MOTT MACDONALD

Former MSD Facility, Breakspear Road South, Ickenham

Air Quality Assessment

September 2022

This page left intentionally blank for pagination.

Mott MacDonald
Floor 3
1 Whitehall Riverside
Leeds LS1 4BN
United Kingdom

T +44 (0)113 394 6700
mottmac.com

Former MSD Facility, Breakspear Road South, Ickenham

Air Quality Assessment

September 2022

Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	September 2022	S Oliver	C Mills	C Mills	Draft
B	September 2022	S Oliver	C Mills	C Mills	Issue

Document reference: 108003-MMD-00-XX-DC-AQ-0001 | 1 | A |

Information class: Standard

Contents

Tables

Figures

1 Introduction

1.1 Overview

Mott MacDonald Limited has been commissioned by Keltbray Developments Ltd, part of the Keltbray Group, to undertake an air quality assessment to accompany the planning application for the development of for a new storage yard located on part of the former Merck Sharpe Dohme (MSD) animal health site to the west of Breakspear Road South near Ickenham.

The development will deliver approximately 7,650sqm GEA of building floorspace. An administration building will be provided, utilising an existing building on the site, with the remaining structures on the site demolished. Four independently operating storage facilities will be provided with associated yard space and access points onto an internal access road. Pedestrian facilities will be provided predominately along the northern side of the internal access road, with a crossing facility provided to connect to the proposed administration building. To facilitate the use of the occasional larger heavy duty vehicles (HDVs) associated with such a storage yard, the access road and bellmouth with the junction of Breakspear Road South will be widened. This is hereafter referred to as the 'proposed development'.

This report provides an assessment of potential air quality impacts to accompany the planning application to be submitted to London Borough of Hillingdon (LBoH). The scope of assessment has been agreed with the environmental health officer (EHO) at LBoH.

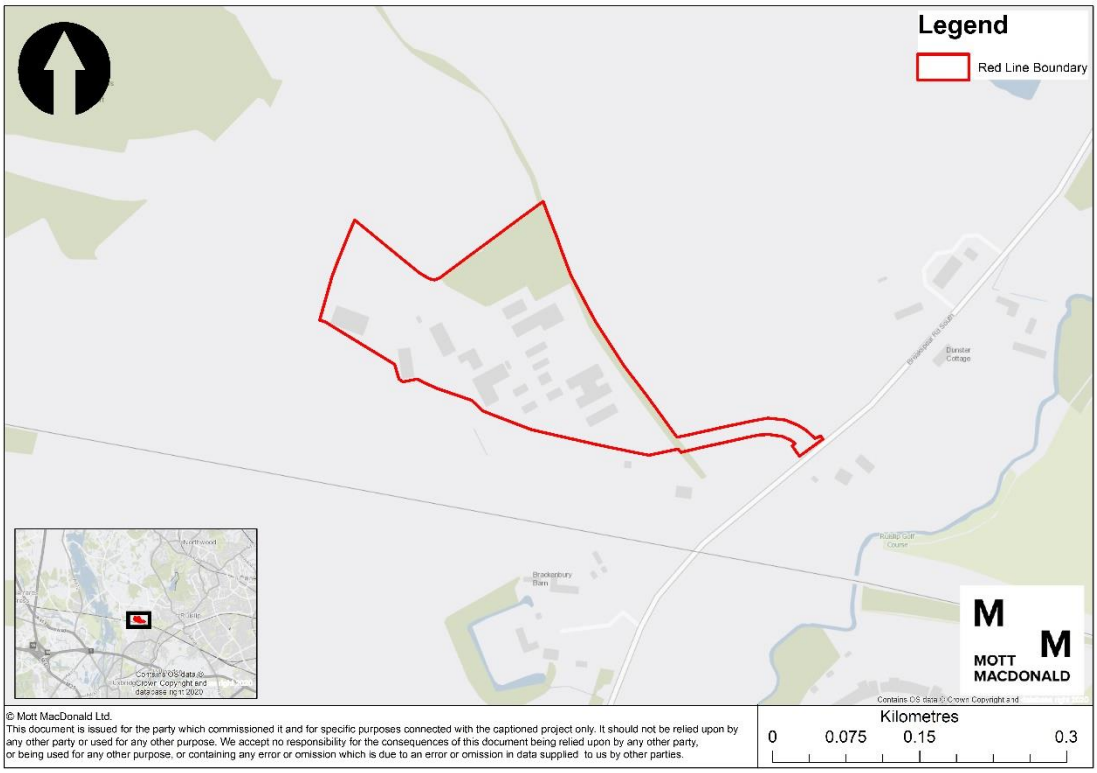
This report provides an assessment of the following key impacts associated with the construction and operational phases of the proposed development:

- nuisance, impact upon health and/or loss of amenity caused by construction dust on sensitive receptors
- changes in pollutant concentrations caused by the proposed development
- air quality neutral in line with London planning policy requirements

1.2 Site location

The proposed development is located on Breakspear Road South in the LBoH. It is located to west of Breakspear Road South, to the north of the existing Chiltern Mainline Railway line on the former MSD animal health site. The site boundary is presented below in Figure 1.1. The site currently comprises of buildings associated with its previous use as MSD animal health centre. There are few receptors in the immediate vicinity of the site.

Figure 1.1: Proposed development location



Source: Mott MacDonald 2022.

1.3 Key pollutants

The assessment considers concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) only as these are the key pollutants of concern associated with construction and operation of the proposed development within the study area. A description of these pollutants is provided below.

1.3.1 Oxides of nitrogen

Oxides of nitrogen is a term used to describe a mixture of nitric oxide (NO) and nitrogen dioxide (NO_2), referred to collectively as NO_X. These are primarily formed from atmospheric and fuel nitrogen as a result of high temperature combustion. The main sources in the UK are road traffic and power generation.

During the process of combustion, atmospheric and fuel nitrogen is partially oxidised via a series of complex reactions to NO. The process is dependent on the temperature, pressure, oxygen concentration and residence time of the combustion gases in the combustion zone. Most NO_X exhausting from a combustion process is in the form of NO, which is a colourless and tasteless gas. It is readily oxidised to NO_2, a more harmful form of NO_X, by chemical reaction with ozone and other chemicals in the atmosphere. NO_2 is a yellowish-orange to reddish-brown gas with a pungent, irritating odour and is a strong oxidant.

1.3.2 Particulate matter

PM_{10} is defined as particulate matter with a diameter of 10 microns (µm) or less. $PM_{2.5}$ is defined as particulate matter with a diameter of 2.5 microns or less. Particulate matter is a complex

mixture of organic and inorganic substances present in the atmosphere. Sources are numerous and include power stations, other industrial processes, road transport, domestic coal burning and trans-boundary pollution. Secondary particulates, in the form of aerosols, attrition of natural materials and, in coastal areas, the constituents of sea spray, are significant contributors to the overall atmospheric loading of particulates. In urban areas, road traffic is generally the greatest source of fine particulate matter, although localised effects are also associated with construction and demolition activity.

2 Legislation and Policy

2.1 Legislation

2.1.1 England

The Air Quality Standards Regulations 2010[1], Air Quality Standards (amendment) Regulations 2016[2], Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019[3] and Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[4] implement Directive 2008/50/EC on ambient air quality[5].

These define limit values and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

The limit values apply everywhere, with the exception of:

- Any locations situated within areas where members of the public do not have access and there is no fixed habitation.
- In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply.
- On the carriageway of roads.
- On the central reservations of roads except where there is normally pedestrian access to the central reservation.

The Department for Environment Food and Rural Affairs (Defra) assesses and reports on the compliance with the limit values for each of the 43 zones and agglomerations across the UK. Zones and/or agglomerations achieve compliance when everywhere within the zone and/or agglomeration (excepting locations provided in the Directive) does not exceed the relevant limit value.

Part IV of the Environment Act 1995[6] (as amended in Schedule 11 of the Environment Act 2021[7]) requires that every local authority shall periodically carry out a review of air quality within its area, including predictions of likely future air quality. The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in the Air Quality (England) Regulations 2000[8] and the Air Quality (England) (Amendment) Regulations 2002[9]. In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values specified in the air quality Directive although compliance dates differ.

1 Statutory Instrument. (2010), *The Air Quality Standards Regulations,* No. 1001.

2 Statutory Instrument. (2016) *The Air Quality Standards (Amendment) Regulations*, No. 1184.

3 Statutory Instrument. (2019) Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations

4 Statutory Instrument. (2020) Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, No. 1313.

5 European Union. (April 2008) *Directive on ambient air quality and cleaner Air for Europe, Directive 2008/50/EC* Official Journal, vol. 152, pp. 0001-0044

6 Department for Environment Food and Rural Affairs. (2003) Part IV of the Environment Act 1995 Local Air Quality Management

7 Statutory Instrument. (2021) Chapter 30, Schedule 11 Local Air Quality Management Framework of Environment Act 2021.

8 Statutory Instrument. (2000) Air Quality (England) Regulations, No. 928

9 Statutory Instrument. (2002) Air Quality (England) (Amendment) Regulations, No. 3043.

As part of the review of air quality, the local authority must assess whether air quality objectives are being achieved, or likely to be achieved within the relevant periods and identify the key sources of emissions responsible for the failure to achieve the objectives. Any parts of a local authority's area where the objectives are not being achieved or are not likely to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, local authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

The Environment Act also requires that the UK Government produces a national 'air quality strategy' (AQS) containing standards, objectives and measures for improving ambient air quality and to keep these policies under review.

2.1.2 Statutory nuisance

Section 79(1)(d) of the Environmental Protection Act 1990[10] defines one type of 'statutory nuisance' as *"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance"*. Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. Best practicable means is a widely-used defence by operators, if employed to prevent or to counteract the effects of the nuisance.

2.2 Policy

2.2.1 UK Air Quality Strategy

The Environment Act requires the UK Government to produce a national Air Quality Strategy. The Air Quality Strategy establishes the UK framework for air quality improvements. The measures agreed at the national and international level are the foundations on which the strategy is based. The 2007 Air Quality Strategy has now been superseded as of the 14th January 2019 with the Clean Air Strategy 2019 (CAS)[11].

The CAS does not set legally binding objectives, the CAS instead has targets for reducing total UK emissions of nitrogen oxides (NO_x) and fine particulate matter ($PM_{2.5}$) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery or NRMM).

2.2.2 National planning policy

2.2.2.1 National Planning Policy Framework

The revised National Planning Policy Framework[12] was published in July 2021 and sets out the Government's planning policies for England. With regard to air quality, it states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality…"

And:

10 Parliament of the United Kingdom (1990) Environmental Protection Act 1990

11 Department for Environment Food and Rural Affairs. (January 2019), 'The Clean Air Strategy'

12 Ministry of Housing, Communities and Local Government (July 2021). National Planning Policy Framework

"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."

2.2.2.2 National Planning Practice Guidance

On 6 March 2014, the Department for Communities and Local Government (DCLG) published a national planning practice guidance web-based resource[13] which was updated on 1st November 2019.

The National Planning Practice Guidance includes a dedicated section on air quality. It notes that, for new planning applications, the local planning authority may require information on:

- "*The 'baseline' local air quality, including what would happen to air quality in the absence of the development*
- *"whether the Scheme could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity) and*
- *"whether occupiers or users of the development could experience poor living conditions or health due to poor air quality.*"

It also states the following in relation to determining whether air quality is relevant to a planning decision:

"Whether air quality is relevant to a planning decision will depend on the Scheme and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the Scheme would be particularly sensitive to poor air quality in its vicinity.)"[14].

2.2.3 Regional policy

2.2.3.1 Mayor of London's Environment Strategy

The London Environment Strategy[15] was published in May 2018. The strategy aims to set out a joint approach to improve London's environment. Regarding air quality, it states the Mayor will:

- *"clean up London's transport system and phase out fossil fuels including diesel, making the whole bus fleet zero emission by 2037 at the latest and introducing the Ultra-Low Emission Zone by 2019 to deter the most polluting vehicles from entering London*

[13] National Planning Practice Guidance web-based resource. Accessible at: https://www.gov.uk/government/collections/planning-practice-guidance

[14] National Planning Practice Guidance 'Air Quality Section'. Accessible at: https://www.gov.uk/guidance/air-quality--3 (published 6 March 2014)

[15] Greater London Authority (May 2018). London Environment Strategy.

- *consider introducing a new Air Quality Positive standard so new building developments contribute to cleaning London's air*
- *use the planning system to help ensure that new schools and other buildings that will be used by people who are particularly vulnerable to pollutants are not located in areas of poor air quality*
- *fund the implementation of air quality plans that will help at least 50 schools in some of London's most polluted areas reduce their pupils' exposure to poor air*
- *provide more information to Londoners on when air pollution is bad, with guidance on monitors*
- *give people with fire places or wood burning stoves better information on which to use so they don't make air pollution worse*
- *set even tighter long-term air quality standards based on the best health evidence to make sure Londoners can breathe the cleanest air and start addressing the problem of indoor air quality"*

2.2.3.2 The London Plan

In 2021, the GLA and Mayor of London published the London Plan 2021[16], which replaces the previous London Plan of 2008. This is the overarching strategic plan for London, providing an integrated framework for economic, environmental, social and transport development for the next 20-25 years. It forms part of the wider development context for Greater London and provides the framework to which local authorities' planning policies and decisions must conform.

Policy SI 1 ('Improving Air Quality') of the London Plan states that:

"A - Development Plans, through relevant strategic, site-specific and area based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B - To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

> *1. Development proposals should not:*
>
> *a) lead to further deterioration of existing poor air quality*
>
> *b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits*
>
> *c) create unacceptable risk of high levels of exposure to poor air quality.*
>
> *2. In order to meet the requirements in Part 1, as a minimum:*
>
> *a) development proposals must be at least Air Quality Neutral*
>
> *b) development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures*
>
> *c) major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1*

[16] Greater London Authority (March 2021). The London Plan: The Spatial Development Strategy for London.

d) development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.

C - Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

1) how proposals have considered ways to maximise benefits to local air quality, and

2) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.

D - In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.

E - Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development."

2.2.3.3 The Mayor of London's SPG on Sustainable Design and Construction

The Mayor of London produces Supplementary Planning Guidance (SPG) to provide further guidance on policies in the London Plan. In April 2014, the SPG on Sustainable Design and Construction[17] was published. This includes a requirement that new developments in London are 'air quality neutral', meaning all major new developments must calculate the building and transport-related emissions of NO_x and PM_{10} and compare these with a benchmark for development. The SPG on Sustainable Design and Construction also sets emission standards for solid biomass and combined heat and power (CHP) plants in London. 'Where individual and/or communal gas boilers are installed in commercial and domestic buildings they should achieve a NOx rating of less than 40mgNOx/kWh.'[17]

2.2.3.4 The Mayor of London's SPG on Construction Dust

In July 2014, the Mayor published a SPG on "*The Control of Dust and Emissions During Construction and Demolition"*[18], which sets out measures to reduce emissions of dust, PM_{10} and $PM_{2.5}$ associated with construction and demolition activities in London. It also aims to control NOx from these same activities by introducing an Ultra Low Emissions Zone (ULEZ) for non-road mobile machinery as state below:

"From 1 September 2015 NRMM of net power between 37kW and 560kW used in London will be required to meet the standards set out below. This will apply to both variable and constant speed engines for both NOx and PM. These standards will be based upon engine emissions standards set in EU Directive 97/68/EC and its subsequent amendments.

[17] Greater London Authority (2014), 'Sustainable Design and Construction – Supplementary Planning Guidance, April 2014.'

[18] Greater London Authority (2014). Supplementary Planning Guidance on the control of dust and emissions during construction and demolition, July 2014.

- *NRMM used on the site of any major development within Greater London will be required to meet Stage IIIA of the Directive as a minimum; and*
- *NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IIIB of the Directive as a minimum.*

From 1 September 2020 the following will apply:

- *NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum.*
- *NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IV of the Directive as a minimum."*

2.2.3.5 The Mayor of London's Transport Strategy

The Mayor's Transport Strategy (MTS)[19] compliments the above regional policy documents by setting out policies and measures for the development of London's transport infrastructure. It aims to promote improvements in air quality, by "reducing air pollutant emissions from ground-based transport, contributing to EU air quality targets" while enabling economic, social and environmental development. The MTS recognises that air quality in London is the worst in the country and supports the policies included in the Mayor of London's Environment Strategy, such as the expansion of Low Emission Zones and improvements to the bus fleets.

2.2.4 Local policy

The local plan for LBOH consists of two documents, the Local Plan Part 1 – Strategic Policies (adopted November 2012) and Local Plan Part 2 – Development Management Policies (adopted January 2020). These set the foundation for how planning will be controlled in LBOH.

Within the Local Plan Part 1 – Strategic Policies, there are two policies of relevance to the air quality assessment, these are:

Policy EM1: Climate Change Adaption and Mitigation which states:

"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."

And Policy EM8: Land, Water, Air and Noise which states:

"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.

[19] Greater London Authority (2010). Mayor's Transport Strategy, May 2010.

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."

Within the Local Plan Part 2 - Development Management Policies, there are four policies of relevance to the air quality assessment, these are:

Policy DMEI 14: Air Quality which states:

"*A) Development proposals should demonstrate appropriate reductions in emissions to sustain compliance with and contribute towards meeting EU limit values and national air quality objectives for pollutants. B) Development proposals should, as a minimum: i) be at least "air quality neutral"; ii) include sufficient mitigation to ensure there is no unacceptable risk from air pollution to sensitive receptors, both existing and new; and iii) actively contribute towards the improvement of air quality, especially within the Air Quality Management Area."*

And Policy DMT 1: Managing Transport Impacts which states:

"A) Development proposals will be required to meet the transport needs of the development and address its transport impacts in a sustainable manner. In order for developments to be acceptable they are required to:

v) have no significant adverse transport or associated air quality and noise impacts on the local and wider environment, particularly on the strategic road network."

And Policy DMT 2: Highways Impacts which states:

"Development proposals 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;"

2.3 Summary

Air quality objectives and limit values are summarised in Table 2.1. As the local planning authority is responsible for determining this planning application, air quality impacts have been considered against the air quality objectives only.

Table 2.1: Relevant air quality objectives and limit values

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date	
				Air Quality Objectives	Limit Values
Nitrogen dioxide (NO_2)	Annual	40 µg/m^3	-	31 December 2005[(a)]	1 January 2010[(c)]
	1-Hour	200 µg/m^3	18	31 December 2005[(a)]	1 January 2010[(c)]
Particulates (PM_{10})	Annual	40 µg/m^3	-	31 December 2004[(a)]	1 January 2005[(c)]
	24-Hour	50 µg/m^3	35	31 December 2004[(a)]	1 January 2005[(c)]

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date	
				Air Quality Objectives	Limit Values
Fine particulates ($PM_{2.5}$)[e]	Annual	20 µg/m^3	-	-	1 January 2020[c]
		25 µg/m^3	-	2020[b]	-
NOx[d]	Annual	30 µg/m^3	-	31 December 2000[a]	19 July 2001[c]

Notes:
[a] Air Quality (England) Regulations 2000 as amended
[b] Air Quality Strategy 2007
[c] EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe, as transposed into UK Law
[d] Designated for the protection of vegetation and ecosystems and also referred to as the 'critical level' for NOx. The policy of the UK statutory nature conservation agencies is to apply the annual mean NOx criterion in internationally designated conservation sites and Site of Special Scientific Interest (SSSI) on a precautionary basis, as the limit value applies only to locations more than 20km from towns with more than 250,000 inhabitants or more than 5km from other built-up areas, industrial installations or motorways.
[e] As the Air Quality Strategy 2007 and EU Directive 2008/50/EC have a different numerical standard for $PM_{2.5}$, the more stringent standard of 20µg/m^3 has been adopted for this assessment.

Table 2.2 provides details of where the respective objectives should and should not apply and therefore the types of receptors that are relevant to the assessment of air quality.

Table 2.2: Locations where the air quality objectives apply

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

Source: Defra TG22[20].

[20] Department for Environment, Food and Rural Affairs and Devolved Administrations (August 2022). Local Air Quality Management – Technical Guidance LAQM.TG22

3 Methodology

3.1 Overview

This section sets out the approach that has been taken for the assessment of impacts on air quality during construction and operation as a result of the proposed development.

3.2 Construction phase

3.2.1 Construction dust assessment

3.2.1.1 Overview

Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75 microns in diameter; the most common impacts from dust emissions are soiling and increased ambient PM_{10} concentrations[20]. Dust can be mechanically transported either by wind or re-suspension by vehicles. It can also arise from wind erosion on material stock piles and earth moving activities. Further details on the construction dust assessment can be found below.

3.2.1.2 Construction dust assessment approach

Guidance from the IAQM[21] recommends splitting the construction phase into four separate source categories and determining the dust risk associated with each of these individually. This assessment has determined the risk of each of the following source categories:

- Demolition
- Earthworks
- Construction
- Track out (the transport of dust and dirt onto the public road network).

The risk of each source for dust effects is described as 'negligible', 'low risk', 'medium risk' or 'high risk' depending on the nature and scale of the construction activities and the proximity of sensitive receptors to the construction site boundary. The assessment is used to define appropriate mitigation measures to reduce the level of effects such that they are not significant.

The assessment considers three separate effects from dust:

- Annoyance due to dust soiling
- Harm to ecological receptors, and
- The risk of health effects due to a significant increase in exposure to PM_{10}.

Step 1 of the assessment applies screening criteria to the proposed development which states that an assessment will normally be required where there is:

- A 'human receptor' within:
  - 350m of the boundary of the site, or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- An 'ecological receptor' within:

[21] Institute of Air Quality Management (2014) 'Guidance on the assessment of dust from demolition and construction'.

- 50m of the boundary of the site, or
- 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

No further assessment is required if there are no receptors within the defined boundaries.

Step 2A of the assessment is to determine the overall dust-raising magnitude ('small', 'medium' or 'large') from each of the dust sources identified (demolition, earthworks, construction and trackout) in accordance with the criteria outlined in Table 7.9 in Appendix C.

Step 2B of the assessment involves defining the sensitivity of receptors (as high, medium or low) for each dust effect (dust soiling, human health and ecosystem impacts) in accordance with the criteria presented within Table 7.10 in Appendix C.

The sensitivity of the surrounding area is then determined for each dust effect by considering the criteria in Table 7.11, Table 7.12 and Table 7.13 in Appendix C. Criteria presented in these tables are based on the distance of the source to the closest receptors, the receptor sensitivity, and in the case of PM_{10} effects, the local background concentration. The highest level of area sensitivity defined for each dust effect has been used in the assessment.

The final step of the assessment (Step 2C) combines the dust emission magnitude and the sensitivity of the area, to determine the overall dust risk category for each dust source and for each dust effect. The criteria used to define the dust risk category for each dust source and effect is presented within Table 7.14, Table 7.15, Table 7.16 and Table 7.17 in Appendix C.

The dust risk category defined for each dust source and effect is then used to determine appropriate site-specific mitigation measures to be adopted. It should be noted that in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation.

At the time of assessment, full detailed construction information was not available, as such reasoned assumptions were used on top of available data to conduct the assessment. These assumptions were based on the size of the existing structures on site, the proposed development site area, the development proposals and estimations of HDV movements.

3.2.2 Construction site plant emissions

Construction work requires the use of a range of site plant, such as excavators, piling equipment, cranes and on-site generators. All construction plants have an energy demand and some may result in direct emissions to air from exhausts. Guidance from the IAQM[21] notes that effects from exhaust emissions from on-site plant are unlikely to be significant. Given the local and temporary nature of site plant, effects of plant emissions on local air quality are considered to be of negligible significance relative to the surrounding road traffic contributions on the local road network. Construction plant emissions have therefore not been assessed further. Nevertheless, mitigation measures to reduce the effect of site plant on local air quality are presented in Section 6.

3.2.3 Construction road traffic emissions

The construction period is estimated to last for nine months. EPUK[22] and IAQM[21] indicates that assessment of construction traffic emissions is only likely to be required for large, long-term construction sites that will generate an additional annual average daily traffic (AADT) flow of 100 Light Duty Vehicles (LDV) movements or more per day or changes of 25 HDV movements or more per day (within an AQMA) for a period of a year or more. The proposed development will

[22] Environmental Protection UK and Institute of Air Quality Management (2017) 'Land-use planning & development control: Planning for air quality'.

likely fall under this criteria, however at the request of the environmental health officer (EHO) from LBOH, construction road traffic emissions have been assessed with a quantitative approach using an atmospheric dispersion model. The modelling methodology is the same as the approach that has been applied for operational road traffic emissions, full details on the dispersion modelling methodology are presented in Section 3.3.1.

3.2.3.1 Traffic data

Traffic data has been provided by the proposed developments traffic consultant in annual average daily traffic flows (AADT) with HDV[23] percentages for the following scenarios:

- Base year, 2019 (for model verification)
- Do-Minimum 2022 (scenario in which the proposed development has not been constructed)
- Do-Something construction 2022 (scenario in which the proposed development is under construction)

It should be noted that the construction period is estimated to last for approximately nine months, the peak flow traffic data from within the nine months for the most intensive period of construction has been factored into an AADT for use within the assessment, this is considered a conservative approach.

Construction HDV traffic will travel to and depart from the site from the A40, which is the sites closest connection to the strategic road network. HDVs will head south from the proposed development on Breakspear Road South before joining the B467 Swakeleys Road and connect to the A40. The traffic data also contains flows associated with the temporary HS2 Ltd construction depot that is in temporary operation to the south of the proposed development.

Data was provided based on traffic counts for the local road network in 2022, data from the Department for Transport (DfT) Road Traffic Statistics database[24] has been used to supplement the traffic data counts.

Where specific speed data was not available the relevant speed limits on those roads have been assumed within the assessment. At junctions, speeds have been reduced in accordance with Defra Local Air Quality Management: Technical Guidance (LAQM (TG22))[20], which states:

"For a busy junction, assume that traffic approaching the junction slows to an average of 20 kilometres per hour… In general, these speeds are relevant for approach distances of approximately 25 metres. For other junctions (non-motorway) and roundabouts where some slowing of traffic occurs, you should assume that the speed is 10 kilometres per hour slower than the average free flowing speed"

At all junctions within the study area speeds have been slowed to 20 kilometres per hour (kph) due to the level of traffic and congestion experienced.

3.3 Operation phase

The below sections describe the methodology for assessment of the operational phase of the proposed development.

[23] A HDV is any vehicle with a gross weight greater than 3.5 tonnes. This typically includes heavy goods vehicles (HGVs), buses and coaches

[24] Department for Transport (2022) Road Traffic Statistics. Available at: https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints

3.3.1 Road traffic emissions

3.3.1.1 Overview

This section describes the approach taken to consider the air quality effects of the road traffic emissions assessment of the proposed development, key elements of which include model choice, meteorological data, traffic data, emission factors, NO_x to NO_2 conversion and dealing with model uncertainty.

3.3.1.2 Traffic data

Traffic data has been provided by the proposed developments traffic consultant in annual AADT with HDV[25] percentages for the following scenarios:

- Base year, 2019 (for model verification)
- Do-Minimum 2022 (scenario in which the proposed development has not been built)
- Do-Something operation 2022 (scenario in which the proposed development is built and operational)

The 2022 traffic data also contains flows associated with the temporary HS2 Ltd construction depot that is in operation to the south of the site. The HS2 site will not be permanent and as such the inclusion within the traffic data for the operational phase of the proposed development is a conservative assumption.

As with the construction phase, HDV traffic generated during the operational phase will depart the site and head southbound towards the A40 which is the sites closest connection to the strategic road network.

The following roads have been modelled within the assessment:

- Breakspear Road South (north and south of the proposed development)
- B467 Swakeleys Road
- Harvil Road
- B483 Park Road
- A40

It should be noted that some roads have been modelled within the assessment even though they are below the screening criteria for requiring a detailed assessment set out within EPUK/IAQM guidance[22]. This was undertaken following a request from the EHO at LBoH. Modelled roads are presented on Figure 7.1 in Appendix A. Speeds at junctions have been slowed in line with the approach undertaking for construction traffic discussed in Section 3.2.3.1.

3.3.1.3 Model selection

The assessment uses the advanced dispersion model ADMS-Roads (version 5.0.0.1) to assess the proposed developments potential air quality impacts, ADMS-Roads is a PC-based model produced and validated by Cambridge Environmental Research Consultants for the dispersion of pollutants in the atmosphere released from road traffic sources.

3.3.1.4 Meteorological data

The most important meteorological parameters governing the atmospheric dispersion of emissions are wind direction and wind speed as described below:

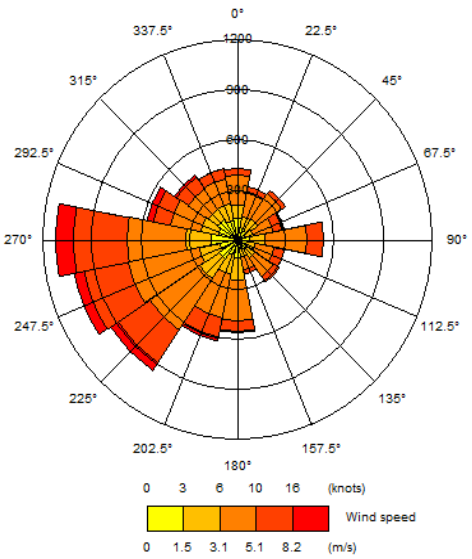
[25] A HDV is any vehicle with a gross weight greater than 3.5 tonnes. This typically includes heavy goods vehicles (HGVs), buses and coaches

- wind direction determines the sector of the compass into which emissions are dispersed
- wind speed affects the distance, which emissions travels over time and can affect dispersion by increasing the initial dilution of pollutants.

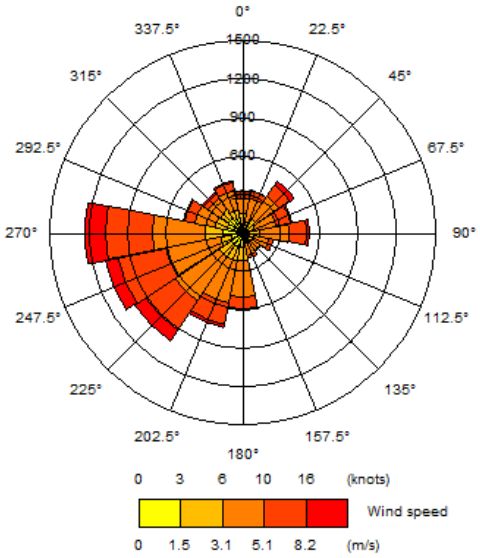
For meteorological data to be suitable for dispersion modelling purposes, a number of parameters need to be measured on an hourly basis. These parameters include wind speed, wind direction, cloud cover and temperature. There are only a limited number of sites where the required meteorological measurements are made.

Following consideration of the meteorological data available, data from RAF Northolt meteorological station was used as this is the most representative data available for the study area. This meteorological station is located approximately 3.9km south-east of the proposed development. Wind roses representing this data are shown in Figure 3.1. As indicated in the wind roses, the predominant wind direction is from the south-west.

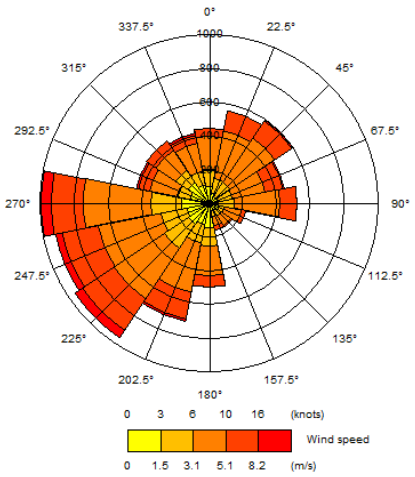
Figure 3.1: Wind Roses for RAF Northolt meteorological station 2019-2021



2019



2020



2021

3.3.1.5 Emission factors

The Emissions Factors Toolkit (EFT) (Version 11.1), released in November 2021[26], has been used to provide emissions factors for use within the modelling. A split of traffic composition including AADT and percentage of HDVs has been used to generate emission factors for each road link included in the model.

3.3.1.6 Background concentrations

At the request of the EHO of LBoH, local authority monitored background data has been used within the assessment. There was only one background monitor in close proximity to the study area for the assessment of road traffic emissions. This was a NO_2 passive diffusion tube monitor (LBoH ID: HILL23) located south of the A40 approximately 2.1km south of the proposed development. The concentration for 2019 has been used within the assessment as the background NO_2 concentration. Further details on why 2019 was used are presented in Section 4.1.

There are no monitors within or close to the study area for PM_{10} and $PM_{2.5}$, in light of this the Defra projected background concentrations have been applied within the assessment. Defra provides mapped future year projections of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ for each 1km grid square across the UK for all years between 2018 to 2030[27].

Background concentrations used within the modelling assessment are presented in Appendix C.

3.3.1.7 NO_x to NO_2 relationship

The model used for this assessment provides outputs for oxides of nitrogen (NO_x) which need to be converted to NO_2 to allow comparison with the relevant air quality objectives. Defra provides a spreadsheet-based method, which is available from Defra's Air Information Resource (AIR) website[28], for calculating annual mean NO_x to NO_2 conversions. This method has been used within the assessment and is the most appropriate way of determining NO_2 concentrations from road NO_x contributions.

3.3.1.8 Predicted short-term pollutant concentrations

For all discrete receptors assessed, annual mean concentrations of NO_2 have been presented. Defra's TG16 document[20] indicates that the hourly NO_2 air quality objective of 200µg/m^3 (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60µg/m^3. Following this guideline, the hourly objective will not be considered further within this assessment if the annual modelled mean NO_2 concentrations are found to be less than 60µg/m^3.

The prediction of daily mean concentrations of PM_{10} is available as an output option within the ADMS-roads dispersion model for comparison against the short-term air quality objective. However, as the model output for annual mean concentrations is considered more accurate than the modelling of the daily mean, an empirical relationship has been used to determine daily mean PM_{10} concentrations. In accordance with TG16 the following formula has been used:

[26] Defra (2021) Emissions Factors Toolkit https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

[27] Defra Background maps (2018) [Online] Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps

[28] Defra (2022). LAQM support, Review and Assessment, Tools. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

No. of 24-hour mean exceedances = -18.5 + 0.00145 x annual mean^3 + (206 / annual mean)

Based on this formula, an annual mean PM_{10} concentration of 32µg/m^3 equates to 35 days at or above 50µg/m^3.

3.3.1.9 Sensitive human health receptors

The air quality objectives only apply in locations of relevant exposure. Therefore, receptors have been chosen following the advice set out in Defra LAQM TG16 and presented in Table 2.2.

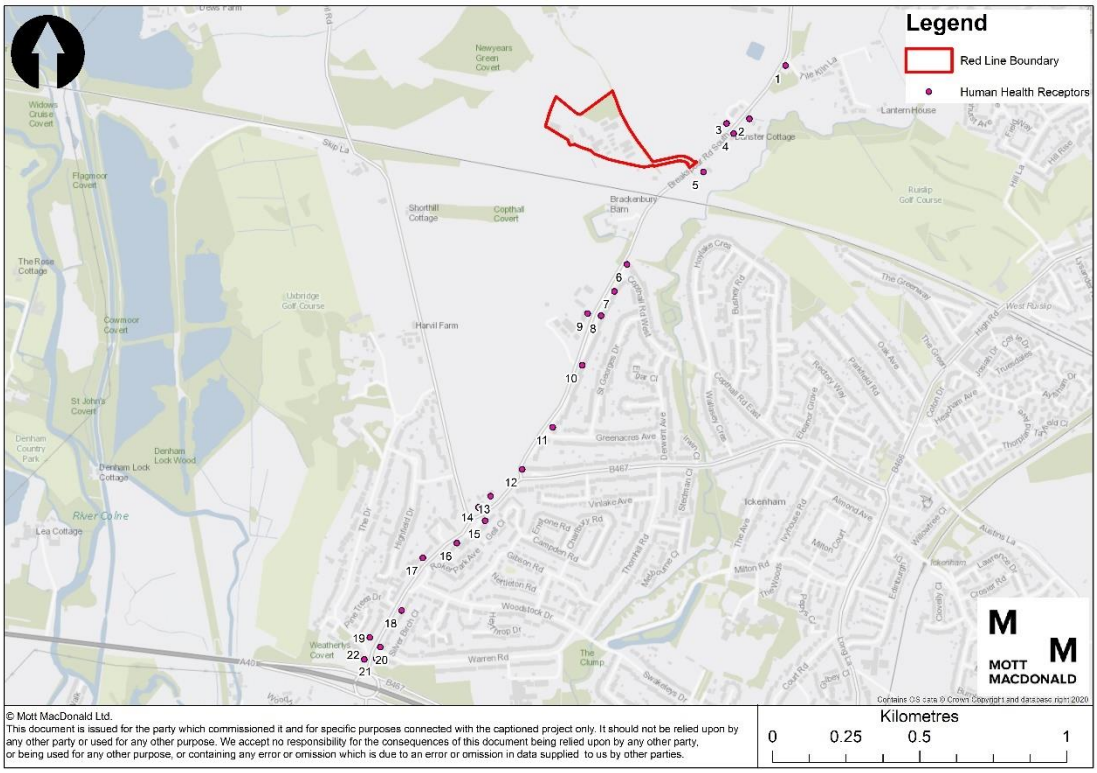
Human health receptors were chosen at worst case locations within 200m of the affected roads. Receptors were selected using professional judgement at locations where total pollutant concentrations were expected to be greatest (typically receptors closest to roads), or where the greatest change in air quality was anticipated based on the traffic impact. The human health receptors were modelled a height of 1.5m which is considered to be the representative head height of ground floor buildings. The chosen receptors are presented below in Table 3.1 and displayed on Figure 3.2.

Table 3.1: Modelled Human Receptors

Receptor ID	Receptor Name	National Grid reference		Height (m)	Receptor Type
		X	Y		
1	Tile Kiln Lane	507623	187639	1.5	Residential
2	Breakspear Road South	507500	187458	1.5	Residential
3	Grays Cottages	507423	187442	1.5	Residential
4	Gatemead Farm	507447	187408	1.5	Residential
5	Residence opposite site entrance	507343	187278	1.5	Residential
6	114 Breakspear Road	507084	186964	1.5	Residential
7	110 Breakspear Road South	507041	186872	1.5	Residential
8	94 Breakspear Road South	506996	186790	1.5	Residential
9	The Bungalow	506950	186797	1.5	Residential
10	62 Breakspear Road South	506932	186622	1.5	Residential
11	20 Breakspear Road South	506831	186411	1.5	Residential
12	190 Swakeleys Road	506727	186268	1.5	Residential
13	London Lodges	506620	186177	1.5	Residential
14	218 Swakeleys Road	506579	186140	1.5	Residential
15	195 Swakeleys Road	506602	186094	1.5	Residential
16	213 Swakeleys Road	506505	186018	1.5	Residential
17	222 Swakeleys Road	506390	185968	1.5	Residential
18	263 Swakeleys Road	506318	185790	1.5	Residential
19	254 Swakeleys Road	506209	185698	1.5	Residential
20	279 Swakeleys Road	506245	185665	1.5	Residential
21	Warren Road	506231	185626	1.5	Residential
22	The Dr	506191	185623	1.5	Residential

Source: Mott MacDonald, 2022.

Figure 3.2: Modelled human health receptors



Source: Mott MacDonald, 2022.

3.3.1.10 Sensitive ecological receptors

There are no nationally or locally designated ecological sites within 200m of the study area, with the closest being Frays Farm Meadow Site of Special Scientific Interest (SSSI) located approximately 0.4km away west of Swakeleys Road. Ecological receptors have therefore not been considered further.

3.3.1.11 Significance of effect

Guidance is available from a range of regulatory authorities and advisory bodies on how best to determine and present the significance of effects within an air quality assessment. It is generally considered good practice that, where possible, an assessment should communicate effects both numerically and descriptively.

Any description of an effect of a development is informed by numerical results; an element of professional judgement must also be involved. To ensure that the descriptions of effects used within the assessment are clear, consistent and in accordance with the latest guidance, definitions for the assessment of changes in air quality concentration at individual human health receptors have been adopted from the EPUK and IAQM guidance. Table 3.2 provides impact descriptors for changes in pollutant concentrations as a result of the Scheme.

The magnitude of any concentration change identified must be considered in relation to the Air Quality Assessment Level (AQAL), which may be an air quality objective, regulatory limit or target value. The most important aspects to consider are the percentage of long-term average concentrations at the individual receptor in the assessment year in relation to the AQAL and the percentage of change in concentration in relation to the AQAL.

EPUK and IAQM recognises that professional judgement is required in the interpretation of air quality assessment significance. Table 3.2 is intended as a tool to help interpret the results to the air quality assessment and would therefore be employed in conjunction with professional judgement.

Table 3.2: Impact descriptors for individual receptors

Long term average concentration at receptor in assessment year	Change in concentration relative to air quality assessment level (AQAL)			
	1%	2%-5%	6%-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76%-94% of AQAL	Negligible	Slight	Moderate	Moderate
95%-102% of AQAL	Slight	Moderate	Moderate	Substantial
103%-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Source: Land-Use Planning and Development Control: Planning for Air Quality' guidance produced by EPUK and the IAQM

Notes: [a] AQAL = Air Quality Assessment Level i.e. 40µg/m^3 for annual mean NO_2. The table is only designed to be used with annual mean concentrations

[b] Percentage pollutant concentrations are intended to be rounded to whole numbers. For example, the '<1%' category in this table includes all changes from 0.5% to 1.4% (equivalent to an annual mean NO_2 absolute concentration change of between 0.2µg/m^3 and 0.6µg/m^3). Changes of 0% (i.e. less than 0.5%) are described as negligible.

[c] When defining the concentration as a percentage of the AQAL, use the 'do minimum' concentrations where there is a decrease in pollutant concentration and the 'do something' concentration for an increase.

For the purposes of this assessment, impacts of Moderate Adverse or Moderate Beneficial and above would be further considered using professional judgement to determine if the Scheme has caused a significant effect. The application of professional judgement would consider:

- the existing and future air quality in the absence of a development;
- the extent of current and future population exposure to the impacts; and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

3.3.1.12 Assessment assumptions and limitations

Dispersion modelling has associated with it an inherent level of uncertainty, primarily as a result of:

- Uncertainties with emissions data
- Uncertainties with meteorological data, and
- Simplifications made in the model algorithms or post processing of the data that represent atmospheric dispersion or chemical reactions.

A process known as model verification aims to address these uncertainties. Verification is carried out by comparing modelled concentrations with monitored concentrations to identify any disparity and where required adjusting modelled outputs.

Full details of model verification are presented in Appendix B.

3.3.2 Air Quality Neutral assessment

An Air Quality Neutral assessment has been undertaken for the proposed development in line with the draft London Plan Guidance – Air Quality Neutral[29]. The consultation draft was

[29] Mayor of London (2021) London Plan Guidance – Air Quality Neutral. Available at: https://www.london.gov.uk/sites/default/files/air_quality_neutral_lpg_-_consultation_draft_0.pdf

published in November 2021 by the Greater London Authority to assist developers in ensuring that all new developments were air quality neutral in line with the London Plan Policy SI 1. The document provides benchmarks for emissions from buildings and transport that the proposed development emissions are assessed against. The proposed development does not contain any new combustion plant such as gas fired boilers, building emissions benchmarks have therefore not been assessed. Transport emissions have been assessed using the additional traffic generated by the proposed development.

3.3.3 Defra damage cost approach

At the request of the EHO from LBoH, the Defra damage cost approach has been undertaken in line with the Defra damage cost guidance[30] and Defra damage costs toolkit[31]. This has been undertaken for NO_x and $PM_{2.5}$ emissions resulting from the operation of the proposed development. This assessment sets a monetary value per tonne of emission generated by the proposed development.

The assessment has taken into account the emissions generated by operational road traffic as a result of the proposed development. Annual emissions have been calculated using the Defra EFT (Version 11.1)[32]. An appraisal period of five years has been undertaken.

3.3.4 Energy generation

The proposed development is fully powered by electricity with connections to the national grid. There is no proposed combustion equipment on site and therefore no proposed emissions to air as a result of site energy generation.

3.3.5 Operational minerals

The proposed development will not store raw materials on site. The storage space on site will be used to store equipment such as plant, small tools, scaffolding and other structures. As no potential dust generating raw materials will be stored on site, assessment of operational mineral dust has been scoped out of the assessment.

3.4 Consultation

Consultation was undertaken with the environmental health officer (EHO) responsible for air quality at LBOH via email on the 3rd August 2022 and via an online meeting on 5th August 2022. The scope of the air quality assessment was agreed, with the EHO providing notes on the proposed scope, comments included:

- A requirement to model construction traffic emissions
- A requirement to include roads even though they do not meet the screening criteria within accepted IAQM/EPUK guidance, modelled roads are presented on Figure 7.1 in Appendix A
- The use of local authority monitoring background sites for background concentrations within the modelling assessments over Defra projected backgrounds
- Use of publicly available HS2 Ltd monitoring data within the assessment
- The use of Defra's damage cost approach for NO_x and $PM_{2.5}$ emissions

[30] Department for Food, Environment and Rural Affairs (2021) Air quality appraisal: damage cost guidance. Available at: https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance

[31] Department for Food, Environment and Rural Affairs (2021) Air quality appraisal: damage costs toolkit. Available at: https://www.gov.uk/government/publications/assess-the-impact-of-air-quality

[32] Department for Food, Environment and Rural Affairs (2021) Emissions Factors Toolkit. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

4 Baseline Conditions

4.1 Overview

Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. Data has been obtained from LBoH, publicly available HS2 data and Defra to inform the baseline. The latest full year of data currently available is for 2020.

It should be noted that the 2020 data (and also 2021 data if it was available) may may not provide an true reflection of baseline conditions. This is due to the effects of coronavirus national lockdowns on ambient air quality monitoring data. National lockdown restrictions led to reduced vehicle emissions during national lockdown periods, which in turn led to lower ambient pollutant concentrations. The 2020 data is likely to present an underrepresentation of ambient pollutant concentrations. The 2019 data is therefore the most recent likely representation of the air quality baseline conditions and has been used to inform the assessment

4.2 Local authority review and assessment

LBoH have one air quality management area (AQMA) declared within the borough, this AQMA was declared in 2003 for exceedances of the NO_2 annual mean objective. The AQMA covers the entirety of the south and middle of the borough, it is bordered to the north by the Chiltern Mainline Railway line. The site is not located within this AQMA but is located approximately 90m north of the AQMA. The AQMA is presented on Figure 4.1.

4.3 Local authority automatic monitoring sites

There were 12 automatic monitoring sites within the LBoH jurisdiction in 2020. 11 of these sites were located around Heathrow airport to the south of the borough approximately 9km south of the proposed development. The other site was located in South Ruislip approximately 4.5km southeast of the proposed development, this site will be heavily influenced by road traffic from the centre of Ruislip. These sites are not considered representative of site conditions and have not been considered further.

4.4 Local authority diffusion tube monitoring sites

LBoH undertook passive diffusion tube monitoring at 44 locations within the borough in 2020. The closest of these diffusion tubes was located 1.8km east of the proposed development in the centre of Ruislip. This is not considered representative of site conditions. There were two diffusion tubes located to the north of the A40/Swakeleys Road junction 1.9km south of the proposed development. These tubes are likely to be heavily influenced by road emissions from the A40 and connecting junction, and again are not considered representative of site conditions.

These monitoring sites are located on roads that will be affected by traffic flows in the construction and operational phase. There is also one monitoring site to the south of the A40 (ID: HILL23), this is a background site and has been used as a background concentration within the dispersion modelling assessment at the request of the EHO from LBoH. The results from these diffusion tubes are presented below in Table 4.1. There are no monitored exceedances of the NO_2 annual mean in 2018-2020. The concentration at the HILL42 monitoring site was close to the annual mean objective level in 2019, however, it should be noted that this is a roadside monitor that is not a relevant location of exposure for where the annual mean objective applies (see Table 2.2).

Table 4.1: Local authority diffusion tube monitoring

Site ID	British National Grid Coordinates		Site Type	Data Capture 2020	Annual Mean NO_2 Concentration ($\mu g/m^3$)		
	X	Y			2018[a]	2019[b]	2020[c]
HILL06	506243	185653	Roadside	83	37.6	35.0	30.9
HILL42	506192	185614	Roadside	83	-	39.6	28.9
HILL23	506143	185395	Background	75	35.1	29.3	22.1

Source: London Borough of Hillingdon Air Quality Annual Status Report 2020.
Note: Results have been bias adjusted. (-) indicates monitoring not undertaken in that year.
[a] Bias adjustment factor of 0.92
[b] Bias adjustment factor of 0.89.
[c] Bias adjustment factor of 0.89.

4.5 HS2 diffusion tube monitoring sites

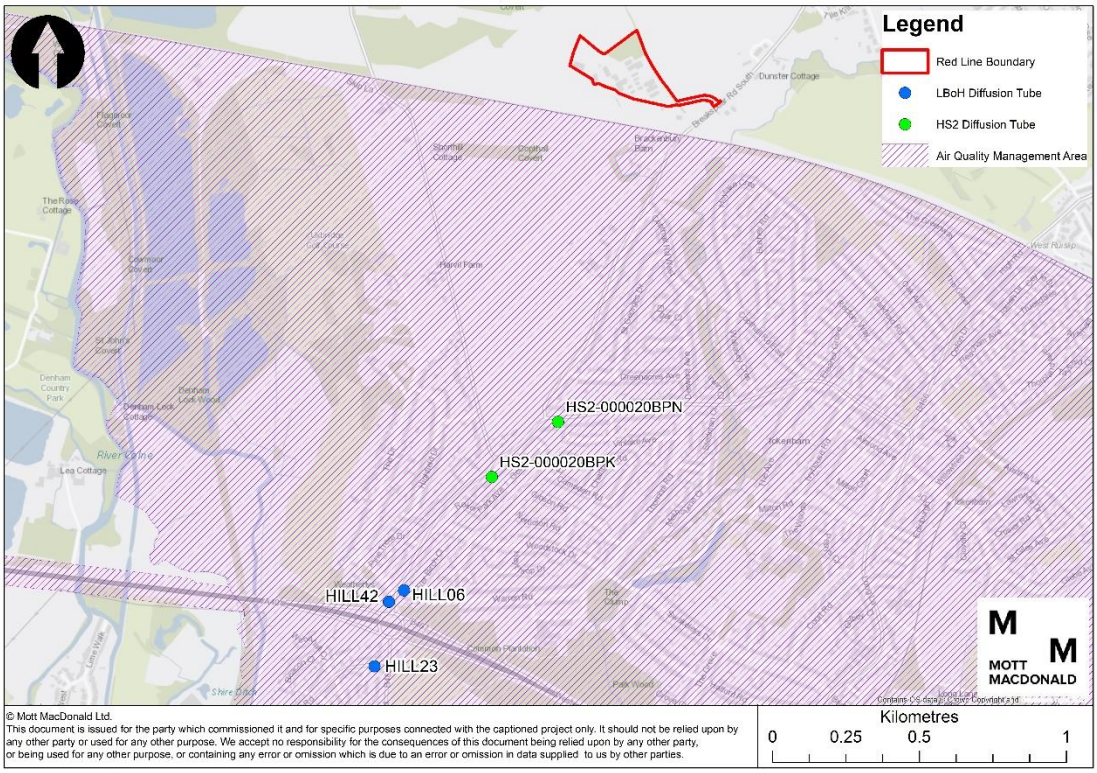
As part of the HS2 development project, HS2 Ltd have undertaken air quality monitoring to assess the impacts of the development on ambient air quality in areas where the scheme is being constructed. This data is available online and is free for commercial use under the UK governments open license. There are 11 diffusion tubes within the LBOH jurisdiction, two of these are located to the south of the proposed development on Swakeleys Road. There were no exceedances of the NO_2 annual mean objective at these sites in 2018 – 2020. It should be noted that these two diffusion tubes are roadside monitors, and the concentrations are likely higher than those at the proposed development. HS2-000020BPK is located on a section of Swakeleys Road that is to be affected by traffic flows on the construction and operational phase of the proposed development. The results from these diffusion tubes are presented below in Table 4.2 and the location of the diffusion tubes is presented on Figure 4.1.

Table 4.2: HS2 diffusion tube monitoring

Site ID	British National Grid Coordinates		Site Type	Data Capture 2020	Annual Mean NO_2 Concentration ($\mu g/m^3$)		
	X	Y			2018[a]	2019[b]	2020[c]
HS2-000020BPN	506767	186224	Roadside	67	31.0	31.0	24.8[d]
HS2-000020BPK	506542	186037	Roadside	75	35.8	34.9	27.8

Source: HS2 Air Quality Annual Report 2020, HS2 Ltd.
Note: Results have been bias adjusted.
[a] Bias adjustment factor of 0.95
[b] Bias adjustment factor of 0.95.
[c] Bias adjustment factor of 0.85.
[d] Site annualised as data capture < 75%

Figure 4.1: Monitoring and AQMA



Source: Mott MacDonald, 2022.

4.6 Defra projected background concentrations

Defra provides mapped future year projections of background pollution concentrations for NO_x, NO_2, PM_{10} and $PM_{2.5}$ for each 1km grid square across the UK for all years between 2018 to 2030[33]. The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against 2018 (the baseline year) UK monitoring data.

Table 4.3 presents the adjusted background concentrations for the 1km grid squares containing the proposed development in the current year of 2022. These are all well below the relevant air quality objectives.

Table 4.3: Projected background concentrations (µg/m^3) of NO_x, NO_2, PM_{10} and $PM_{2.5}$ (maximum concentrations across proposed development area)

Year	Pollutant			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$
2022	17.8	13.2	13.8	9.5

Source: Defra (2018)
Note: The background concentrations shown are for the 1km square centred on 507500, 187500.

4.7 Summary

The proposed development is not within an AQMA. It is however located approximately 90m north of the Hillingdon AQMA that is designated for exceedances of the NO_2 annual mean

[33] Defra Background maps (2018) [Online] Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps

objective. There are no local authority automatic or passive monitors in close vicinity to the site. Data publicly available from HS2 Ltd has been analysed with two diffusion tubes in close proximity to the site. One of these monitors is located on Swakeleys Road on a section affected by construction and operational traffic. There are also two local authority monitors located on Swakeleys Road further south on sections also to be affected by construction and operational traffic. There were no exceedances of the annual mean objective in 2018 – 2020 at any of these monitoring sites. These locations were all roadside monitors and are likely to be higher than concentrations on the proposed development site.

There are no monitors of PM_{10} and $PM_{2.5}$ in the vicinity of the proposed development, the Defra projected background data indicates that concentrations in the area are low and well below objective levels.

5 Potential Impacts

5.1 Overview

This section provides details of the likely effects predicted to occur from the construction and operation of the proposed development.

5.2 Construction

5.2.1 Construction dust assessment

Construction dust emissions from the proposed development will only occur during the construction phase and therefore are described as temporary. The dust emission magnitude descriptors that have been applied to each of the construction activities are presented in Table 5.1 along with the justification for the selections.

Table 5.1: Dust emission magnitude

Activity	Dust emission magnitude	Justification
Demolition	Medium	Some buildings are to be retained on site and repurposed. No detailed demolition information is currently available, medium magnitude selected due to demolition of some structures which is likely a conservative estimate.
Earthworks	Large	Total exact area of earthworks is currently unknown. Worst case assumption of entire site to be requiring an element of earthworks. On this basis this would result in an area of 48,000m^2. The threshold for a large magnitude is 10,000m^2.
Construction	Medium	The development will consist of five buildings with a proposed built volumetric area of 31,295m^3. This is within the medium threshold of 25,000m^3 to 100,000m^3.
Trackout	Large	Peak construction movements during the construction phase are 51 HDV movements a day. This will be limited to peak construction periods which are currently projected to be a maximum of 3 months. This is just above the threshold for a large magnitude of 50.

The sensitivity of receptors to dust soiling and PM_{10} was determined through the identification of the number of receptors within a range of distance bands and by annual mean PM_{10} concentrations.

(a) Annual mean PM10 concentration taken from Defra background pollutant concentrations presented in Table 4.3.

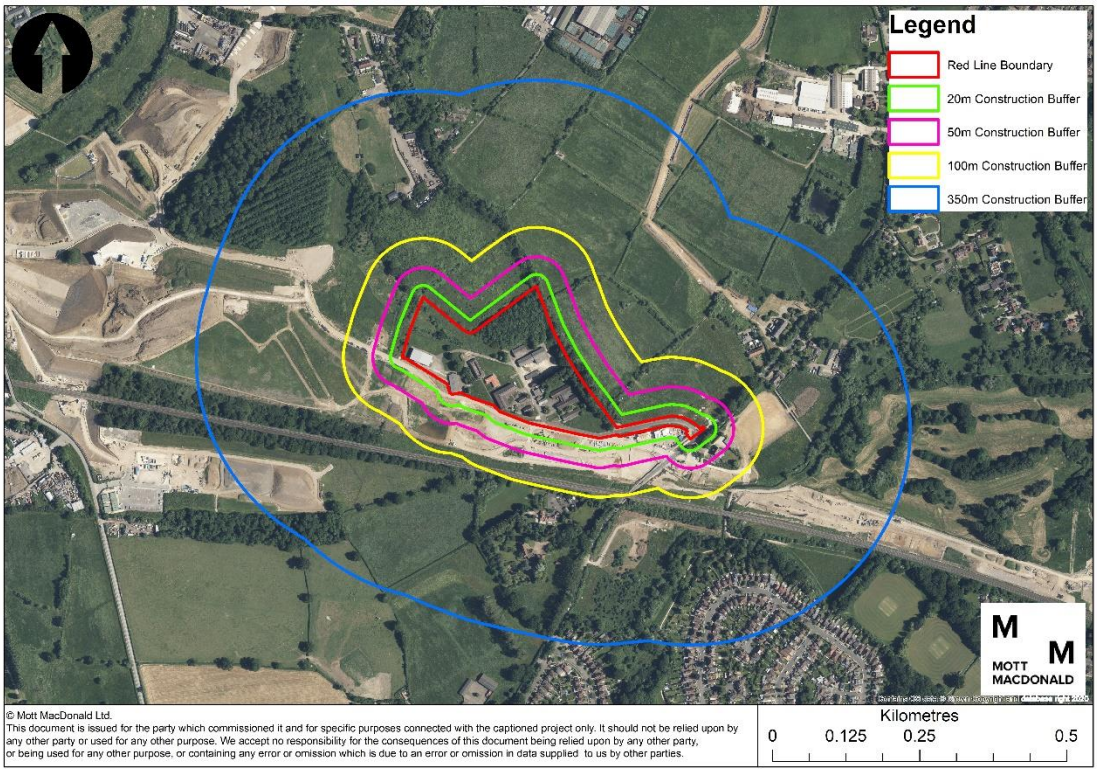
Figure 5.1 and Table 5.2 present the sensitivity of the area to the identified construction activities associated. No ecological receptors have been identified within 50m of the proposed development therefore impacts on ecological receptors have been scoped out. The criteria to determine sensitivity is presented in Table 7.10, Table 7.11, Table 7.12 and Table 7.13 in Appendix D.

Table 5.2: Receptor sensitivity

Activity	Dust soiling		Health effects of PM_{10}	
	Sensitivity	Comment	Sensitivity	Comment
Demolition	Low	There is one residence within 50m of the site entrance, however this is an existing road where there will be no significant construction as this is located away from the main site area. 10-100 receptors are within 350m of the site, on Breakspear Road South and on Hoylake Crescent.	Low	The background annual mean PM_{10} concentration on site is less than 24µg/m$^{3(a)}$. 10-100 receptors are within 350m of the site.
Earthworks	Low		Low	
Construction	Low		Low	
Trackout	Medium	1 receptor within 20m and 10-100 receptors are within 50m of the trackout route southbound on Breakspear Road South which both give a medium sensitivity. Residences are on Breakspear Road South and Copthall Road West.	Low	The background annual mean PM_{10} concentration on site is less than 24µg/m$^{3(a)}$. 1 receptor within 20m and 10-100 receptors are within 50m of the trackout route which both give a low sensitivity.

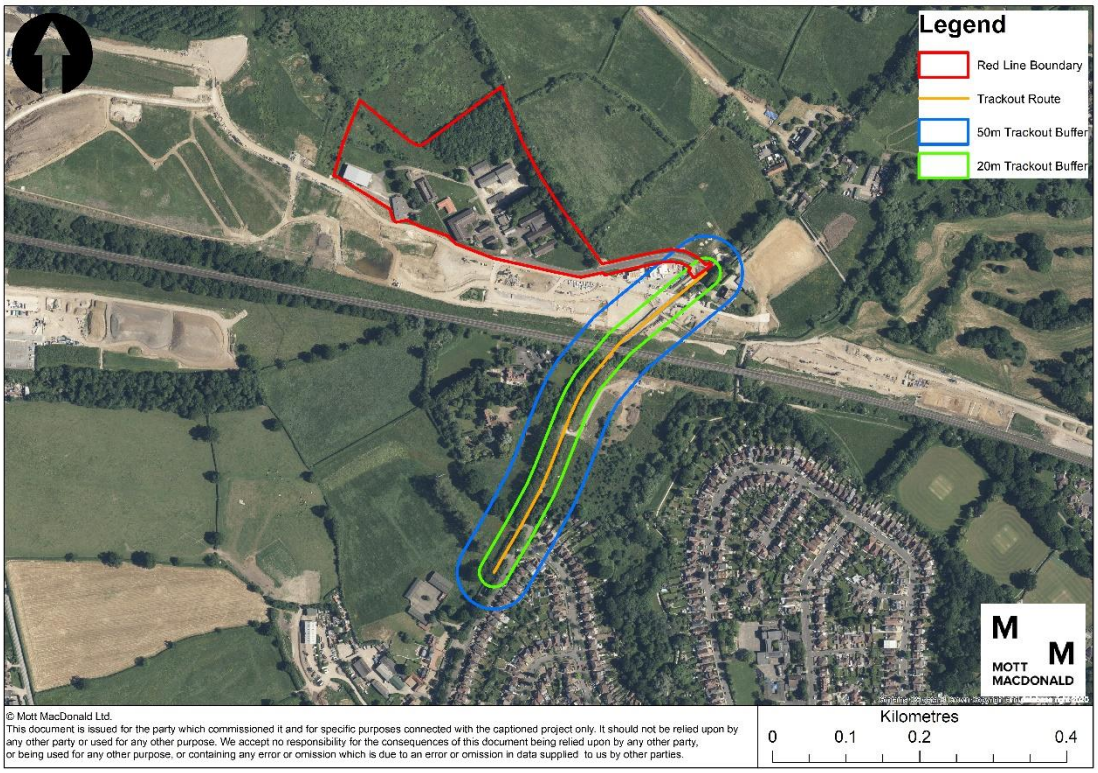
[(a)] Annual mean PM_{10} concentration taken from Defra background pollutant concentrations presented in Table 4.3.

Figure 5.1: Construction buffers



Source: Mott MacDonald 2022.

Figure 5.2: Construction trackout buffers



Source: Mott MacDonald 2022.

The overall risk of receptors to dust soiling effects and PM_{10} effects are presented in Table 5.3. Risk is based on the criteria presented in Appendix D.

Table 5.3: Summary of the risk of construction effects

Activity	Dust Soiling Effects	PM10 Effects
Demolition	Low Risk	Low Risk
Earthworks	Low Risk	Low Risk
Construction	Low Risk	Low Risk
Track Out	Medium Risk	Low Risk

As presented in Table 5.3, dust soiling effects for the proposed development are assessed to be low risk, apart from trackout that is medium risk. PM_{10} effects are deemed to be low risk without mitigation. Mitigation measures appropriate for the proposed development have been presented in Section 6 and incorporation of such measures within a Construction Environmental Management Plan (CEMP) is expected to reduce the predicted risk of construction effects such that effects are not considered to be significant.

5.2.2 Construction road traffic emissions

5.2.2.1 NO_2 concentrations

Concentrations of NO_2 during the construction phase have been predicted at receptors identified in Section 3.3.1.9 and are presented below in Table 5.4.

There are no predicted exceedances of the NO_2 annual mean objective in the Do-Minimum or the Do-Something scenarios. The biggest predicted changes are 0.1µg/m^3 at Receptors 12, 15,

17 and 20. Changes in concentrations at all other receptors are predicted to be less than 0.1µg/m^3. The impact at all receptors is predicted to be 'negligible' and therefore not significant in accordance with IAQM criteria.

Table 5.4: Construction annual mean NO_2 predicted pollutant concentrations (µg/m^3)

Receptor number	Receptor name	NO_2 annual mean concentration (µg/m^3)[a]		Predicted 2022 pollutant concentration change (µg/m^3)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	31.9	31.9	<0.1	Negligible
2	Breakspear Road South	31.1	31.1	<0.1	Negligible
3	Grays Cottages	30.4	30.4	<0.1	Negligible
4	Gatemead Farm	31.6	31.6	<0.1	Negligible
5	Residence opposite site entrance	30.4	30.4	<0.1	Negligible
6	114 Breakspear Road	31.6	31.6	<0.1	Negligible
7	110 Breakspear Road South	30.9	30.9	<0.1	Negligible
8	94 Breakspear Road South	30.9	30.9	<0.1	Negligible
9	The Bungalow	30.6	30.6	<0.1	Negligible
10	62 Breakspear Road South	31.2	31.2	<0.1	Negligible
11	20 Breakspear Road South	31.2	31.2	<0.1	Negligible
12	190 Swakeleys Road	35.0	35.1	0.1	Negligible
13	London Lodges	31.9	31.9	<0.1	Negligible
14	218 Swakeleys Road	33.2	33.2	<0.1	Negligible
15	195 Swakeleys Road	33.5	33.6	0.1	Negligible
16	213 Swakeleys Road	35.1	35.1	<0.1	Negligible
17	222 Swakeleys Road	33.0	33.1	0.1	Negligible
18	263 Swakeleys Road	34.8	34.8	<0.1	Negligible
19	254 Swakeleys Road	33.1	33.1	<0.1	Negligible
20	279 Swakeleys Road	36.3	36.4	0.1	Negligible
21	Warren Road	37.4	37.4	<0.1	Negligible
22	The Dr	35.9	35.9	<0.1	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

5.2.2.2 PM_{10} concentrations

Concentrations of PM_{10} during the construction phase have been predicted and are presented below in Table 5.5.

There were no exceedances of the PM_{10} annual mean objective in the Do-Minimum or Do-Something. The change in PM_{10} concentrations at all receptors is predicted to be less than 0.1µg/m^3 and the impact at all receptors was 'negligible'. In accordance with the IAQM criteria the impacts are therefore not significant.

Table 5.5: Construction annual mean PM_{10} predicted pollutant concentrations (µg/m^3)

Receptor number	Receptor name	PM_{10} annual mean concentration (µg/m^3)[a]		Predicted 2022 pollutant concentration change (µg/m^3)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	14.5	14.5	<0.1	Negligible
2	Breakspear Road South	14.3	14.3	<0.1	Negligible
3	Grays Cottages	14.1	14.1	<0.1	Negligible
4	Gatemead Farm	14.5	14.5	<0.1	Negligible
5	Residence opposite site entrance	14.1	14.1	<0.1	Negligible
6	114 Breakspear Road	15.3	15.3	<0.1	Negligible
7	110 Breakspear Road South	15.1	15.1	<0.1	Negligible
8	94 Breakspear Road South	14.9	14.9	<0.1	Negligible
9	The Bungalow	14.8	14.8	<0.1	Negligible
10	62 Breakspear Road South	14.9	14.9	<0.1	Negligible
11	20 Breakspear Road South	14.9	14.9	<0.1	Negligible
12	190 Swakeleys Road	15.9	15.9	<0.1	Negligible
13	London Lodges	15.1	15.1	<0.1	Negligible
14	218 Swakeleys Road	15.3	15.3	<0.1	Negligible
15	195 Swakeleys Road	15.4	15.4	<0.1	Negligible
16	213 Swakeleys Road	15.9	15.9	<0.1	Negligible
17	222 Swakeleys Road	17.2	17.2	<0.1	Negligible
18	263 Swakeleys Road	17.6	17.6	<0.1	Negligible
19	254 Swakeleys Road	17.0	17.0	<0.1	Negligible
20	279 Swakeleys Road	17.9	17.9	<0.1	Negligible
21	Warren Road	18.0	18.0	<0.1	Negligible
22	The Dr	17.5	17.5	<0.1	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

The predicted number of days where PM_{10} concentrations are above 50µg/m^3 are presented below in Table 5.6. There were no receptors predicted to be in exceedance of the 35-day threshold and no receptors that experienced a change in number of days as a result of construction traffic associated with the proposed development. The predicted impact at all receptors is therefore 'negligible' and not significant.

Table 5.6: Short Term PM_{10} predicted number of days above 50µg/m³

Receptor number	Receptor name	PM_{10} days above 50µg/m^3[a]		Days change	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	0.1	0.1	0.0	Negligible
2	Breakspear Road South	0.1	0.1	0.0	Negligible
3	Grays Cottages	0.2	0.2	0.0	Negligible
4	Gatemead Farm	0.1	0.1	0.0	Negligible

Receptor number	Receptor name	PM_{10} days above 50µg/m^3[a]		Days change	Impact descriptor
		2022 DM[b]	2022 DS[b]		
5	Residence opposite site entrance	0.2	0.2	0.0	Negligible
6	114 Breakspear Road	0.2	0.2	0.0	Negligible
7	110 Breakspear Road South	0.1	0.1	0.0	Negligible
8	94 Breakspear Road South	0.1	0.1	0.0	Negligible
9	The Bungalow	0.1	0.1	0.0	Negligible
10	62 Breakspear Road South	0.1	0.1	0.0	Negligible
11	20 Breakspear Road South	0.1	0.1	0.0	Negligible
12	190 Swakeleys Road	0.3	0.3	0.0	Negligible
13	London Lodges	0.1	0.1	0.0	Negligible
14	218 Swakeleys Road	0.2	0.2	0.0	Negligible
15	195 Swakeleys Road	0.2	0.2	0.0	Negligible
16	213 Swakeleys Road	0.3	0.3	0.0	Negligible
17	222 Swakeleys Road	0.9	0.9	0.0	Negligible
18	263 Swakeleys Road	1.1	1.1	0.0	Negligible
19	254 Swakeleys Road	0.8	0.8	0.0	Negligible
20	279 Swakeleys Road	1.3	1.3	0.0	Negligible
21	Warren Road	1.4	1.4	0.0	Negligible
22	The Dr	1.1	1.1	0.0	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

5.2.2.3 $PM_{2.5}$ concentrations

Concentrations of $PM_{2.5}$ during the construction phase have been predicted and are presented below in Table 5.7.

There were no predicted exceedances of the $PM_{2.5}$ annual mean objective in the Do-Minimum or Do-Something. The maximum change in concentration is predicted to be 0.1µg/m^3, this change is at Receptors 12 and 16. The rest of the receptors are predicted to have a change in concentration of less than 0.1µg/m^3. The impact at all receptors is 'negligible' and therefore not significant in accordance with IAQM criteria.

Table 5.7: Construction annual mean $PM_{2.5}$ predicted pollutant concentrations (µg/m^3)

Receptor number	Receptor name	$PM_{2.5}$ annual mean concentration (µg/m^3)[a]		Predicted 2022 pollutant concentration change (µg/m^3)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	9.9	9.9	<0.1	Negligible
2	Breakspear Road South	9.8	9.8	<0.1	Negligible
3	Grays Cottages	9.7	9.7	<0.1	Negligible
4	Gatemead Farm	9.9	9.9	<0.1	Negligible
5	Residence opposite site entrance	9.7	9.7	<0.1	Negligible

Receptor number	Receptor name	$PM_{2.5}$ annual mean concentration (µg/m³)[a]		Predicted 2022 pollutant concentration change (µg/m³)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
6	114 Breakspear Road	10.4	10.4	<0.1	Negligible
7	110 Breakspear Road South	10.3	10.3	<0.1	Negligible
8	94 Breakspear Road South	10.1	10.1	<0.1	Negligible
9	The Bungalow	10.0	10.0	<0.1	Negligible
10	62 Breakspear Road South	10.1	10.1	<0.1	Negligible
11	20 Breakspear Road South	10.1	10.1	<0.1	Negligible
12	190 Swakeleys Road	10.6	10.7	0.1	Negligible
13	London Lodges	10.2	10.2	<0.1	Negligible
14	218 Swakeleys Road	10.3	10.3	<0.1	Negligible
15	195 Swakeleys Road	10.4	10.4	<0.1	Negligible
16	213 Swakeleys Road	10.6	10.7	0.1	Negligible
17	222 Swakeleys Road	11.4	11.4	<0.1	Negligible
18	263 Swakeleys Road	11.6	11.6	<0.1	Negligible
19	254 Swakeleys Road	11.3	11.3	<0.1	Negligible
20	279 Swakeleys Road	11.8	11.8	<0.1	Negligible
21	Warren Road	11.9	11.9	<0.1	Negligible
22	The Dr	11.6	11.6	<0.1	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

5.3 Operation

5.3.1 Operational road traffic emissions

5.3.1.1 NO_2 concentrations

Concentrations of NO_2 during the operational phase have been predicted at receptors identified in Section 3.3.1.9 and are presented below in Table 5.8.

There are no predicted exceedances of the NO_2 annual mean objective in the Do-Minimum or the Do-Something scenarios. The biggest predicted changes are 0.1µg/m³ at Receptors 4, 12, 14, 15, 17 and 20. Changes in concentrations at all other receptors are predicted to be below 0.1µg/m³. The impact at all receptors is 'negligible' and therefore not significant in accordance with IAQM criteria.

Table 5.8: Construction annual mean NO_2 predicted pollutant concentrations (µg/m³)

Receptor number	Receptor name	NO_2 annual mean concentration (µg/m³)[a]		Predicted 2022 pollutant concentration change (µg/m³)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	31.9	31.9	<0.1	Negligible
2	Breakspear Road South	31.1	31.1	<0.1	Negligible

Receptor number	Receptor name	NO_2 annual mean concentration (µg/m^3)[a]		Predicted 2022 pollutant concentration change (µg/m^3)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
3	Grays Cottages	30.4	30.4	<0.1	Negligible
4	Gatemead Farm	31.6	31.7	0.1	Negligible
5	Residence opposite site entrance	30.4	30.4	<0.1	Negligible
6	114 Breakspear Road	31.6	31.6	<0.1	Negligible
7	110 Breakspear Road South	30.9	30.9	<0.1	Negligible
8	94 Breakspear Road South	30.9	30.9	<0.1	Negligible
9	The Bungalow	30.6	30.6	<0.1	Negligible
10	62 Breakspear Road South	31.2	31.2	<0.1	Negligible
11	20 Breakspear Road South	31.2	31.2	<0.1	Negligible
12	190 Swakeleys Road	35.0	35.1	0.1	Negligible
13	London Lodges	31.9	31.9	<0.1	Negligible
14	218 Swakeleys Road	33.2	33.3	0.1	Negligible
15	195 Swakeleys Road	33.5	33.6	0.1	Negligible
16	213 Swakeleys Road	35.1	35.1	<0.1	Negligible
17	222 Swakeleys Road	33.0	33.1	0.1	Negligible
18	263 Swakeleys Road	34.8	34.8	<0.1	Negligible
19	254 Swakeleys Road	33.1	33.1	<0.1	Negligible
20	279 Swakeleys Road	36.3	36.4	0.1	Negligible
21	Warren Road	37.4	37.4	<0.1	Negligible
22	The Dr	35.9	35.9	<0.1	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

5.3.1.2 PM_{10} concentrations

Concentrations of PM_{10} during the operational phase have been predicted and are presented below in Table 5.9.

There were no predicted exceedances of the PM_{10} annual mean objective in the Do-Minimum or Do-Something scenarios. The biggest predicted changes are 0.1µg/m^3 at Receptors 1, 5, 10 and 22. Changes in concentrations at all other receptors are predicted to be below 0.1µg/m^3. In accordance with IAQM criteria the impacts are 'negligible' and therefore not significant.

Table 5.9: Construction annual mean PM_{10} predicted pollutant concentrations (µg/m^3)

Receptor number	Receptor name	PM_{10} annual mean concentration (µg/m^3)[a]		Predicted 2022 pollutant concentration change (µg/m^3)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	14.5	14.6	0.1	Negligible
2	Breakspear Road South	14.3	14.3	<0.1	Negligible

Receptor number	Receptor name	PM_{10} annual mean concentration (µg/m^3)[a]		Predicted 2022 pollutant concentration change (µg/m^3)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
3	Grays Cottages	14.1	14.1	<0.1	Negligible
4	Gatemead Farm	14.5	14.5	<0.1	Negligible
5	Residence opposite site entrance	14.1	14.2	0.1	Negligible
6	114 Breakspear Road	15.3	15.3	<0.1	Negligible
7	110 Breakspear Road South	15.1	15.1	<0.1	Negligible
8	94 Breakspear Road South	14.9	14.9	<0.1	Negligible
9	The Bungalow	14.8	14.8	<0.1	Negligible
10	62 Breakspear Road South	14.9	15.0	0.1	Negligible
11	20 Breakspear Road South	14.9	14.9	<0.1	Negligible
12	190 Swakeleys Road	15.9	15.9	<0.1	Negligible
13	London Lodges	15.1	15.1	<0.1	Negligible
14	218 Swakeleys Road	15.3	15.3	<0.1	Negligible
15	195 Swakeleys Road	15.4	15.4	<0.1	Negligible
16	213 Swakeleys Road	15.9	15.9	<0.1	Negligible
17	222 Swakeleys Road	17.2	17.2	<0.1	Negligible
18	263 Swakeleys Road	17.6	17.6	<0.1	Negligible
19	254 Swakeleys Road	17.0	17.0	<0.1	Negligible
20	279 Swakeleys Road	17.9	17.9	<0.1	Negligible
21	Warren Road	18.0	18.0	<0.1	Negligible
22	The Dr	17.5	17.6	0.1	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

The predicted number of days where PM_{10} concentrations are above 50µg/m^3 are presented below in Table 5.10. There were no receptors predicted to be in exceedance of the 35-day threshold and no receptors that experienced a change in number of days as a result of operational traffic associated with the proposed development. The predicted impact at all receptors is therefore 'negligible' and not significant.

Table 5.10: Short Term PM_{10} predicted number of days above 50µg/m^3

Receptor number	Receptor name	PM_{10} days above 50µg/m^3[a]		Days change	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	0.1	0.1	0.0	Negligible
2	Breakspear Road South	0.1	0.1	0.0	Negligible
3	Grays Cottages	0.2	0.2	0.0	Negligible
4	Gatemead Farm	0.1	0.1	0.0	Negligible
5	Residence opposite site entrance	0.2	0.2	0.0	Negligible
6	114 Breakspear Road	0.2	0.2	0.0	Negligible
7	110 Breakspear Road South	0.1	0.1	0.0	Negligible

Receptor number	Receptor name	PM_{10} days above 50µg/m^3[a]		Days change	Impact descriptor
		2022 DM[b]	2022 DS[b]		
8	94 Breakspear Road South	0.1	0.1	0.0	Negligible
9	The Bungalow	0.1	0.1	0.0	Negligible
10	62 Breakspear Road South	0.1	0.1	0.0	Negligible
11	20 Breakspear Road South	0.1	0.1	0.0	Negligible
12	190 Swakeleys Road	0.3	0.3	0.0	Negligible
13	London Lodges	0.1	0.1	0.0	Negligible
14	218 Swakeleys Road	0.2	0.2	0.0	Negligible
15	195 Swakeleys Road	0.2	0.2	0.0	Negligible
16	213 Swakeleys Road	0.3	0.3	0.0	Negligible
17	222 Swakeleys Road	0.9	0.9	0.0	Negligible
18	263 Swakeleys Road	1.1	1.1	0.0	Negligible
19	254 Swakeleys Road	0.8	0.8	0.0	Negligible
20	279 Swakeleys Road	1.3	1.3	0.0	Negligible
21	Warren Road	1.4	1.4	0.0	Negligible
22	The Dr	1.1	1.1	0.0	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

5.3.1.3 $PM_{2.5}$ concentrations

Concentrations of $PM_{2.5}$ during the operational phase have been predicted and are presented below in Table 5.11.

There are no predicted exceedances of the $PM_{2.5}$ annual mean objective in the Do-Minimum or Do-Something scenarios. The maximum predicted change in concentration is 0.1µg/m^3, at Receptors 12 and 16. The remaining of the receptors are predicted to have a change in concentration of less than 0.1µg/m^3. The impact at all receptors is 'negligible' and therefore not significant in accordance with IAQM criteria.

Table 5.11: Construction annual mean $PM_{2.5}$ predicted pollutant concentrations (µg/m^3)

Receptor number	Receptor name	$PM_{2.5}$ annual mean concentration (µg/m^3)[a]		Predicted 2022 pollutant concentration change (µg/m^3)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
1	Tile Kiln Lane	9.9	9.9	<0.1	Negligible
2	Breakspear Road South	9.8	9.8	<0.1	Negligible
3	Grays Cottages	9.7	9.7	<0.1	Negligible
4	Gatemead Farm	9.9	9.9	<0.1	Negligible
5	Residence opposite site entrance	9.7	9.7	<0.1	Negligible
6	114 Breakspear Road	10.4	10.4	<0.1	Negligible
7	110 Breakspear Road South	10.3	10.3	<0.1	Negligible
8	94 Breakspear Road South	10.1	10.1	<0.1	Negligible

Receptor number	Receptor name	$PM_{2.5}$ annual mean concentration (µg/m³)[a]		Predicted 2022 pollutant concentration change (µg/m³)	Impact descriptor
		2022 DM[b]	2022 DS[b]		
9	The Bungalow	10.0	10.0	<0.1	Negligible
10	62 Breakspear Road South	10.1	10.1	<0.1	Negligible
11	20 Breakspear Road South	10.1	10.1	<0.1	Negligible
12	190 Swakeleys Road	10.6	10.7	0.1	Negligible
13	London Lodges	10.2	10.2	<0.1	Negligible
14	218 Swakeleys Road	10.3	10.3	<0.1	Negligible
15	195 Swakeleys Road	10.4	10.4	<0.1	Negligible
16	213 Swakeleys Road	10.6	10.7	0.1	Negligible
17	222 Swakeleys Road	11.4	11.4	<0.1	Negligible
18	263 Swakeleys Road	11.6	11.6	<0.1	Negligible
19	254 Swakeleys Road	11.3	11.3	<0.1	Negligible
20	279 Swakeleys Road	11.8	11.8	<0.1	Negligible
21	Warren Road	11.9	11.9	<0.1	Negligible
22	The Dr	11.6	11.6	<0.1	Negligible

Note: [a] Concentration showing the worst case from the assessment of three meteorological years (2019 – 2021)
[b] DM = Do-Minimum, DS = Do-Something

5.3.2 Air Quality Neutral assessment

There is no proposed combustion equipment on site with heating services to be provided through electricity with connection to the national grid. In accordance with para 3.1.1 of the Air Quality Neutral LPG[29], the proposed development is assumed to meet the building emission benchmark and no assessment is required.

The transport emissions benchmark for the proposed development has been calculated in line with the Air Quality Neutral LPG[29].

The proposed development has a gross internal area (GIA) floorspace of 7,170m^2. The land use of the site will be industrial. The transport emissions benchmark used in the air quality neutral assessment are presented below in Table 5.12.

Table 5.12: Transport emissions benchmark calculations

Land use	Gross internal area (m^2)	Benchmark trip rate (trips per m^2)	Total benchmark trip rate (trips/year)
Industrial	7,170	16.3[a]	116,871

Note: [a] Benchmark trip rate for industrial use in outer London

The predicted trip rate has been calculated from the traffic data provided by the transport consultant for the air quality modelling. The maximum flow change in AADT has been used to calculate the annual trip rate. This calculation is presented below in Table 5.13.

Table 5.13: Annual trip rate

Maximum AADT change	Annual trip rate
129	47,085[a]

Note: [a] Annual trip rate calculated by multiplying the change in AADT in the opening year by 365.

The transport emissions benchmark has then been compared with the annual trip rate, this is presented below in Table 5.14. The proposed development is assessed to be air quality neutral in line with the Mayor of London SPG.

Table 5.14: Air quality neutral calculation

Total transport emissions benchmark	Proposed development annual trip rate	Difference
116,871	47,085	-69,786

5.3.3 Defra damage costs

At request of the EHO from LBoH, Defra damage costs have been calculated for the proposed development. It should be noted that as presented in Section 0, the proposed development is deemed to be air quality neutral in line with the Mayor of London SPG, and as such Defra damage costs are not required for any offsetting payments in line with the SPG.

The assessment considers concentrations of NO_x and $PM_{2.5}$ as a result of the operational phase of the proposed development. Annual emissions on the worst affected road links have been calculated using the Defra EFT, these were the road links with the higher change in predicted vehicle flows as a result of the proposed development. The annual emissions are presented below in Table 5.15.

Table 5.15: NO_x and $PM_{2.5}$ annual emissions

Pollutant	Emissions (tonnes)				
	2022	2023	2024	2025	2026
NO_x	0.173	0.151	0.131	0.117	0.109
$PM_{2.5}$	0.016	0.015	0.015	0.015	0.015

A price base year of 2022 was used in the assessment and an appraisal period of five years. The present values from the Defra damage cost calculator are presented below in Table 5.16.

Table 5.16: NO_x and $PM_{2.5}$ net present values

Pollutant	Low sensitivity present value	Central present value	High sensitivity present value
NO_x	£1,820	£22,416	£87,566
$PM_{2.5}$	£4,154	£19,785	£61,484

6 Mitigation

6.1 Overview

This section presents the proposed mitigation to reduce the potential impacts predicted in the preceding sections.

6.2 Construction phase

The construction phase activities are predicted to have a 'low to medium risk' in terms of dust soiling at sensitive receptors and 'low risk' for PM_{10} effects without mitigation. Best practice mitigation measures should be introduced to reduce the risk to negligible and should include techniques such as those outlined in IAQM and GLA guidance. These are presented below:

- General
  - display the name and contact details of person(s) accountable for air quality and dust issues on the application site boundary
  - display head or regional office contact information
  - develop and implement a Dust Management Plan
  - record all dust and air quality complaints, identify causes and take appropriate action and record measures to reduce emissions
  - make the complaints log available to local authority when asked
  - 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
  - carry out regular on and off site inspections, especially where receptors are to monitor dust and record inspection results. An inspection log should be made available to the local authority when asked
  - increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions
  - plan site layout so that machinery and dust causing activities are away from receptors, as far as is possible
  - erect solid screens or barriers around dusty activities or the application site boundary that are at least as high as any stockpiles on site. Keep clean using wet methods
  - avoid site runoff of water or mud. A record of any site run off should be kept and actions to prevent reoccurrence
  - keep site fencing, barriers and scaffolding clean using wet methods
  - remove materials that have a potential to produce dust from site as soon as possible
  - cover, seed or fence stockpiles to prevent wind whipping
  - only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques
  - ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, (using recycled water supply where possible)
  - use enclosed chutes and conveyors and covered skips
  - minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate
  - ensure equipment is readily available on site to clean any dry spillages

  - no burning of waste
  - reuse and recycle waste to reduce dust from waste materials
- Operating vehicle/machinery and sustainable travel
  - Ensure all on-road vehicles comply with the requirements of the London Low Emissions Zone and London NRMM standards and log all machinery online using the GLA NRMM register[34]
  - ensure all vehicles switch off engines when stationary – no idling vehicles.
  - avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable
  - impose and signpost a maximum speed limit
  - produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials
- Earthworks
  - re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
  - use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover topsoil, as soon as practicable
- Construction
  - avoid scabbling (roughening of concrete surfaces) if possible.
  - ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Trackout
  - use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material trackout out of the site. This may require the sweeper being continuously in use.
  - avoid dry sweeping of large areas.
  - ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport.
  - inspect on-site haul routes for integrity and repair where required.
  - record all inspections of haul routes and any subsequent action in a site log book.
  - 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 gates to be located at least 10m from receptors where possible.

6.3 Operation phase

There are no mitigation measures required for the operation of the proposed development.

[34] Cleaner Construction for London (2022) 'Non-Road Mobile Machinery (NRMM) Practical Guide v.5' Available online at: https://www.london.gov.uk/sites/default/files/nrmm_practical_guide_april_2022_web.pdf

7 Conclusion

This report provides an assessment of the following key impacts associated with the construction and operational phase of the proposed development:

- nuisance, impact upon health and/or loss of amenity caused by construction dust on sensitive receptors
- changes in pollutant concentrations caused by additional traffic generated by the proposed development during the construction and operation phase
- Air quality neutral as required by Mayor of London SPG

A qualitative assessment of construction dust effects has been undertaken for the proposed development. There is predicted to be a 'low to medium risk' of dust creating nuisance and/or loss of amenity and 'low risk' of PM_{10} leading to adverse health effects (without mitigation). Following the appropriate implementation of the mitigation measures listed in Section 6.2, impacts are predicted not to be significant.

The proposed development is not located within an AQMA, the Hillingdon AQMA is located 90m south.

The air quality effects from road traffic emissions during the construction and operation phase of the proposed development have been considered at sensitive receptors using an atmospheric dispersion model. The model has been verified against local authority and HS2 Ltd air quality monitoring data and has been used to estimate the air quality effects of the proposals using traffic forecasts.

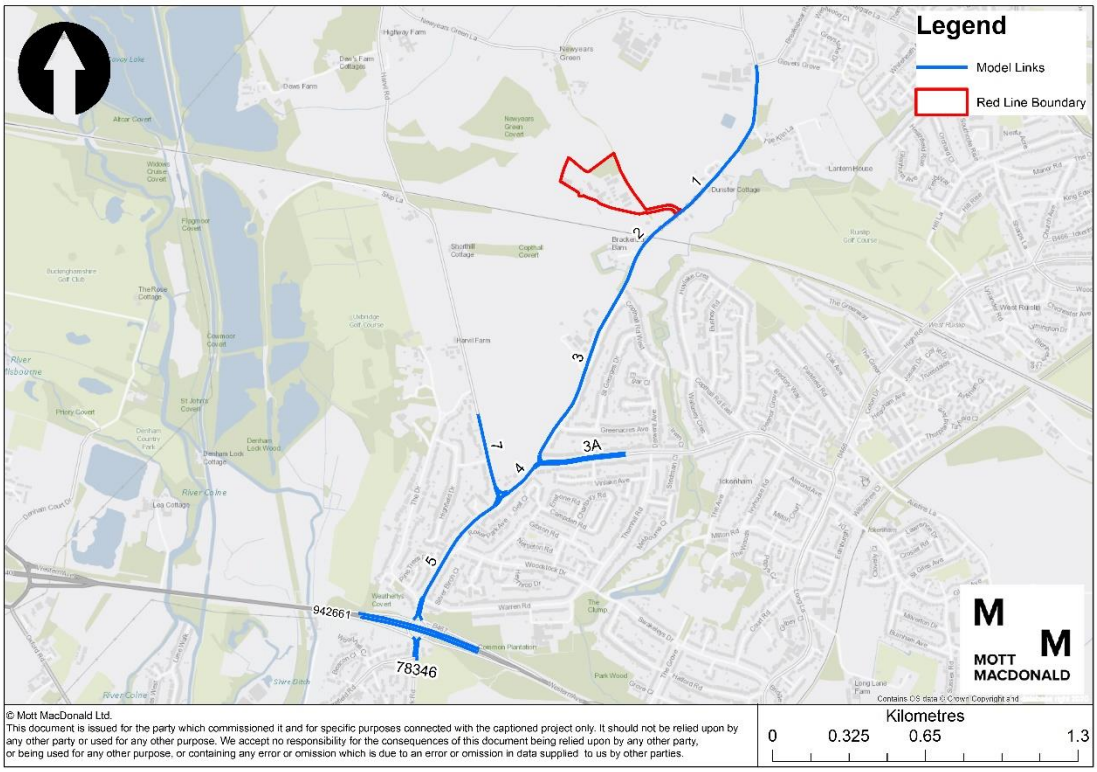
Modelled concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below air quality objectives in the Do-Minimum and Do-Something scenarios of the construction and operational phases. The proposed development results in 'negligible' changes in the concentration of all modelled pollutants at all receptors. In accordance with the IAQM significance criteria adopted for the assessment, impacts are concluded to be not significant.

An air quality neutral assessment has been undertaken in line with Mayor of London SPG. The assessment considered transport emissions only as building emissions were not required due to the proposed developments design. The assessment concludes that the proposed development is considered to be air quality neutral. Whilst the proposed development is air quality neutral, Defra damage costs were calculated at the request of the EHO from LBoH, although not technically applicable.

The proposed development is not considered to conflict with any national, regional or local planning policy within London or LBoH.

A. Traffic data

Figure 7.1: Modelled roads



Source: Mott MacDonald 2022

Table 7.1: 2019 base year traffic

Road	Road ID	AADT	HDV (%)	Speed (kph)
Breakspear Road South (north of site)	1NB	6609	2.5	45
Breakspear Road South (north of site)	1SB	6034	2.7	43
Breakspear Road South (north of site)	1 Two-Way	12643	2.6	64
Breakspear Road South (south of site)	2NB	6719	3.0	47
Breakspear Road South (south of site)	2SB	6033	3.4	48
Breakspear Road South (south of site)	2 Two-Way	12752	3.2	64
Breakspear Road South	3NB	7078	1.8	64
Breakspear Road South	3SB	5968	3.4	64
Breakspear Road South	3 Two-Way	13046	2.5	64
B467 Swakeleys Road	4NB	12490	2.7	48
B467 Swakeleys Road	4SB	11671	3.1	48

Road	Road ID	AADT	HDV (%)	Speed (kph)
B467 Swakeleys Road	4 Two-Way	24161	2.9	48
B467 Swakeleys Road	5NB	15535	3.2	35
B467 Swakeleys Road	5SB	15355	2.9	36
B467 Swakeleys Road	5 Two-Way	30890	3.0	48
B467 Swakeleys Road	3AWB	7108	2.4	48
B467 Swakeleys Road	3AEB	6816	3.3	48
B467 Swakeleys Road	3A Two-way	13925	2.9	48
Harvil Road	7 Two-way	6729	3.7	48
Harvil Road	7 NB	3365	3.7	48
Harvil Road	7 SB	3365	3.7	48
B483 Park Road (DFT Count)	942661 Two-Way	27610	3.2	48
B483 Park Road (DFT Count)	942661 NB	12172	3.4	48
B483 Park Road (DFT Count)	942661 SB	15438	3.1	48
A40 (DFT Count)	78346 Two-Way	85585	6.3	113
A40 (DFT Count)	78346 EB	42793	6.3	113
A40 (DFT Count)	78346 WB	42793	6.3	113

Table 7.2: 2022 Do-Minimum traffic

Road	Road ID	AADT	HDV (%)	Speed (kph)
Breakspear Road South (north of site)	1NB	6693	3.0	45
Breakspear Road South (north of site)	1SB	6111	3.3	43
Breakspear Road South (north of site)	1 Two-Way	12804	3.1	64
Breakspear Road South (south of site)	2NB	6805	3.6	47
Breakspear Road South (south of site)	2SB	6110	4.1	48
Breakspear Road South (south of site)	2 Two-Way	12915	3.8	64
Breakspear Road South	3NB	7168	2.1	64
Breakspear Road South	3SB	6044	4.1	64
Breakspear Road South	3 Two-Way	13212	3.0	64
B467 Swakeleys Road	4NB	12649	3.2	48
B467 Swakeleys Road	4SB	11820	3.7	48
B467 Swakeleys Road	4 Two-Way	24469	3.4	48
B467 Swakeleys Road	5NB	15733	3.9	35
B467 Swakeleys Road	5SB	15551	3.4	36
B467 Swakeleys Road	5 Two-Way	31284	3.7	48
B467 Swakeleys Road	3AWB	7199	2.9	48
B467 Swakeleys Road	3AEB	6903	4.0	48
B467 Swakeleys Road	3A Two-way	14102	3.4	48
Harvil Road	7 Two-way	6815	4.4	48
Harvil Road	7 NB	3407	4.4	48

Road	Road ID	AADT	HDV (%)	Speed (kph)
Harvil Road	7 SB	3407	4.4	48
B483 Park Road (DFT Count)	942661 Two-Way	27962	3.9	48
B483 Park Road (DFT Count)	942661 NB	12327	4.1	48
B483 Park Road (DFT Count)	942661 SB	15635	3.7	48
A40 (DFT Count)	78346 Two-Way	86676	7.6	113
A40 (DFT Count)	78346 EB	43338	7.6	113
A40 (DFT Count)	78346 WB	43338	7.6	113

Table 7.3: 2022 construction traffic

Road	Road ID	AADT	HDV (%)	Speed (kph)
Breakspear Road South (north of site)	1NB	6698	3.0	45
Breakspear Road South (north of site)	1SB	6115	3.3	43
Breakspear Road South (north of site)	1 Two-Way	12813	3.1	64
Breakspear Road South (south of site)	2NB	6835	3.9	47
Breakspear Road South (south of site)	2SB	6140	4.5	48
Breakspear Road South (south of site)	2 Two-Way	12975	4.2	64
Breakspear Road South	3NB	7199	2.5	64
Breakspear Road South	3SB	6074	4.5	64
Breakspear Road South	3 Two-Way	13273	3.4	64
B467 Swakeleys Road	4NB	12679	3.4	48
B467 Swakeleys Road	4SB	11850	3.9	48
B467 Swakeleys Road	4 Two-Way	24529	3.6	48
B467 Swakeleys Road	5NB	15763	4.0	35
B467 Swakeleys Road	5SB	15581	3.6	36
B467 Swakeleys Road	5 Two-Way	31344	3.8	48
B467 Swakeleys Road	3AWB	7199	2.9	48
B467 Swakeleys Road	3AEB	6903	4.0	48
B467 Swakeleys Road	3A Two-way	14102	3.4	48
Harvil Road	7 Two-way	6815	4.4	48
Harvil Road	7 NB	3407	4.4	48
Harvil Road	7 SB	3407	4.4	48
B483 Park Road (DFT Count)	942661 Two-Way	27962	3.9	48
B483 Park Road (DFT Count)	942661 NB	12327	4.1	48
B483 Park Road (DFT Count)	942661 SB	15635	3.7	48
A40 (DFT Count)	78346 Two-Way	86676	7.6	113
A40 (DFT Count)	78346 EB	43338	7.6	113
A40 (DFT Count)	78346 WB	43338	7.6	113

Table 7.4: 2022 operational traffic

Road	Road ID	AADT	HDV (%)	Speed (kph)
Breakspear Road South (north of site)	1NB	6738	3.0	45
Breakspear Road South (north of site)	1SB	6157	3.2	43
Breakspear Road South (north of site)	1 Two-Way	12895	3.1	64
Breakspear Road South (south of site)	2NB	6871	3.8	47
Breakspear Road South (south of site)	2SB	6173	4.3	48
Breakspear Road South (south of site)	2 Two-Way	13044	4.1	64
Breakspear Road South	3NB	7234	2.4	64
Breakspear Road South	3SB	6107	4.4	64
Breakspear Road South	3 Two-Way	13341	3.3	64
B467 Swakeleys Road	4NB	12714	3.4	48
B467 Swakeleys Road	4SB	11883	3.8	48
B467 Swakeleys Road	4 Two-Way	24598	3.6	48
B467 Swakeleys Road	5NB	15798	4.0	35
B467 Swakeleys Road	5SB	15614	3.5	36
B467 Swakeleys Road	5 Two-Way	31413	3.8	48
B467 Swakeleys Road	3AWB	7199	2.9	48
B467 Swakeleys Road	3AEB	6903	4.0	48
B467 Swakeleys Road	3A Two-way	14102	3.4	48
Harvil Road	7 Two-way	6815	4.4	48
Harvil Road	7 NB	3407	4.4	48
Harvil Road	7 SB	3407	4.4	48
B483 Park Road (DFT Count)	942661 Two-Way	27962	3.9	48
B483 Park Road (DFT Count)	942661 NB	12327	4.1	48
B483 Park Road (DFT Count)	942661 SB	15635	3.7	48
A40 (DFT Count)	78346 Two-Way	86676	7.6	113
A40 (DFT Count)	78346 EB	43338	7.6	113
A40 (DFT Count)	78346 WB	43338	7.6	113

B. Model verification

B.1 Overview

Model verification is a process by which checks are carried out to determine the performance of a dispersion model at a local level, primarily by comparison of modelled results with monitoring data. Differences between modelled and monitored data may occur as a result of uncertainties associated with a number of model inputs including:

- traffic flows, speeds and vehicle splits
- emissions estimates
- background concentrations
- meteorological data
- surface roughness length and terrain

The verification process investigates uncertainties and minimises them either through informed refinement of model input parameters or adjustment of the model output if it is deemed necessary.

Verification of NO_2 has been carried out using 2019 monitoring data available from LBoH and HS2 Ltd. All inputs within the modelling were as per the main assessment methodology presented in Section 3.3.1. There was no available monitoring within the study area for PM_{10} or $PM_{2.5}$. As such, the NO_x verification factor has also been applied to PM_{10} and $PM_{2.5}$ concentrations.

B.2 Methodology

Guidance produced by Defra[20] provides a methodology for model verification including calculation methods and directions on the suitability of monitoring data.

For the purpose of this verification only roadside monitoring sites have been used as kerbside sites tend to result in over prediction at non-kerbside locations which are the primary focus of this assessment.

Verification of NO_2 concentrations has been carried out using 2019 results from four roadside sites within the study area, all four of these monitors were diffusion tubes.

Background concentrations used in the verification process were derived from available local authority background monitors within the study area, at the request of the EHO from LBoH. There was one urban background NO_2 diffusion tube in close proximity to the study area. The concentrations from this diffusion tube are presented below in Table 7.5.

Table 7.5: Background monitoring used in verification

Site ID	Monitor Type	National grid reference		Annual Mean NO_2 Concentration 2019 (µg/m³)
		X	Y	
HILL23	Diffusion Tube	506143	185395	29.3

Table 7.6 presents the monitored data used within the verification, the location of the monitoring sites and monitored pollutant concentrations.

Table 7.6: Monitored data used in model verification

Site ID	National grid reference		Monitor Type	Annual Mean Monitored Concentrations 2019 (µg/m³)	
	X	Y		NOx	NO_2
HS2-000020BPN	506243	185653	Diffusion tube	3.6	31.0
HS2-000020BPK	506192	185614	Diffusion tube	12.2	34.9
LA-HILL06	506542	186037	Diffusion tube	12.4	35.0
LA-HILL42	506767	186224	Diffusion tube	23.0	39.6

Note: NO_x values for the diffusion tubes have been derived from the NO_x to NO_2 calculator.

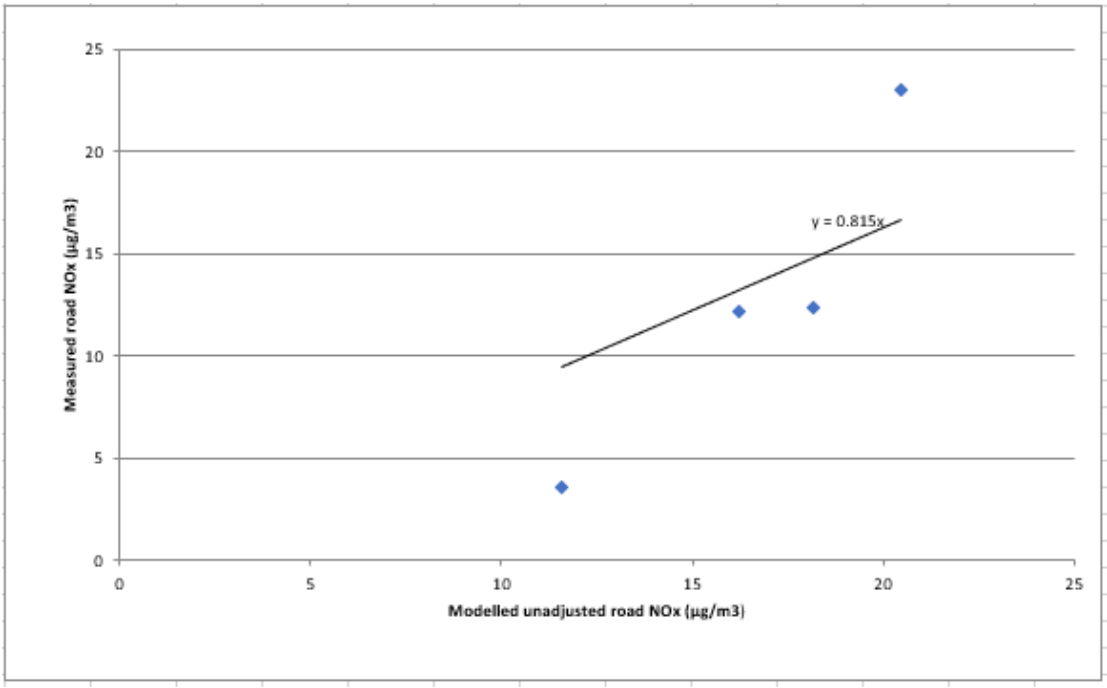
B.3 Verification results

Table 7.7 present the model results for NO_2. It has been concluded that the model is slightly over-predicting annual mean NO_2 concentrations within the study area, though a very small underprediction was experienced at one site.

Table 7.7: Model verification results for NO_2

Location	Monitored Total NO_2 (µg/m³)	Modelled Total NO_2 (µg/m³)	% Difference
HS2-000020BPN	31.0	34.7	11.8
HS2-000020BPK	34.9	36.7	5.2
LA-HILL06	35.0	37.5	7.3
LA-HILL42	39.6	38.5	-2.7

Figure 7.2: Model verification results for NO_2



Source: Mott MacDonald 2022

To derive the adjustment factor for this assessment, the modelled road NO_x contribution has been compared to monitored road NO_x contribution. From the model verification results, a verification factor of 0.82 was produced. As this would reduce the predicted impacts from the model, and to be conservative within the assessment, a verification factor of 1 is being applied to the model outputs.

B.4 Summary

Following the model verification, no adjustment has been applied to modelled outputs across the study area. This is a conservative assumption following the model showing an over prediction of concentrations within the verification assessment. As there is no available monitoring for PM_{10} or $PM_{2.5}$ within the study area, no factor will be applied to the outputs from the PM_{10} and $PM_{2.5}$ modelling.

C. Background concentrations used in modelling assessment

Table 7.8: Background concentrations used in modelling assessment

Receptor ID	2022 pollutant concentration		
	NO_2[(a)]	PM_{10}[(b)]	$PM_{2.5}$[(b)]
1	29.3	13.8	9.5
2	29.3	13.8	9.5
3	29.3	13.8	9.5
4	29.3	13.8	9.5
5	29.3	13.8	9.5
6	29.3	14.6	10.0
7	29.3	14.6	10.0
8	29.3	14.4	9.8
9	29.3	14.4	9.8
10	29.3	14.4	9.8
11	29.3	14.4	9.8
12	29.3	14.4	9.8
13	29.3	14.4	9.8
14	29.3	14.4	9.8
15	29.3	14.4	9.8
16	29.3	14.4	9.8
17	29.3	16.3	10.8
18	29.3	16.3	10.8
19	29.3	16.3	10.8
20	29.3	16.3	10.8
21	29.3	16.3	10.8
22	29.3	16.3	10.8

Note: [(a)] Concentration from LBoH urban background diffusion tube 'HILL23' 2019 concentration.
[(b)] Defra projected background concentration

D. Construction dust assessment criteria

Table 7.9: Determination of dust raising magnitude

Source	Large	Medium	Small
Demolition	Total building volume > 50,000m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities > 20m above ground	Total building volume 20,000m^3 - 50,000m^3, potentially dusty construction material, demolition activities 10-20m above ground level	Total building volume <20,000m^3, construction material with low potential for dust release (e.g. .metal cladding or timber), demolition activities <10m above ground, demolition during wetter months
Earthworks	Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes	Total site area 2,500m^2 – 10,000m2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonne – 100,000 tonne	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000tonne, earthworks during wetter months
Construction	Total building volume >100,000m^3, piling, on site concrete batching; sandblasting	Total building volume 25,000m3 – 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	>100 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m	25-100 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m	<25 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m

Source: IAQM

Table 7.10: Receptor sensitivity

Sensitivity of Effect	High	Medium	Low
Sensitivities of people to dust soiling effects	Users can reasonably expect an enjoyment of a high level of amenity; or The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks b and car showrooms.	Users would expect a to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or The appearance, aesthetics or value of their property could be diminished by soiling; or The 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. Indicative examples include parks and places of work.	The enjoyment of amenity would not reasonably be expected a; or Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or There is transient exposure, where the people or Property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Indicative examples include playing fields,

Sensitivity of Effect	High	Medium	Low
			farmland (unless commercially-sensitive horticultural), footpaths, short term car parks b and roads.
Sensitivities of people to the health effects of PM_{10}	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).c Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	Locations where the people exposed are workers d, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	Locations where human exposure is transient e Indicative examples include public footpaths, playing fields, parks and shopping streets.
Sensitivities of receptors to ecological effects	Locations with an international or national designation and the designated features may be affected by dust soiling; or Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain g. Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • Locations with a national designation where the features may be affected by dust deposition. • Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.	Locations with a local designation where the features may be affected by dust deposition. Indicative example is a local Nature Reserve with dust sensitive features.

A People's expectations will vary depending on the existing dust deposition in the area

B Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with work place or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.

C This follows Defra guidance as set out in LAQM.TG(09).

D Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM10. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason workers have been included in the medium sensitivity category.

E There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

F A Habitat Regulation Assessment of the site may be required as part of the planning process, if the site lies close to an internationally designated site i.e. Special Conservation Areas (SACs), Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) and RAMSAR sites.

G Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

Table 7.11: Sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 7.12: Sensitivity of the area to human health impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 7.13: Sensitivity of the area to ecological impacts

Receptor Sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table 7.14: Risk of dust impacts - demolition

Sensitivity of Area	Dust Emissions Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 7.15: Risk of dust impacts - earthworks

Sensitivity of Area	Dust Emissions Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk

Sensitivity of Area	Dust Emissions Magnitude		
	Large	Medium	Small
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 7.16: Risk of dust impacts - construction

Sensitivity of Area	Dust Emissions Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 7.17: Risk of dust impacts – trackout

Sensitivity of Area	Dust Emissions Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible