7.0 AIR QUALITY

Introduction

7.1 This chapter of the ES assesses the likely significant effects of the Development with respect to Air Quality.

Policy Context

The Air Quality Strategy

7.2 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK[i]. The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.

7.3 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM)[ii]. This requires local authorities to regularly and systematically review and assess air quality within their boundary, and appraise development and transport plans against these assessments. The relevant NAQOs for LAQM are prescribed in the Air Quality (England) Regulations 2000[iii] and the Air Quality (Amendment) (England) Regulations 2002[iv].

7.4 Where an objective is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

7.5 The Local Air Quality Management Technical Guidance 2016, issued by the Department for Environment, Food and Rural Affairs (Defra) for Local Authorities provides advice as to where the NAQOs apply[v]. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM_{10}) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure.

Air Quality EU Limit Values

7.6 The Air Quality Standards Regulations 2010 implements the European Union's Directive on ambient air quality and cleaner air for Europe (2008/50/EC), and includes limit values for NO_2[vi]. These limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with. The compliance date for the NO_2 EU Limit Value was 1 January 2010, five years later than the date for the NAQO.

7.7 Directive 2008/50/EC consolidated the previous framework directive on ambient air quality assessment and management and its first three daughter directives. The limit values remained unchanged, but it now allows Member States a time extension for compliance, subject to European Commission (EC) approval.

7.8 The Directive limit values are applicable at all locations except:

- Where members of the public do not have access and there is no fixed habitation;
- On factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and
- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

Human Health Air Quality Objectives

7.9 The NAQOs for NO_2 and PM_{10} set out in the Air Quality Regulations (England) 2000 and the Air Quality (England) (Amendment) Regulations 2002, are shown Table 7.1.

Table 7.1: NO_2 and PM_{10} Objectives

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO_2)	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year
	Annual mean	40µg/m^3
Particulate Matter (PM_{10})	24-hour mean	50µg/m^3 not to be exceeded more than 35 times a year
	Annual mean	40µg/m^3

7.10 The objectives for NO_2 and PM_{10} were to have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Analysis of long-term monitoring data suggests that if the annual mean NO_2 concentration is less than 60µg/m^3 then the one-hour mean NO_2 objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved[vii].

7.11 The Air Quality Strategy 2007 includes an exposure reduction target for smaller particles known as $PM_{2.5}$[viii]. These are an annual mean target of 25µg/m^3 by 2020 and an average urban background exposure reduction target of 15% between 2010 and 2020.

7.12 The ambient air quality and cleaner air for Europe directive (2008/50/EC) was adopted in May 2008, and includes a national exposure reduction target, a target value and a limit value for $PM_{2.5}$, shown in Table 7.2. The UK Government transposed this new directive into national legislation in June 2010.

Table 7.1: $PM_{2.5}$ Objectives

	Time Period	Objective	To be Achieved by
UK Objectives	Annual mean	25µg/m^3	2020
	3 year running annual mean	15% reduction in concentrations measured at urban background Sites	Between 2010 and 2020
European Obligations	Annual mean	Target value of 25µg/m^3	2010
	Annual mean	Limit value of 25µg/m^3	2015
	Annual mean	Stage 2 indicative Limit value of 20µg/m^3	2020
	3 year Average Exposure Indicator (AEI) (a)	Exposure reduction target relative to the AEI depending on the 2010 value of the 3 year AEI (ranging from a 0% to a 20% reduction)	2020
	3 year Average Exposure Indicator (AEI)	Exposure concentration obligation of 20µg/m^3	2015

Note: (a) The 3 year annual or AEI is calculated from the $PM_{2.5}$ concentration averaged across all urban background monitoring locations in the UK e.g. the AEI for 2010 is the mean concentration measured over 2008, 2009 and 2010.

National Planning Policy Framework

7.13 The National Planning Policy Framework (NPPF) was published in March 2012[ix]. It sets out the Government's planning policies for England and how they are expected to be applied. In relation to conserving and enhancing the natural environment, paragraph 109 states that:

> *"The planning system should contribute to and enhance the natural and local environment by… preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."*

7.14 Paragraph 124, also states that:

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

7.15 Paragraph 203 goes on to say:

> *"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."*

Planning Practice Guidance

7.16 The Planning Practice Guidance (PPG) was published in March 2014 to support the NPPF[x]. Paragraph 001, Reference 32-001-20140306 of the PPG provides a summary as to why air quality is a consideration for planning:

> *"… Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit… The local air quality management (LAQM) regime requires every district and unitary authority to regularly review and assess air quality in their area. These reviews identify whether national objectives have been, or will be, achieved at relevant locations, by an applicable date… If national objectives are not met, or at risk of not being met, the local authority concerned must declare an air quality management area and prepare an air quality action plan… Air quality can also affect biodiversity and may therefore impact on our international obligations under the Habitats Directive… Odour and dust can also be a planning concern, for example, because of the effect on local amenity."*

7.17 Paragraph 002, Reference 32-002-20140306, of the PPG concerns the role of Local Plans with regard to air quality:

> *"… Drawing on the review of air quality carried out for the local air quality management regime, the Local Plan may need to consider:*
>
> *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments;*
>
> *the impact of point sources of air pollution; and*
>
> *ways in which new development would be appropriate in locations where air quality is or likely to be a concern and not give rise to unacceptable risks from pollution. This could be through, for example, identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable."*

7.18 Paragraph 005, Reference 32-005-20140306, of the PPG identifies when air quality could be relevant for a planning decision:

> *"… When deciding whether air quality is relevant to a planning application, considerations could include whether the development would:*
>
> *Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*
>
> *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area.*
>
> *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.*
>
> *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.*

> *Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites."*

7.19 Paragraph 007, Reference 32-007-20140306, of the PPG provides guidance on how detailed an assessment needs to be:

> *"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific."*

7.20 Paragraph 008, Reference 32-008-20140306, of the PPG provides guidance on how an impact on air quality can be mitigated:

> *"Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact… Examples of mitigation include:*
>
> *the design and layout of development to increase separation distances from sources of air pollution;*
>
> *using green infrastructure, in particular trees, to absorb dust and other pollutants;*
>
> *means of ventilation;*
>
> *promoting infrastructure to promote modes of transport with low impact on air quality;*
>
> *controlling dust and emissions from construction, operation and demolition; and*
>
> *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development."*

7.21 Paragraph 009, Reference 32-009-20140306, of the PPG provides guidance on how considerations about air quality fit into the development management process by means of a flowchart. The final two stages in the process deal with the results of the assessment:

> *"Will the proposed development (including mitigation) lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations." If Yes:*

"Consider how the proposal could be amended to make it acceptable or, where not practicable, consider whether planning permission should be refused."

The London Plan

7.22 The London Plan 2016 provides strategic planning guidance for Greater London[xi]. Each Borough's development plans must be in 'general conformity' with it.

7.23 The Plan includes Policy 7.14 (Improving Air Quality) which states that development proposals should:

- Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the Greater London Authority and London Councils;
- Where biomass boilers are included, set out a detailed air quality assessment that should forecast pollutant concentrations. Permission should only be granted if no adverse impacts from biomass are identified; and
- Aim to be 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as AQMAs).

7.24 Boroughs and others with relevant responsibilities should also have policies that:

- Seek reductions in levels of pollutants referred to in the Government's National Air Quality Strategy having regard to the Mayor's Air Quality Strategy; and
- Take account of the findings of the Air Quality Review and Assessments and Action Plans, in particular where AQMAs have been designated.

7.25 The Mayor will work with strategic partners to ensure the spatial, transport and design policies of the London Plan support his Air Quality Strategy.

7.26 The Plan also includes Policy 8.2 (Planning Obligations) which states that the Mayor will provide guidance for boroughs and other partners on the preparation of frameworks for negotiations on planning obligations reflecting strategic priorities including the improvement of Air Quality.

7.27 Supplementary Planning Guidance (SPG) on 'Sustainable Design and Construction' adopted in April 2014 forms part of the Implementation Framework for the London Plan[xii]. For air pollution, the Mayor's Priorities are stated as:

- Developers are to design their schemes so that they are at least 'air quality neutral';
- Developments should be designed to minimise the generation of air pollution;
- Developments should be designed to minimise and mitigate against increased exposure to poor air quality;

- Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants set out in Appendix 7 (of the document); and
- Developers and contractors should follow the guidance set out in the SPG on 'The control of dust and emissions during construction and demolition' when constructing their development.

7.28 The SPG on 'Sustainable Design and Construction' requires that air quality assessments are prepared for major developments where the development:

- is located within an AQMA;
- is likely to result in a new air pollution exceedance;
- is located within 150 m of a sensitive receptor (schools, hospitals, care homes, nurseries, residential development);
- will bring sensitive receptors into an area of poor air quality;
- includes biomass boilers and/or combined heat and power; and
- involves waste management/treatment activities, mineral extraction or any other general industrial combustion process.

7.29 For major developments that meet the above criteria, an air quality assessment is required to be submitted with the planning application and include:

- a review of air quality around the development site using existing air quality monitoring and/or modelling data;
- air quality dispersion modelling data carried out in accordance with the London Councils Air Quality and Planning Guidance;
- an indication of the number of people (receptors) which will be exposed to poor air quality as a result of the development, and show their location on a map;
- an assessment of the impact on air quality during the construction phase and detailed mitigation methods for controlling dust and pollution emissions in line with the adopted SPG on 'The control of dust and emissions from construction and demolition';
- an outline and justification of mitigation measures associated with the design, location and operation of the development in order to reduce air pollution and exposure to poor air quality; and
- a maintenance regime for any combustion equipment or mitigation measures.

7.30 The SPG on 'Sustainable Design and Construction' provides guidance on:

- Minimising air quality emissions from location, transport, construction and demolition, and design and occupation;
- Protecting internal air quality;

- What is meant by 'air quality neutral';
- Emissions standards for combustion plant; and
- Offsetting provisions.

7.31 'Air quality neutral' applies across London as a whole and emission benchmarks have been proposed in terms of buildings' operation and transport emissions in order to meet this criteria. It is understood that the benchmark should be capable of being met without the need for significant additional mitigation. The emission benchmarks are summarised in Appendix 7.2.

7.32 Where individual and/or communal gas fired boilers are installed in commercial and domestic buildings they should achieve a NO_x rating of less than 40 mgNO_x/kWh. If the particular combustion equipment is not known at the time of the planning application, developers are required to provide a written statement of their commitment and ability to meet the emissions standards within their Air Quality Assessments. Emissions standards are provided for solid biomass boilers and CHP plants (see Appendix 7.3).

7.33 Where developments do not meet the air quality neutral benchmarks, it is suggested that appropriate on-site mitigation measures will be required to off-set any excess in emissions. Measures could include:

- Green planting/walls and screens;
- Upgrade or abatement work to combustion plant;
- Retro-fitting abatement technology for vehicles and flues; and
- Exposure reduction.

7.34 In addition, as part of the Implementation Framework for the London Plan, a SPG on 'The control of dust and emissions during construction and demolition' was published in July 2014[xiii].

7.35 This SPG requires an 'Air Quality and Dust Risk Assessment' to be submitted at the time of a planning application; with an Air Quality and Dust Management Plan submitted prior to the commencement of works.

Mayor's Air Quality Strategy

7.36 The Mayor's Air Quality Strategy (2010) sets out policies to improve air quality in London, and includes the following measures[xiv]:

- Ensuring that public transport becomes cleaner;
- Reducing traffic growth by improving public transport and encouraging developers to make easy access to public transport in new developments; and

- Introduction of Phase 3 of the Low Emission Zone (LEZ) in 2012 to cover PM_{10} emissions from minibuses and heavier Light Goods Vehicles (LGVs), and a LEZ Nitrogen Oxides (NO_x) standard from 2015.

7.37 Policy 7 on 'Using the planning process to improve air quality' aims to ensure that no new development has a negative impact on air quality in London. It states that the Mayor will use his planning powers to:

- Develop a check list to guide boroughs and developers in the assessment of potential emissions from new developments;
- Minimise increased exposure to existing poor air quality, particularly in AQMAs and where developments are to be used by large numbers of vulnerable people;
- Ensure air quality benefits are realised through planning conditions and Section 106 agreements; and
- A package of non-transport policy measures is also proposed to reduce localised pollution sources.

Local Policy

London Borough of Hillingdon Local Plan

7.38 The LBH Local Plan is formed of several documents: Development Plan, Local Plan Part 1, Local Plan Part 2, Supplementary planning documents and guidance, Unitary Development Plan and an Area action plan[xv]. The documents that include strategic objectives and policies relevant to air quality are detailed below.

7.39 The LBH Local Plan Part 1 was adopted in November 2012 and comprises strategic policies that set out the overall and broad locations of growth up to 2026. The Plan includes the spatial vision, strategic objectives as well as core policies and an implementation framework. Throughout the plan there is emphasis on improving air quality within the borough.

7.40 The plan includes a strategic objective to improve air quality. Objective SO11 aims to:

> *"address the impacts of climate change, and minimise emissions of carbon and local air quality pollution from new development and transport."*

7.41 Several policies in the Local Plan Part 1 address air quality. Policy BE1: Built Environment states:

"The Council will require all new development to improve and maintain the quality of the built environment in order to create successful and sustainable neighbourhoods, where people enjoy living and working and that serve the long-term needs of all residents. All new developments should:

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

7.42 Policy EM1: Climate Change and Mitigation states:

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

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

7.43 Policy EM8: Land, Water, Air and Noise states:

"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."

7.44 The plan also includes a framework for how these policies will be implemented.

London Borough of Hillingdon Supplementary Planning Guidance

7.45 The Air Quality Supplementary Planning guidance was adopted in May 2002[xvi]. This SPG aims to:

> *"i. To identify those circumstances when an air quality assessment will be required to accompany a development proposal.*
>
> *ii. To provide technical guidance on the process of air quality assessment.*
>
> *iii. To provide guidance on the circumstances when air quality conditions and S106 planning obligations will be sought in accordance with national guidance and Hillingdon's UDP policies for air quality. The guidance is aimed at ensuring that air quality has been considered in enough depth and to help minimise any potential impacts."*

London Borough of Hillingdon Air Quality Action Plan

7.46 The Air Quality Action Plan for the LBH was adopted in 2004[xvii]. The plan contains several packages of measures. The details of these are presented below:

- Package to reduce emissions from road transport including switching to cleaner technologies, tackling through traffic and promotion of cleaner vehicle technology.
- Package to deal with emissions from specific sources within the Borough including measures specific to Heathrow Airport and measures concerning local industries and other businesses.
- Package to promote more effective use of resources in the Borough including improving eco-efficiency of current and future developments, including properties owned or run by the Council.
- Package of more general actions including the implementation of Mayors Air Quality Strategy in the Borough.

Assessment Methodology

Scope of Assessment

7.47 The assessment provided in this chapter describes existing air quality within the study area, considers the suitability of the Site for residential development, and assesses the impact of construction and operational activities on air quality in the surrounding area. The main air pollutants of concern related to construction are dust and fine Particulate Matter (PM_{10}), and for road traffic and railway emissions are Nitrogen Dioxide (NO_2) and Particles (PM_{10} and $PM_{2.5}$).

7.48 Stationary locomotives can give rise to high short-term sulphur dioxide (SO_2) near railway stations[xviii]. However, no relevant exposure was identified within 15 m of possible locations for stationary locomotives and therefore SO_2 emissions have been scoped out of this assessment.

7.49 An energy centre is proposed to be installed as part of the Development. An assessment of the emissions has been undertaken to evaluate the potential air quality impacts of emissions from the proposed energy centre and demonstrate that the proposed stack height is adequate to sufficiently disperse emissions.

7.50 An assessment to evaluate if the proposed development is 'Air Quality Neutral' in terms of transport and building emissions has also been undertaken (Appendix 7.4).

Consultation

7.51 Consultation has been carried out with the London Borough of Hillingdon (LBH) Sustainability Officer, Ian Thynne (13th May 2016), regarding the Development scoping opinion and to discuss the specific methodology (Appendix 7.5).

Existing Conditions

7.52 Information on existing air quality has been obtained by collating the results of monitoring carried out by LBH. Background concentrations for the Site have been defined using the national pollution maps published by Defra[xix]. These cover the whole country on a 1x1 km grid. These are the standard methods by which background conditions are assessed.

Assessing Construction Impacts

7.53 Emissions from Construction Phase traffic will not have a significant effect on local air quality as the additional traffic movements will average less than 25 Heavy Duty Vehicles per day (Annual Average Daily Traffic) over the construction period. Emissions from non-road mobile machinery will need to comply with the requirements of Low Emission Zone for NRMM (NRMM).

7.54 During demolition and construction the main potential effects are dust annoyance and locally elevated concentrations of PM_{10}. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.

7.55 Separation distance is also an important factor. Large dust particles (greater than 30µm), responsible for most dust annoyance, will largely deposit within 100 m of sources. Intermediate particles (10-30µm) can travel 200 – 500 m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1 km; however, the impact on the short-term concentrations of PM_{10} occurs over a shorter distance. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

7.56 The SPG on 'The control of dust and emissions during construction and demolition'[xx] outlines the risk evaluation to be undertaken based on the site evaluation process set out in the Institute of Air Quality Management (IAQM) 2014 guidance on the assessment of dust from demolition and construction[xxi].

7.57 In accordance with this SPG, the dust emission magnitude is defined as either large, medium or small (Table 7.3) taking into account the general activity descriptors on site and professional judgement.

7.58 The sensitivity of the study area to construction dust impacts is defined as high, medium or low (Table 7.4), taking into account professional judgement.

Table 7.2: Criteria for Dust Emission Magnitude

Dust Emission Magnitude	Activity
Large	**Demolition** >50,000 m^3 building demolished, dusty material (i.e. concrete), on-site crushing/screening, demolition >20 m above ground level
	Earthworks >10,000 m^2 site area, dusty soil type (i.e. clay), >10 earth moving vehicles active simultaneously, >8 m high bunds formed, >100,000 tonnes material moved
	Construction >100,000 m^3 building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty soil type (i.e. clay), >100 m unpaved roads
Medium	**Demolition** 20,000 – 50,000 m^3 building demolished, dusty material (i.e. concrete) 10 – 20 m above ground level
	Earthworks

Dust Emission Magnitude	Activity
	2,500 – 10,000 m^2 site area, moderately dusty soil (i.e. silt), 5 – 10 earth moving vehicles active simultaneously, 4 m – 8 m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 – 100,000 m^3 building volume, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material, 50 – 100 m unpaved roads
Small	**Demolition** <20,000 m^3 building demolished, non-dusty material, <10 m above ground level, work in winter
	Earthworks <2,500 m^2 site area, non-dusty soil, <5 earth moving vehicles active simultaneously, <4 m high bunds, <20,000 tonnes material moved
	Construction <25,000 m^3, non-dusty material
	Trackout <10 HDVs out / day, non-dusty soil, < 50 m unpaved roads

Table 7.3: Area Sensitivity Definitions

Area Sensitivity	People and Property Receptors	Ecological Receptors
High	>100 dwellings, hospitals, schools, care homes within 50 m 10 – 100 dwellings within 20 m Museums, car parks, car showrooms within 50 m PM_{10} concentrations approach or are above the daily mean objective.	National or Internationally designated site within 20 m with dust sensitive features / species present
Medium	>100 dwellings, hospitals, schools, care homes within 100m 10 – 100 dwellings within 50 m Less than 10 dwellings within 20 m Offices/shops/parks within 20 m	National or Internationally designated site within 50 m with dust sensitive features / species present Nationally designated site or particularly important plant species within 20 m

Area Sensitivity	People and Property Receptors	Ecological Receptors
	PM_{10} concentrations below the daily mean objective.	
Low	>100 dwellings, hospitals, schools, care homes 100 –350 m away 10 – 100 dwellings within 50 – 350 m Less than 10 dwellings within 20 – 350 m Playing fields, parks, farmland, footpaths, short term car parks, roads, shopping streets PM_{10} concentrations well below the daily mean objective.	Nationally designated site or particularly important plant species 20 – 50 m Locally designated site with dust sensitive features within 50 m

7.59 Based on the dust emission magnitude and the area sensitivity, the risk of dust impacts is then determined (Table 7.5), taking into account professional judgement.

Table 7.4: Risk of Dust Impacts

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

7.60 Based on the risk of dust impacts, appropriate mitigation is selected from the guidance according to the identified level of risk.

Significance Criteria

7.61 The construction impact significance criteria are based on the SPG on 'The control of dust and emissions during construction and demolition'. The guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations.

7.62 With appropriate mitigation in place, the residual effect of construction impacts on air quality is always assessed as not significant.

Operational Phase Road Traffic Impacts

Sensitive Locations

7.63 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. For the annual mean and daily mean objectives that are the focus of this assessment, sensitive receptors will generally be residential properties, schools, nursing homes, etc. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested, and where there is a combined effect of several road links.

7.64 Based on the above criteria, one commercial property (R1) and thirteen existing residential properties (R2 to R14) have been identified for the assessment. The locations of existing residential receptors were chosen to represent locations where impacts from road traffic related to the Development are likely to be the greatest, i.e. as a result of Development traffic at junctions. The selected locations are therefore considered robust to be able to identify the likely significant effects on air quality as a result of development traffic. These locations are described in Table 7.6. Receptors were modelled at a height of 1.5 m and 4.5 m representing ground and first floor exposure (shown in Appendix 7.13, Figure 7.13.1). In addition, 3 proposed receptors have been chosen (CR1 – CR3) to represent future residential receptors expected from the committed developments, adjacent to the Site. Such proposed receptors were modelled at a height of 1.5 m, 4.5 m and 7.5 m representing ground to second floor exposure (shown in Appendix 7.13, Figure 7.13.2).

Table 7.5: Description of Receptor Locations

Receptor	Height (m)	Location
R1	1.5	Tesco, Bulls Bridge Industrial Est, Hayes Rd
R2	1.5	5 Watersplash Ln
R3	1.5	1 N Hyde Gardens
R4	1.5	218 Nestles Ave
R5	1.5	12 Harold Ave, Hayes
R6	1.5	90 N Hyde Rd
R7	1.5	2 Harold Ave, Hayes
R8	1.5	134 Nestles Ave
R9	1.5	Asa Court, N Hyde Road
R10	4.5	4 Northfield Parade, Station Road,
R11	1.5	1 Bedwell Gardens,
R12	1.5	81 Bedwell Gardens
R13	1.5	110C Cleave Ave

Receptor	Height (m)	Location
R14	1.5	112A Cleave Ave
CR 1	1.5 to 7.5	No.1 Nestle Avenue ('Precis Site')
CR 2	1.5 to 7.5	No.1 Nestle Avenue ('Precis Site')
CR 3	1.5 to 7.5	No.1 Nestle Avenue ('Precis Site')

7.65 Concentrations have also been predicted within the Site at four future residential receptors (Table 7.7), such proposed receptors were modelled at a height of 1.5 m to 10.5 m representing ground to third floor exposure (shown in Figure 7.11.2).

Table 7.6: Proposed Receptors Description

Receptor	Height (m)	Location
B9	1.5 to 10.5	Building B9
C6	1.5 to 7.5	Building C6
D3	1.5 to 7.5	Building D3
E1	1.5 to 10.5	Building E1

7.66 Concentrations have also been predicted at three monitoring locations within the vicinity of the Development in order to verify the modelled results in order to verify the modelled results (see Appendix 7.6 for further details on the verification method).

Road Traffic Impact Predictions

7.67 Predictions have been carried out using the ADMS-Roads dispersion model (v4.0.1.0). The model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the proportion of Heavy Duty Vehicles (HDVs), road characteristics (including road width), and the vehicle speed. It also requires meteorological data. The model has been run using 2015 meteorological data from the Heathrow Airport monitoring station, which is considered suitable for this area.

7.68 AADT flows and the proportions of HDVs, for roads within 250 m of the Site and monitoring sites have been provided by the project transport consultant. Traffic data used in this assessment is summarised in Appendix 7.7. Since the road traffic modelling was undertaken, there has been a very small change in the employment floorspace (around 300sqm) and calculations to estimate the daily traffic flows from the peak hour flows have been amended. This has resulted in a reduction in the with development traffic flows compared to those that have been modelled on all links apart from Nestles Avenue and Harold Avenue, which remain the same.

7.69 As the flows are lower, the road traffic modelling assessment has not been repeated as the results are considered to be robust. However, if the new flows were to be remodelled then there would be a reduction in the development impact compared to what is predicted in this ES chapter.

7.70 Traffic emissions were calculated using the Emission Factor Toolkit (EFT) v7.0, which utilises NO_x emission factors taken from the European Environment Agency (EEA) COPERT 4 (v11) emission tool. The traffic data were entered into the EFT, along with speed data to provide combined emission rates for each of the road links entered into the model.

7.71 Emissions from railway lines located in close proximity to the Site have been taken from the 2010 London Atmospheric Emissions Inventory (LAEI)[xxii]. $PM_{2.5}$ emissions were estimated as a fraction of the particles emissions derived from EMEP/EEA Air Pollutant Emissions Guidebook emissions factors[xxiii]. Nitrogen oxides and particulates emissions used in this assessment are summarised in Appendix 7.8. Railway emissions were assumed to be the same for baseline and future years, although the railway is expected to be electrified in the future.

7.72 Future traffic data for the year 2024 (the anticipated opening year of the Development) has been combined with 2022 emission factors and background concentrations in order to provide a conservative assessment of the effects of the Development as road traffic emissions are predicted to decline with time. Appendix 7.9 contains a technical justification for the selection of emission factor year.

7.73 The following scenarios have been modelled:

- 2015 existing baseline – for model verification
- 2024 future baseline with committed developments and without the Development
- 2024 future with committed developments and with Development

7.74 The future baseline traffic data includes the effects of cumulative and committed developments in the area including those schemes agreed through EIA Scoping and the additional schemes included within the Transport Assessment.

Energy Centre Emissions Impacts

7.75 The energy centre will serve the residential element of the Development, with the commercial element heated by individual space heating.

7.76 Thirteen locations have been chosen as receptor locations for the energy centre, (see Figure 7.11.2); the locations and height of the receptors are described in Table 7.8 below.

Table 7.7: Description of Receptor Locations

Receptor	Height (m)	Location
B3	1.5 and 28	Building B3
B4	1.5 and 18.8	Building B4
B5 (A, B and C)	1.5 and 31.0	Building B5
C1	1.5 and 18.5	Building C1
C2 (A and B)	1.5 and 24.0	Building C2
C3	1.5 and 15.5	Building C3
C4	1.5 and 24.0	Building C4
D1 (A, B, C and D)	1.5 and 30.1	Building 1
D2	1.5 and 24.7	Building D2
D3	1.5 to 7.5	Building D3
D4	1.5 and 18.7	Building D4
E2 (A and B)	1.5 and 26.4	Building E2
CD1 (A, B and C)	1.5, 28.5 and 31.5	Committed Building adjacent to building D1
CE2 (A and B)	1.5, 28.5 and 31.5	Committed Building adjacent to building E2

Impact Predictions

7.77 The energy centre modelling has been based on two Ener-G 230 CHP engines to provide base load heat and electricity for the Development. NO_x emissions from the CHP engine are 50 mg/Nm^3 and therefore would meet the Band B requirements of the SPG on the 'Sustainable Design and Construction'. The CHP system would operate for approximately 4,516 hours per year.

7.78 In addition, gas boilers will be installed to supplement the CHP engines and to meet peak heat demand in the event that that CHP is unavailable. The modelling has been based on four Hoval UltraGas 2000D boilers (4 operating, 1 standby). NO_x emissions from the boilers are 35 mg/kWh and are therefore compliant with SPG requirements. The gas fired boiler demand is equivalent to one 2000 kW boiler operating for approximately 728 hours per year.

7.79 Emissions from the energy centre have been modelled using the ADMS 5 atmospheric dispersion modelling programme. The programme was run with 1 year of hourly sequential meteorological data from the Heathrow Airport monitoring station for the year 2015 formatted for use in the ADMS model.

7.80 The emissions from the CHP and the boilers were modelled as releases from separate flues at a height of 2 m above the adjacent D1 residential building. NO_x emissions from the two CHP engines are estimated to be approximately 0.018 g/s in total, and NO_x emissions from one 2000 kW boiler 0.019 g/s.

7.81 For the assessment of long term effects, the modelling was undertaken for the annual estimated operating hours and profile of the CHP engines and gas fired boilers. For the assessment of short term effects, the modelling was based on four boilers operating all time between November and February inclusive. This is likely to overestimate the short term effects as the peak energy demand is unlikely to last for more than a few hours per year.

7.82 Entrainment of the plume into the wake of nearby buildings (the so-called building downwash effect) has been taken into account in the model by including the surrounding buildings within the model. Buildings dimensions and location are presented in Appendix 7.10. The modelling has only included the tallest buildings in the immediate vicinity of the energy centre location as these will have the most effect on dispersion. The modelling has included the B1, C1 and D1 building blocks as well as the committed development buildings to the west of the Site.

7.83 The emission parameters for the CHP and the boilers are shown in Table 7.9. The exit diameter of the stacks was calculated to provide a minimum exit velocity of 10 m/s in compliance with the requirements of the SPG for the CHP and boilers.

Table 7.8: Summary of Energy Emissions Parameters

Equipment	Exhaust gas flow rate (m^3/s)	Exit velocity (m/s)	NO_x release rate (g/s)	Exhaust Temperature (°C)
CHP (each)	0.27	10	0.009	120
Boiler (each)	0.842	10	0.019	69

7.84 Further details of the model set-up parameters are provided in Appendix 7.10.

Assessment Criteria

Significance

7.85 There is no official guidance in the UK on how to assess the significance of air quality impacts of existing sources on a new development. The approach developed by Environment Protection UK (EPUK) and the IAQM considers the change in air quality as a result of a proposed development on existing receptors[xxiv].

7.86 The guidance sets out three stages: determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance. Impact magnitude relates to the change in pollutant concentration; the impact description relates this change to the air quality objective. Table 7.10 sets out the impact magnitude descriptors, whilst Table 7.11 sets out the impact descriptors for the effects of road traffic emissions.

Table 7.9: Impact Magnitude for Changes in Ambient Pollutant Concentrations

Magnitude (% Change in Concentration)	Annual Mean NO_2 and PM_{10} (40 µg/m³)	Annual Mean $PM_{2.5}$ (25 µg/m³)	Annual Mean of 32 µg/m³ equating to 35 days above 50 µg/m³ for PM_{10})
Very Large (≥9.5%)	≥3.8 µg/m³	≥2.375 µg/m³	≥3.04 µg/m³
Large (>5.5% - ≤9.5%)	>2.2 – ≤3.8 µg/m³	>1.375 – ≤2.375 µg/m³	>1.76 - ≤3.04 µg/m³
Medium (>1.5% - ≤5.5%)	>0.6 – ≤2.2 µg/m³	>0.375 – ≤1.375 µg/m³	>0.48 - ≤1.76 µg/m³
Small (>0.5% - ≤1.5%)	>0.2 – ≤0.6 µg/m³	>0.125 – ≤0.375 µg/m³	>0.16 - ≤0.48 µg/m³
Imperceptible (≤0.5%)	≤0.2 µg/m³	≤0.125 µg/m³	≤0.16 µg/m³

Table 7.10: Impact Descriptor for Changes in Concentration at a Receptor

Concentration with Development in relation to Objective / Limit Value	Emission Magnitude				
	Imperceptible	Small	Medium	Large	Very Large
> 109.5 % (a)	Negligible	Moderate	Substantial	Substantial	Substantial
>102.5% - ≤109.5% (b)	Negligible	Moderate	Moderate	Substantial	Substantial
>94.5% - ≤102.5% (c)	Negligible	Slight	Moderate	Moderate	Substantial
>75.5% - ≤94.5% (d)	Negligible	Negligible	Slight	Moderate	Moderate
≤75.5% (e)	Negligible	Negligible	Negligible	Slight	Moderate

Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.
(a) NO_2 or PM_{10}: > 43.8µg/m^3 annual mean; $PM_{2.5}$ >27.4µg/m^3 annual mean; PM_{10} >35.0µg/m^3 annual mean (days).
(b) NO_2 or PM_{10}: > 41.0 – ≤ 44µg/m^3 annual mean; $PM_{2.5}$ > 25.6 – ≤27.4µg/m^3 annual mean; PM_{10} >32.8 – ≤35.0 µg/m^3 annual mean (days).
(c) NO_2 or PM_{10}: > 37.8 – ≤41.0µg/m^3 annual mean; $PM_{2.5}$ >23.6 – ≤25.5µg/m^3 of annual mean; PM_{10} >30.2 – ≤32.8µg/m^3 annual mean (days).
(d) NO_2 or PM_{10}: >30.2 - ≤37.8µg/m^3 annual mean; $PM_{2.5}$ >18.9 - ≤23.75µg/m^3 annual mean; or <24 - ≤ 30.4µg/m^3 annual mean (days).
(e) NO_2 or PM_{10}: ≤30 µg/m^3 annual mean; $PM_{2.5}$ ≤18.75 µg/m^3 annual mean; PM_{10} ≤24.2µg/m^3 annual mean (days).

7.87 For point source emissions such as those from the energy centre, where the averaging period is one hour or less, the impact magnitude and severity are considered in relation to the predicted contribution alone. A contribution of less than 10% of the objective value can be considered imperceptible and negligible, 11-20% small and minor, 21-50% medium and moderate and above 50% large and major.

7.88 The guidance states that the assessment of significance should be based on professional judgement, taking into account factors including:

- the number of properties affected by minor, moderate or major air quality impacts and a judgement on the overall balance;
- the magnitude of the changes and the descriptions of the impacts at the receptors i.e. Table 7.10 and Table 7.11 findings;
- whether or not an exceedance of an objective or limit value is predicted to arise in the operational study area (where there are significant changes in traffic) where none existed before or an exceedance area is Majorly increased;
- the uncertainty, comprising the extent to which worst-case assumptions have been made; and
- the extent to which an objective or limit value is exceeded.
- Where impacts can be considered in isolation at an individual receptor, moderate or major impacts (i.e. per Table 7.11) may be considered to be a significant environmental effect, whereas negligible or minor impacts would not be considered significant. The overall effect however, needs to be considered in the round taking into account the changes at all of the modelled receptor locations, with a judgement made as to whether the overall air quality effect of the development is significant or not which is a binary judgement (i.e. there is no degree of significance, only whether the overall effect is significant or not).

Limitations and Assumptions

7.89 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

7.90 A disparity between the national road transport emission projections and measured annual mean concentrations of NO_x and NO_2 has been identified in recent years. Whilst projections suggest that both annual mean NO_x and NO_2 concentrations from road traffic emissions should have fallen by around 15-25% over the past 6 to 8 years, at many monitoring sites levels have remained relatively stable, or have even shown a slight increase[xxv].

7.91 In order to take account of uncertainties in future year vehicle emission factors, the assessment has been carried out for 2024, utilising 2022 emission factors and background concentrations. This is considered to provide a conservative assessment of future concentrations (as explained in Paragraph 7.71).

Baseline Conditions

Local Air Quality Management

7.92 The LBH has investigated air quality within its area as part of its responsibilities under the Local Air Quality Management (LAQM) regime. The LBH 2016 Progress report stated regarding Hillingdon's AQMA *"An AQMA was declared in Hillingdon against exceedance of objectives for NO_2 in 2003. Air quality problems in the Borough continue to be most severe around Heathrow Airport and the major road network that goes through the Borough, reflecting the largest sources of nitrogen oxide (NO_x) emissions within the AQMA which covers the southern half of the Borough"*[xxvi]. The whole of the London Borough of Hillingdon south of the Chiltern-Marylebone railway line is declared an AQMA and this includes the Site.

Monitoring

NO_2

7.93 The LBH carry out monitoring of NO_2 concentrations at a number of locations across the borough. The closest and most representative locations have been selected for this assessment and presented in Table 7.12 and shown in Appendix 7.13 (Figure 7.13.3). The diffusion tubes for the year 2015 (the latest available year) were supplied and analysed by Gradko.

Table 7.11: Measured Annual Mean NO_2 Concentrations, 2011 – 2015

ID	Site Type	Within AQMA	Annual Mean (µg/m³)				
			2011	2012	2013	2014	2015
Diffusion Tubes							
HD55*	R	Y	38.6	**41.0**	38.9	**40.0**	35.7
HD56	R	Y	36.0	37.0	35.5	35.4	31.4

ID	Site Type	Within AQMA	Annual Mean (µg/m³)				
			2011	2012	2013	2014	2015
HD203	R	Y	-	**44.8**	**43.4**	**46.8**	**41.9**
HD214*	R	Y	-	**48.3**	**44.5**	**50.5**	**43.7**
Automatic Station							
HIL5* (Hillingdon Hayes)	R	Y	**55.3**	**45.9**	**47.0**	**52.9**	**46.2**
Objective		**40**					

Exceedances are highlighted in bold. R= Roadside
2011 – 2015 data taken from the LBH Progress Report 2016[xxvii]
* Used for model verification

7.94 Measured concentrations at the Hillingdon Hays Automatic Station (HIL5) have been above the limit between 2011 and 2015. Concentrations show a decreasing trend between 2014 and 2015 at all locations.

PM_{10}

7.95 PM_{10} monitoring is currently carried out using nine monitors within the Borough. The closest location is Hillingdon Hayes (Table 7.13).

Table 7.12: Measured PM_{10} Concentrations, 2011 – 2015

Site ID	Site Type	2011	2012	2013	2014	2015
Annual Mean (µg/m³)						
HIL 5 (Hillingdon Hayes)	R	25	25.4	29.4	34.5	28
Objective		**40**				
Number of days > 50µg/m³						
HIL 5 (Hillingdon Hayes)	R	18	15 (47)	17 (46)	45 (60)	14
Objective		**35**				

R = Roadside. 2011 – 2015 data taken from the LBH Progress Report 2016[xxviii]

7.96 PM_{10} measured concentrations have been below the relevant objectives since 2011.

$PM_{2.5}$

7.97 There is no $PM_{2.5}$ monitoring in close proximity to the Site.

Background Concentrations

7.98 In addition to the measured concentrations, estimated background concentrations for the Site have been obtained from the national maps provided by Defra[xxix] (Table 7.14). Defra background pollutant concentrations where adjusted using the NO_2 Adjustment for NO_x Sector removal tool to avoid double counting modelled railway emissions[xxx]. The background concentrations are all well below the relevant objectives.

Table 7.13: Estimated Annual Mean Background Concentrations

Year	Grid Reference	Annual Mean (µg/m³)			
		NO_x	NO_2	PM_{10}	$PM_{2.5}$
2015	510_178	56.0	33.5	19.8	14.2
	509_179	47.4	29.1	18.1	13.7
	509_178	54.7	32.7	19.6	14.0
	510_179	50.1	30.4	18.7	13.6
2022	510_178	40.1	25.6	18.5	12.9
	509_179	36.4	23.4	17.0	12.5
	509_178	40.2	25.5	18.3	12.8
	510_179	38.1	24.3	17.5	12.5
Objectives		**-**	**40**	**40**	**25**

7.99 Background concentrations are below the relevant objectives.

Predicted Baseline Concentrations

7.100 The ADMS-Roads model has been run to predict NO_2, PM_{10} and $PM_{2.5}$ concentrations at each of the existing receptor locations identified in Table 7.6 and Table 7.7 for baseline years of 2015 and 2024. The results are presented in Appendix 7.11 (Table 7.9.1). The 2024 baseline scenario includes the identified committed developments.

7.101 Predicted 2015 baseline concentrations of NO_2 are below the objective for receptors R4, R6, R7, R8, R10 and R11. The remaining receptors are above the objective. Receptor R1 is a commercial property, as such, the annual mean objective does not apply (refer to section 7.13). Concentrations do not exceed 60 µg/m³ at any of the receptors and therefore the short-term objective is not expected to be exceeded at these locations. Predicted 2024 without the Development NO_2 concentrations are all below the objective except for the future committed developments receptor CR3.

7.102 Receptor CR3 is located adjacent to the railway line and at ground floor level. The railway was modelled assuming no emissions reduction in the future, but the railway line is expected to be electrified by 2024. Ground floor levels are generally reserved for commercial properties and therefore the annual mean objective of 40 µg/m³ would not apply if this were the case.

7.103 Predicted PM_{10} and $PM_{2.5}$ are below the objective for both baseline scenarios years.

7.104 Baseline concentrations are predicted to decrease between 2015 and 2024 as vehicle emission factors and background concentrations are assumed to improve, despite the traffic increase in the network.

Likely Significant Effects

Construction Phase

7.105 The main potential effects during construction are dust deposition and elevated PM_{10} concentrations. The following activities have the potential to cause emissions of dust:

- Site preparation including delivery of construction material, erection of fences and barriers;
- Demolition of existing buildings on site;
- Earthworks including digging foundations and landscaping;
- Materials handling such as storage of material in stockpiles and spillage;
- Construction and fabrication of units; and
- Disposal of waste materials off-site.

7.106 Typically, the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

7.107 Based on the SPG on 'The control of dust and emissions during construction and demolition' criteria (Table 7.3), the risk of dust emissions is considered to be large. The study area is considered to be of high sensitivity (Table 7.4), as there are more than 10 dwellings within 20 m of the southern boundary of the Site. The residential properties are upwind of the predominant south westerly wind direction. Appropriate mitigation corresponding to a high risk site is therefore required during the construction phase (Table 7.5). With appropriate mitigation in place (set out later in this chapter) the construction impacts are described as not significant.

Operational Phase

Road Traffic

7.108 Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$, the changes in annual mean concentrations and impact magnitude brought by the Development at existing receptors in 2024 both with and without the Development in place are presented in Appendix 7.11 (Table 7.11.2 to Table 7.11.5). There are no predicted exceedances of the annual mean NO_2 except for receptor CR3 at ground floor level. There are no predicted exceedances of PM_{10} and $PM_{2.5}$ at all receptors.

7.109 Based on the impact magnitude descriptors presented in Table 7.10, the changes in annual mean NO_2 concentrations range from imperceptible to medium. Receptors R1, R2, R5 to R8 and CR1 (ground floor) the changes are described as small). At receptors R3 and R4 the changes are described as medium. The changes in PM_{10} concentrations are described as imperceptible for receptors R11 to R14, CR1 (second floor) and CR2 (first floor) to CR3. At receptors R1, R6, R8 to R10, CR1 (ground and first floor) and CR2 (ground floor) the PM_{10} changes are described as small. At receptors R2 to R5 and R7 PM_{10} the changes are described as medium. The changes in $PM_{2.5}$ concentrations follow the same pattern as the PM_{10} changes, except for receptor R7 where it is described as small.

7.110 Using the criteria set out in Table 7.11, the impact on annual mean NO_2 is described as negligible at all receptors, except for R3 where it is described as minor adverse. The impact on annual mean PM_{10} concentrations is described as negligible at all receptor locations. The impact on $PM_{2.5}$ concentrations is described as negligible at all receptor locations, except for receptors R2 and R3 where it is described as minor adverse.

7.111 Predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at proposed receptor locations within the Development are below the relevant air quality objectives (Appendix 7.11, Table 7.11.5). The highest NO_2 concentrations were predicted at receptor B9 located approximately 30m from the railway.

Energy Centre Emissions

7.112 Predicted concentrations at the modelled receptors locations across the façade of the buildings located in the vicinity of the stacks are shown in Appendix 7.12 for a stack height of 2m above the adjacent D1 building.

7.113 The maximum annual average impacts as a result of the energy centre occur on the top floors of the adjacent committed development building CD1 A which is closest to the energy centre stacks. The maximum predicted annual average NO_2 increment is 0.46 µg/m^3 at receptor CD1 A on the 10th floor. This increment is classified as small in accordance with the criteria in Table 7.11. The increments at the CD1 C on the 10th floor and E2 A on the 9th floor are also classified as small. All of the other increments are imperceptible.

7.114 The maximum predicted hourly average concentration is well below the relevant objective value and occurs at the top floor of the adjacent committed development receptor CD1 B, at 20.8µg/m^3. This is equivalent to approximately 10.4% of the hourly average objective and therefore classed as a imperceptible change and a negligible impact. All of the other hourly average concentrations are less than 10% of the hourly average objective and therefore can also be classed as having a negligible impact.

7.115 The maximum predicted environmental concentrations at the residential receptor locations are shown in Appendix 7.2. The predicted process contribution has been added to the baseline concentrations at the receptor locations from the road traffic modelling.

7.116 The predicted hourly average concentrations from the model have been added to twice the annual average baseline concentration.

7.117 There are no predicted exceedances of the relevant assessment levels as a result of emissions from the energy centre when these are added to the baseline concentrations. All of the predicted impacts of the energy centre emissions are negligible.

Mitigation Measures

Construction Phase

7.118 The following standard high risk mitigation measures from the SPG on 'The control of dust and emissions during construction and demolition' are recommended. An Air Quality and Dust Management Plan should be submitted to the Local Authority for approval prior to works commencing on site.

Site Management

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Develop Dust Management Plan.
- Display the name and contact details of persons accountable on the site boundary.
- Display the head or regional office information on the site boundary.
- Record and respond to all dust and air quality pollutant emissions complaints.

- Make a complaint log available to the local authority when asked.
- Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked.
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken.
- Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.
- Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site. Where possible, stockpiles will be below the height of the barriers, or kept damp where necessary.
- Fully enclosure site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.
- Avoid site run off of water or mud.
- Remove potentially dusty materials from site as soon as possible.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Carry out regular dust soiling checks of buildings within 100 m of site boundary and cleaning to be provided if necessary.

Operating Vehicle/Machinery

- Ensure all on road vehicles comply with the London Low Emission Zone.
- Ensure all non-road mobile machinery (NRMM) comply with the standards; where applicable.
- Ensure all vehicles switch off engines when stationary.
- Avoid the use of diesel or petrol powered generators where possible.
- Impose and signpost a maximum speed limit of 10mph on surface hauls and work areas.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

- Implement a Travel Plan that supports and encourages sustainable travel (public transports, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding and sawing equipment with dust suppression equipment.
- Ensure an adequate supply of water on site for dust suppressant.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Reuse and recycle waste to reduce dust from waste materials; and
- Avoid bonfires and burning of waste materials on site.

Demolition

- Use of soft strip inside buildings before demolition;
- Ensure effective water suppression is used during demolition operations;
- Avoid explosive blasting; and
- Bag and remove any biological debris or damp down such material before demolition.

Earthworks

- Re-vegetate earthworks and exposed areas/ soil stockpiles to stabilise surfaces.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil.
- Only remove secure covers in small areas during work and not all at once

Construction

- Avoid scrabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allow to dry out.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emissions control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Trackout

- Regularly use a water-assisted dust sweeper on the access and local roads, as necessary to remove any material track on the site.
- Avoid dry sweeping of large areas.
- Where necessary, vehicles entering and leaving sites should be securely covered to prevent escape of materials during transportation.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes which are regularly damped down with fixed or mobile sprinklers systems and regularly cleaned.
- Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Implement a wheel washing system.
- 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.
- Access gate to be located at least 10 m from receptors where possible.
- Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site.

Operational Phase

7.119 The air quality effects of road traffic generated by the Development are considered to be not significant as there are no predicted exceedances of the relevant air quality strategy objectives at the existing and future receptor locations. The one receptor where an exceedance is predicted to occur, the Development impact is negligible and the exceedance is due to emissions from the adjacent railway line which will be electrified. No direct mitigation is therefore required for air quality impacts.

7.120 The Development travel plan presents a range of measures to promote sustainable travel that have the potential to reduce private vehicle use and associated pollutants emissions.

7.121 No additional mitigation is required for emissions from the Energy Centre.

Air Quality Neutral

7.122 The Development is not 'Air Quality Neutral' in terms of transport emissions. Mitigation measures could include green planting / walls or exposure reduction methods although it is not intended to install green rooves on the commercial element of the development. A suitable mitigation strategy should be agreed with the local authority. These can be discussed and agreed at reserved matters stage.

Residual Effects

Construction Phase

7.123 With appropriate mitigation in place the residual effect of construction is assessed as not significant.

Operational Phase

7.124 The operational residual air quality effects of the Development are judged to be not significant.

Cumulative Effects

Construction Phase

7.125 The full list of committed developments set out in Chapter 2 of the ES has been reviewed. It is considered that potential cumulative construction effects could occur with the following developments in the vicinity of the Site should construction occur at the same time:

- 20 Blyth Road, Hayes (ref: 1425/APP/2011/3040);
- Upgrade the existing rail station for Crossrail Planning ref. 31592/APP/2015/186);
- Silverdale Road, Hayes (ref 71374/APP/2016/4027);
- Land South of Hayes and Harlington, 'Buccleuch Site' (Planning application has not yet been submitted);
- No.1 Nestle Avenue, 'Precis Site' (Planning application has not yet been submitted); and
- Squirrel Trading Estate (Planning application has not yet been submitted).

7.126 Significant cumulative effects are considered unlikely to occur as each development will be required to employ similar dust mitigation techniques such that the individual construction phase effects would be not significant, alone or in combination.

Operational Phase

7.127 The future year traffic data utilised within the assessment includes committed development in the area as assessed for the Transport Assessment. The assessment has therefore predicted the cumulative concentrations arising from committed developments in the area in 2024.

7.128 The impact of emissions from the Energy Centre has been added to the predicted concentrations as a result of road traffic emissions and background concentrations. The assessment therefore looks at the worst case effects in terms of air quality taking into account committed schemes.

Summary

7.129 The air quality impacts associated with the Development, have been assessed. The Development is located within the Hillingdon's AQMA, declared due to exceedances of the annual mean NO_2 objective.

7.130 The construction works have the potential to create dust. During construction it is recommended that a package of mitigation measures is put in place to minimise the risk of elevated PM_{10} concentrations and dust nuisance in the surrounding area. With mitigation in place the construction impacts are judged as not significant.

7.131 There are no predicted exceedances of air quality strategy objectives within the Site itself and therefore mitigation against poor air quality for future residential receptors is not required.

7.132 There is no significant effect of Development traffic on existing residential receptors in the vicinity of the Site and therefore no additional mitigation is required.

7.133 The impact of emissions from the Energy Centre is negligible.

Table 7.15 contains a summary of the likely significant effects of the Development.

Table 7.14: Table of Significance - Air Quality

Potential Effect	Nature of Effect (Permanent/Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
				I	UK	E	R	C	B	L	
Construction											
Construction Dust and PM_{10}	Temporary	N/A	Mitigation within agreed AQDMP							✓	Negligible
Completed Development											
Road Traffic	Permanent	Negligible	No mitigation is required						✓	✓	Negligible
Energy Centre	Permanent	Negligible	No mitigation is required						✓	✓	Negligible
Cumulative Effects											
Construction	Temporary	N/A	Mitigation within agreed AQDMP							✓	Negligible
Operation	Permanent	Negligible	No mitigation is required						✓	✓	Negligible

*** Geographical Level of Importance**

I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local

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