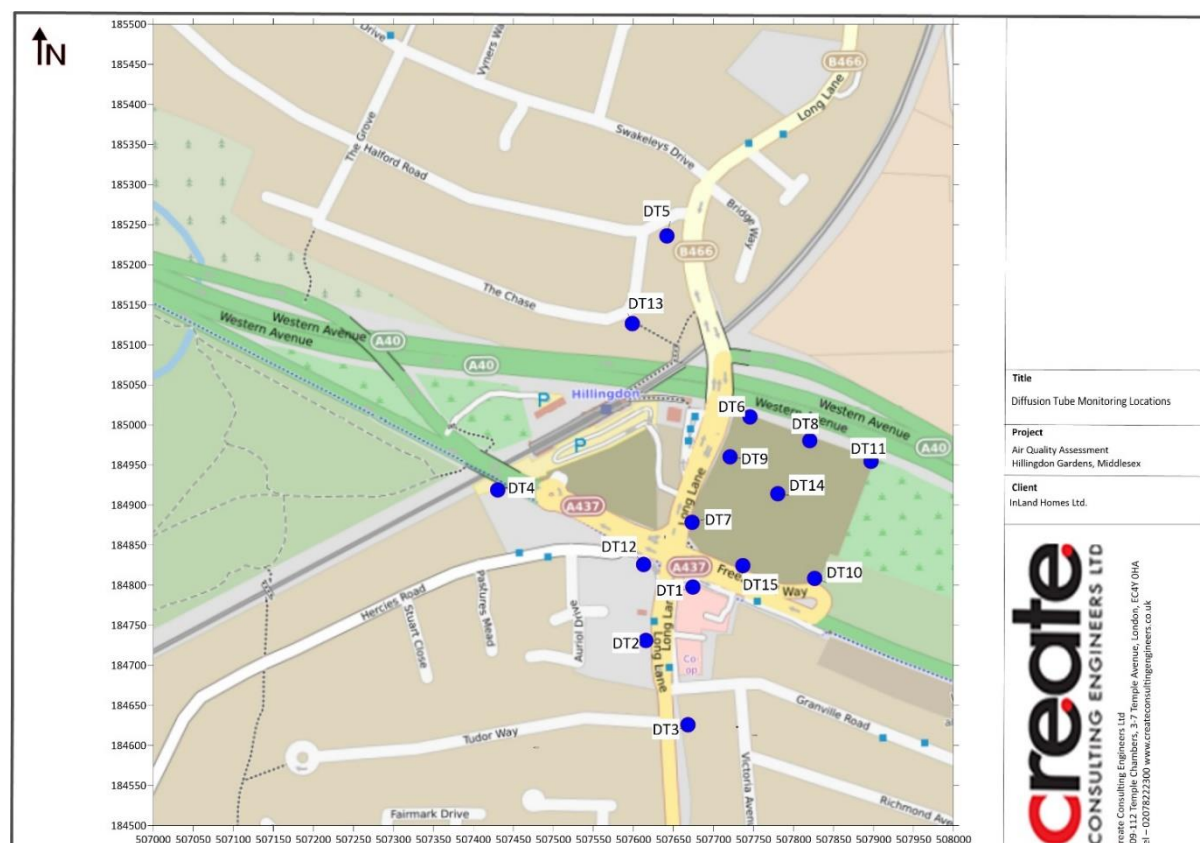
# Hillingdon Garden Diffusion Tube Results

Diffusion tube results from short and long term exposure table.

Location of Samples	December Mean NO <sub>2</sub> Concentration (in µg/m <sup>3</sup> )	January Exposure NO <sub>2</sub> Concentration (in µg/m <sup>3</sup> )	Difference between December and January Concentration (in %)
DT1	<u>43.01</u>	<u>45.36</u>	5.46%
DT2	35.94	<u>43.73</u>	21.67%
DT3	<u>40.30</u>	<u>50.73</u>	25.88%
DT4	29.08	38.25	31.53%
DT5	25	37.98	51.92%
DT6	7.87	36.27	360.86%
DT7	28.91	29.79	3.04%
DT8	26.39	30.43	15.30%
DT9	29.17	17.48	-40.07%
DT10	25.67	29.76	15.93%
DT11	28.88	-	-
DT12	29.62	35.46	19.71%
DT13	28.95	32.87	13.54%
DT14	27.50	30.12	9.52%
DT15	34.81	32.54	-6.52%

Underlined values exceeds the annual objective of over 40 µg/m<sup>3</sup>. The diffusion tubes placed in December were setup on the 4<sup>th</sup> December and January on the 8<sup>th</sup> January.

## Diffusion Tube Locations



## LABORATORY ANALYSIS REPORT

### NITROGEN DIOXIDE IN DIFFUSION TUBES BY U.V.SPECTROPHOTOMETRY

**REPORT NUMBER** 001416R  
**BOOKING IN REFERENCE** 001416  
**DESPATCH NOTE** 76048  
**CUSTOMER** Create Consulting Engineers LTD Attn: Claire Seymour  
15 Princes Street  
Norwich  
NR3 1AF  
**DATE SAMPLES RECEIVED** 11/02/2020

Location	Sample Number	Exposure Data		Time* (hr.)	$\mu\text{g}/\text{m}^3$ *	ppb *	$\mu\text{g NO}_2$ on tube
		Date On*	Date Off*				
DT3	1510265	20/12/2019	06/02/2020	1152.63	50.73	26.48	4.25
DT2	1510266	20/12/2019	06/02/2020	1152.53	43.71	22.81	3.66
DT1	1510269	20/12/2019	06/02/2020	1152.43	45.36	23.67	3.80
DT12	1510270	20/12/2019	06/02/2020	1152.33	35.46	18.51	2.97
DT4	1510250	20/12/2019	06/02/2020	1152.25	38.25	19.96	3.20
DT13	1510252	20/12/2019	06/02/2020	1152.07	32.87	17.15	2.75
DT5	1510254	20/12/2019	06/02/2020	1151.92	37.98	19.82	3.18
DT6	1510280	20/12/2019	06/02/2020	1153.10	36.27	18.93	3.04
DT7	1510276	20/12/2019	06/02/2020	1153.25	29.79	15.55	2.50
DT8	1510260	20/12/2019	06/02/2020	1153.00	30.43	15.88	2.55
DT9	1510277	20/12/2019	06/02/2020	1153.15	17.48	9.12	1.47
DT10	1510273	20/12/2019	06/02/2020	1153.43	29.76	15.53	2.50
DT14	1510256	20/12/2019	06/02/2020	1151.17	30.12	15.72	2.52
DT15	1510271	20/12/2019	06/02/2020	1153.50	32.54	16.98	2.73
Laboratory Blank				1153.50	0.19	0.10	0.016

**Comment: Results are not blank subtracted**

**Tubes were exposed for longer than the recommended time. Results may be compromised.**

**Results have been corrected to a temperature of 293 K (20°)**

**Overall M.U.**  $\pm 9.7\%$

**Limit of Detection** 0.030  $\mu\text{gNO}_2$

The reported expanded uncertainty is based on a standard uncertainty multiplied by a factor of  $k=2$ , providing a level of confidence of approximately 95%. Uncertainty of measurement has not been applied to the reported results.

**Tube Preparation:** 20% TEA / Water

**Analyst Name** Maggie Olszewska

Analysed on UV CARY3

**Report Checked By** Adam Robinson

**Date of Analysis** 20/02/2020

**Date of Report** 20/02/2020

**Analysis carried out in accordance with documented in-house Laboratory Method GLM7**

Samples have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures. Results within this report relate only to samples as received. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*), these calculations and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.

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L. Gates, Laboratory Manager

## LABORATORY ANALYSIS REPORT

### NITROGEN DIOXIDE IN DIFFUSION TUBES BY U.V.SPECTROPHOTOMETRY

**REPORT NUMBER** O00547R  
**BOOKING IN REFERENCE** O00547  
**DESPATCH NOTE** 76048  
**CUSTOMER** Create Consulting Engineers LTD Attn: Claire Seymour  
15 Princes Street  
Norwich  
NR3 1AF  
**DATE SAMPLES RECEIVED** 16/01/2020

Location	Sample Number	Exposure Data		Time* (hr.)	$\mu\text{g}/\text{m}^3$ *	ppb *	$\mu\text{g NO}_2$ on tube
		Date On*	Date Off*				
DT15	1510255	20/12/2019	14/01/2020	602.00	34.81	18.17	1.52
DT10	1510274	20/12/2019	14/01/2020	602.00	25.67	13.40	1.12
DT7	1510275	20/12/2019	14/01/2020	602.00	28.91	15.09	1.27
DT9	1510278	20/12/2019	14/01/2020	601.92	29.17	15.22	1.28
DT6	1510279	20/12/2019	14/01/2020	601.63	7.87	4.11	0.34
DT8	1510261	20/12/2019	14/01/2020	601.62	26.39	13.77	1.15
DT11	1510263	20/12/2019	14/01/2020	601.72	28.88	15.07	1.26
DT3	1510264	20/12/2019	14/01/2020	601.55	40.30	21.03	1.76
DT2	1510267	20/12/2019	14/01/2020	601.48	35.94	18.76	1.57
DT1	1510268	20/12/2019	14/01/2020	601.40	43.01	22.45	1.88
DT12	1510249	20/12/2019	14/01/2020	601.17	29.62	15.46	1.29
DT4	1510251	20/12/2019	14/01/2020	601.28	29.08	15.18	1.27
DT13	1510253	20/12/2019	14/01/2020	602.12	28.95	15.11	1.27
DT5	1510258	20/12/2019	14/01/2020	601.00	25.00	13.05	1.09
DT14	1510257	20/12/2019	14/01/2020	600.00	27.50	14.35	1.20

Laboratory Blank				602.12	0.23	0.12	0.010
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**Comment: Results are not blank subtracted**

**Results have been corrected to a temperature of 293 K (20°)**

**Overall M.U.**  $\pm 9.7\%$

**Limit of Detection** 0.028 $\mu\text{gNO}_2$

The reported expanded uncertainty is based on a standard uncertainty multiplied by a factor of  $k=2$ , providing a level of confidence of approximately 95%. Uncertainty of measurement has not been applied to the reported results.

**Tube Preparation:** 20% TEA / Water

Analysed on UV CARY1

**Analyst Name** Aaron Nolan

**Report Checked By** Adam Robinson

**Date of Analysis** 24/01/2020

**Date of Report** 24/01/2020

**Analysis carried out in accordance with documented in-house Laboratory Method GLM7**

Samples have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures. Results within this report relate only to samples as received. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*), these calculations and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.

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L. Gates, Laboratory Manager

## LABORATORY ANALYSIS REPORT

### NITROGEN DIOXIDE IN DIFFUSION TUBES BY U.V.SPECTROPHOTOMETRY

**REPORT NUMBER** O02020R  
**BOOKING IN REFERENCE** O02020  
**DESPATCH NOTE** 77113  
**CUSTOMER** Create Consulting Engineers LTD Attn: Claire Seymour  
15 Princes Street  
Norwich  
NR3 1AF  
**DATE SAMPLES RECEIVED** 09/03/2020

Location	Sample Number	Exposure Data		Time* (hr.)	$\mu\text{g}/\text{m}^3$ *	ppb *	$\mu\text{g NO}_2$ on tube
		Date On*	Date Off*				
DT7	1540229	05/02/2020	05/03/2020	696.00	30.64	15.99	1.55
DT9	1540230	05/02/2020	05/03/2020	696.00	28.92	15.09	1.46
DT6	1540231	05/02/2020	05/03/2020	696.00	29.38	15.33	1.49
DT8	1540232	05/02/2020	05/03/2020	696.00	25.64	13.38	1.30
DT1	1540237	05/02/2020	05/03/2020	696.00	39.44	20.58	2.00
DT3	1540238	05/02/2020	05/03/2020	696.00	38.13	19.90	1.93
DT2	1540239	05/02/2020	05/03/2020	696.00	34.20	17.85	1.73
DT12	1540240	05/02/2020	05/03/2020	696.00	27.52	14.36	1.39
DT4	1540241	05/02/2020	05/03/2020	696.00	30.64	15.99	1.55
DT11	1540235	05/02/2020	05/03/2020	696.00	25.22	13.17	1.28
DT14	1540236	05/02/2020	05/03/2020	696.00	21.67	11.31	1.10
DT15	1540242	05/02/2020	05/03/2020	696.00	26.37	13.76	1.33
DT10	1540243	05/02/2020	05/03/2020	696.00	29.26	15.27	1.48
DT13	1540244	05/02/2020	05/03/2020	696.00	66.58	34.75	3.37
Laboratory Blank				696.00	0.08	0.04	0.004

**Comment: Results are not blank subtracted**

**Results have been corrected to a temperature of 293 K (20°)**

**Overall M.U.**  $\pm 9.7\%$

**Limit of Detection**

0.028 $\mu\text{gNO}_2$

The reported expanded uncertainty is based on a standard uncertainty multiplied by a factor of  $k=2$ , providing a level of confidence of approximately 95%. Uncertainty of measurement has not been applied to the reported results.

**Tube Preparation:** 20% TEA / Water

**Analyst Name** Aaron Nolan

Analysed on UV CARY1

**Report Checked By**

Louise Mathers

**Date of Analysis** 12/03/2020

**Date of Report**

12/03/2020

**Analysis carried out in accordance with documented in-house Laboratory Method GLM7**

Samples have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures. Results within this report relate only to samples as received. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*), these calculations and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.

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**REPORT OFFICIALLY CHECKED**

Gradko International Ltd  
This signature confirms the authenticity of these results  
Signed.....  
L. Gates, Laboratory Manager