5.0 AIR QUALITY

INTRODUCTION

5.1 This Chapter presents the findings of a detailed air quality assessment of the potential impacts of the proposed development on local air quality.

5.2 Described within this Chapter is the relevant legislative and policy framework; the assessment methodology; the baseline conditions at the proposed development site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

LEGISLATION AND PLANNING POLICY CONTEXT

5.3 . The following section outlines the legislative framework, the national, regional and local planning policy and policy guidance that has been considered in this assessment.

Legislation

International

The European Directive on Ambient Air and Cleaner Air for Europe

5.4 European Directive 2008/50/EC[1] of the European Parliament and of the Council of 21st May 2008, sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.

5.5 The pollutants included are sulphur dioxide (SO_2), NO_2, PM_{10}, $PM_{2.5}$, lead (Pb), carbon monoxide (CO), benzene (C_6H_6), ozone (O_3), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

National

Air Quality (England) Regulations

5.6 Many of the objectives in the AQS were made statutory in England with the *Air Quality (England) Regulations 2000*[2] and the *Air Quality (England) (Amendment) Regulations 2002* (the Regulations)[3] for the purpose of Local Air Quality Management (LAQM).

5.7 The Air Quality Standards (Amendment) Regulations 2016[4] amend the Air Quality Standards Regulations 2010 to implement the changes made by Directive (EU) 2015/1480 and came into force on the 31th December 2016. These regulations prescribe

the 'relevant period' (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'.

5.8 Of the pollutants included in the AQS, NO_2, PM_{10} and $PM_{2.5}$ will be particularly relevant to this development, as these are the primary pollutants associated with road traffic. A summary of the air quality standards for these pollutants is presented in Table 5.1.

Table 5.1 Air Quality Standards and Objectives

Pollutant	Standard (µg/m³)	Averaging Period	No. of Permitted Exceedances
NO_2	200 (a)	1-Hour (99.8th percentile)	18 per annum
	40 (a)	Annual	-
PM_{10}	50 (a)	24-Hour (90.4th percentile)	35 per annum
	40 (a)	Annual	-
$PM_{2.5}$	25 (b)	Annual	-
(a) Air Quality Standards Regulations (2010) (b) EU Directive Limit Value			

Local Air Quality Management (LAQM)

5.9 Part IV of the Environment Act 1995[2] also requires local authorities to periodically Review and Assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

5.10 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

5.11 For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

5.12 The Department of Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their Review and Assessment work[5]. This guidance, referred to in this Chapter as TG16, has been used where appropriate in the assessment.

Policy

National

Air Quality Strategy for England, Scotland, Wales & Northern Ireland

5.13 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland published in July 2007[6], pursuant to the requirements of Part IV of the Environment Act 1995[7]. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

5.14 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3-butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10}, $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3) and polycyclic aromatic hydrocarbons (PAHs).

5.15 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

5.16 The air quality objectives are medium-term policy-based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

5.17 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

National Planning Policy Framework (NPPF), 2021[8]

5.18 The NPPF (paragraph 8) states that the planning system has three overarching objectives in achieving sustainable development including a requirement to:

' *to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently,*

minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'

5.19 Under Section 15: Conserving and Enhancing the Natural Environment, the NPPF (paragraph 174) requires that:

'planning policies and decisions should contribute to and enhance the natural 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 and water quality.'

5.20 In dealing specifically with air quality the NPPF (paragraph 186) states that:

'planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.'

5.21 Paragraph 188 states that:

'the focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities'.

Planning Practice Guidance[9]

5.22 National Planning Practice Guidance (PPG) has been developed to support the NPPF. The guidance provides a concise outline as to how air quality should be considered in order to comply with the NPPF and states that air quality is considered relevant to a planning application when:

'a 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 or action plans and / or breach legal obligations (including those relating for the conservation of habitats and species). Air quality may also be a material

consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.'

5.23 The PPG further states:

'Considerations that may be relevant to determining a planning application include whether the development would:

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; to involve construction sites that would generate large heavy goods vehicle flows over a period of a year or more;*
- *'introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled combined heat and power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a smoke control area'; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*
- *'expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality';*
- *'give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.'*

Regional

The London Environment Strategy, 2018

5.24 The London Environment Strategy[10] was published in 2018. It outlines the current issues facing London with regards to air pollution and sets out actions required. It recognises the need to go beyond legal limits and sets out the timescale and the changes needed to achieve tighter targets.

The London Plan, 2021

5.25 Policy SI1 Improving air quality of the London Plan[11] states:

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.

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.

The Mayor of London's Supplementary Planning Guidance on the Control of Dust and Emissions during Construction and Demolition

5.26 The Mayor of London's Supplementary Planning Guidance[12] builds on the voluntary guidance published in 2006 by the London Councils to establish best practice in mitigating impacts on air quality during construction and demolition work. The SPG incorporates more detailed guidance and best practice, and seeks to address emissions from Non-Road Mobile Machinery (NRMM) through the use of a Low Emissions Zone, which was introduced in September 2015.

5.27 The SPG provides a methodology for assessing the potential impact of construction and demolition activities on air quality following the same procedure as set out in the IAQM guidance. It then identifies the relevant controls and mitigation measures that should be put in place to minimise any adverse impacts, which need to be set out, in draft, in an air quality assessment report submitted with the planning application, and then formalised post submission as an Air Quality and Dust Management Plan. Details of site air quality monitoring protocols are provided with varying requirements depending on the size of the site and the potential risk of adverse impacts.

Local

London Borough Richmond upon Thames Local Plan, 2018

5.28 The LBRuT Local Plan[13] was adopted in July 2018 and sets out policies and guidance for the development of the borough until July 2033 or until it is superseded.

5.29 Policy LP 10 Local Environmental Impacts, Pollution and Land Contamination states:

'A. The Council will seek to ensure that local environmental impacts of all development proposals do not lead to detrimental effects on the health, safety and the amenity of existing and new users or occupiers of the development site, or the surrounding land. These potential impacts can include, but are not limited to, air pollution, noise and vibration, light pollution, odours and fumes, solar glare and solar dazzle as well as land contamination.

Developers should follow any guidance provided by the Council on local environmental impacts and pollution as well as on noise generating and noise sensitive development. Where necessary, the Council will set planning conditions to reduce local environmental impacts on adjacent land uses to acceptable levels.

Air Quality

B. The Council promotes good air quality design and new technologies. Developers should secure at least 'Emissions Neutral' development. To consider the impact of introducing new developments in areas already subject to poor air quality, the following will be required:

1. an air quality impact assessment, including where necessary, modelled data;

2. mitigation measures to reduce the development's impact upon air quality, including the type of equipment installed, thermal insulation and ducting abatement technology;

3. measures to protect the occupiers of new developments from existing sources;

4. strict mitigation for developments to be used by sensitive receptors such as schools, hospitals and care homes in areas of existing poor air quality; this also applies to proposals close to developments used by sensitive receptors. […]'

ASSESSMENT METHODOLOGY

Guidance

5.30 The two key guidance documents for the assessment are set out below.

EPUK & IAQM Land Use Planning and Development Control

5.31 Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in January 2017[14] to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.

5.32 The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments and criteria for assigning the significance of any identified impacts.

Assessment of Dust from Demolition and Construction

5.33 The IAQM published guidance in 2014 on the assessment of emissions from demolition and construction activities[15]. The guidance sets out an approach to identifying the risk of impacts occurring at nearby sensitive receptors from dust generated during the construction process and sets out recommended mitigation measures based on the identified risk.

Scope of Assessment

5.34 The scope of the assessment has been determined in the following way:

- Review of air quality data for the area surrounding the site and background pollutant maps;
- An assessment of the impact of the proposed development in accordance with the Mayor of London's 'air quality neutral' policy;
- Review of local mapping to determine the location of nearby areas that may be sensitive to changes in local air quality; and
- Review of the traffic flow data, which has been used as an input to the air quality modelling assessment.

5.35 There is the potential for impacts on local air quality during both the construction and operational phases of the proposed development as a result of construction activities and vehicle movements on the adjacent road network. Details of the assessment methodology and the specific issues considered are provided below.

During Construction

5.36 To assess the potential impacts associated with dust and PM_{10} releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the Institute of Air Quality Management[16] has been undertaken.

5.37 This approach divides construction activities into the following dust emission categories:

- demolition;
- earthworks;
- construction; and
- trackout.

5.38 The risk of dust effects (low, medium or high) is determined by the scale (magnitude) and nature of the works and the proximity of sensitive human and ecological receptors.

5.39 The significance of the dust effects is based on professional judgement, taking into account the sensitivity of receptors and existing air quality.

Dust Emission Magnitude

5.40 The magnitude of the dust impacts for each source is classified as Small, Medium or Large depending on the scale of the proposed works. Table 5.2 summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 5.2 Dust Emission Magnitude Criteria

Source	Large	Medium	Small
Demolition	• Total building volume >50,000m^3 • Potentially dusty material (e.g. concrete) • Onsite crushing and screening • Demolition activities >20m above ground level.	• Total building volume 20,000 - 50,000m^3 • Potentially dusty material • Demolition activities 10 - 20m above ground level.	• Total building volume <20,000m^3 • Construction material with low potential for dust release • Demolition activities <10m above ground level • Demolition during wetter months
Earthworks	• Total site area >10,000m^2 • Potentially dusty soil type (e.g. clay) • >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 2,500 -10,000m^2 • Moderately dusty soil type (e.g. silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,000 tonnes	• 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 <20,000 tonnes • Earthworks during wetter months
Construction	• Total building volume >100,000m^3 • On site concrete batching • Sandblasting	• Total building volume 25,000 - 100,000m^3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching	• Total building volume <25,000m^3 • Material with low potential for dust release (e.g. metal cladding or timber)
Trackout	• >50 HGV movements in any one day (a)	• 10 - 50 HGV movements in any one day (a)	• <10 HGV movements in any one day (a)

	• Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100m	• Moderately dusty surface material (e.g. silt) • Unpaved road length 50 - 100m	• Surface material with low potential for dust release • Unpaved road length <50m
(a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes.			

5.41 Factors defining the sensitivity of a receptor are presented in Table 5.3.

Table 5.3 Factors defining the Sensitivity of an Area

Sensitivity	Human (health)	Human (dust soiling)	Ecological
High	• Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include residential dwellings, hospitals, schools and residential care homes.	• Regular exposure • High level of amenity expected. • Appearance, aesthetics or value of the property would be affected by dust soiling. • Examples include residential dwellings, museums, medium and long-term car parks and car showrooms.	• Nationally or Internationally designated site with dust sensitive features (b) • Locations with vascular species (c)
Medium	• Locations where workers are exposed over a time period relevant to the air quality objectives for PM_{10} (a) • Examples include office and shop workers (d)	• Short-term exposure • Moderate level of amenity expected • Possible diminished appearance or aesthetics of property due to dust soiling • Examples include parks and places of work	• Nationally designated site with dust sensitive features (b) • Nationally designated site with a particularly important plant species where dust sensitivity is unknown
Low	• Transient human exposure • Examples include public footpaths, playing fields, parks and shopping streets	• Transient exposure • Enjoyment of amenity not expected. • Appearance and aesthetics of property unaffected • Examples include playing fields, farmland (e), footpaths, short-term car parks and roads	• Locally designated site with dust sensitive features (b)
(a) 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.			

Sensitivity	Human (health)	Human (dust soiling)	Ecological
(b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete). (c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee. (d) Does not include workers exposure to PM_{10} as protection is covered by Health and Safety at Work legislation. (e) Except commercially sensitive horticulture.			

5.42 The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Area Sensitivity

5.43 The sensitivity of the area to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM_{10} concentrations in the area. Table 5.4 and Table 5.5 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively. Table 5.6 summarises the criteria for determining the sensitivity of an area to ecological impacts.

Table 5.4 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (a)			
		<20m	<50m	<100m	<350m
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
(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.					

Table 5.5 Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} ($\mu g/m^3$)	Number of Receptors	Distance from the Source (a)				
			<20m	<50m	<100m	<200m	<350m
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<28	-	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

Table 5.6 Sensitivity of Area to Ecological Impacts

Sensitivity of Area	Distance from the Source	
	<20 m	<50 m
High	High Risk	Medium Risk
Medium	Medium Risk	Low Risk
Low	Low Risk	Low Risk

5.44 For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

5.45 The risk of dust impacts prior to mitigation for each emission source is presented in Table 5.7, Table 5.8 and Table 5.9.

Table 5.7 Risk of Dust Impacts - Demolition

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

Table 5.8 Risk of Dust Impacts – Earthworks and Construction

Sensitivity of Area	Dust Emission 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 5.9 Risk of Dust Impacts – Trackout

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

5.46 Construction traffic will contribute to existing traffic levels on the surrounding road network. The greatest potential for impacts on air quality from traffic associated with this phase of the proposed development will be in the areas immediately adjacent to the principal means of access for construction traffic. It is anticipated that on a daily basis there would be 25 Heavy Duty Vehicle (HDV) movements generated on the local road network per day therefore based on the EPUK/IAQM guidance criteria impacts on local air quality are unlikely to be significant and have not been considered any further within this assessment.

During Operation

5.47 The prediction of local air quality has been undertaken using ADMS Roads dispersion model. This is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process.

5.48 The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict road specific concentrations of oxides of nitrogen (NO_x) and PM_{10} at sensitive receptors selected by the user. Meteorological data from Heathrow Airport for 2019 has been used for the assessment.

5.49 The predicted concentrations of NO_x have been converted to NO_2 using the latest LAQM calculator (version 8.1) on the DEFRA air quality website[17].

5.50 Traffic data for use in the assessment has been provided by the traffic consultants, Velocity Transport Planning Ltd. A summary of the traffic data used in the assessment can be found in Appendix 5.1. The data includes details of annual average daily traffic flows (AADT), vehicle speeds and percentage HGV for the assessment years considered.

5.51 Based on the traffic data provided the following scenarios have been included in the assessment:

- 2019 – Baseline (for verification of the model);
- 2030 – Base + committed developments;

- 2030 – Base + committed developments + Proposed Development.

5.52 The emission factors released by Defra in August 2020, provided in the emissions factor toolkit EFT2020_10.1 have been used to predict traffic related emissions in 2019 (for verification purposes) and 2030.

5.53 To predict local air quality, traffic emissions predicted by the model must be added to local background concentrations. Background concentrations of NO_x, NO_2 , PM_{10} and $PM_{2.5}$ have been taken from the DEFRA 2018 background maps available on the UK-Air website[18]. Data for 2019 has been extracted for the grid subareas representing the site and surrounding road network.

5.54 To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area is usually undertaken. This process aims to minimise modelling uncertainty and systematic error by correcting the modelled results by an adjustment factor to gain greater confidence in the final results.

5.55 A verification factor of 2.49 was determined which indicates that the model is under-predicting in this area. This factor was applied to the modelled road-NO_x concentrations prior to conversion to annual mean NO_2 concentrations using the NO_x to NO_2 calculator. Further details of the determination of the verification factor are provided in Appendix 5.2.

5.56 Local roadside monitoring data was not available for concentrations of PM_{10} and $PM_{2.5}$. The modelled pollutant road-contributions for PM_{10} and $PM_{2.5}$ were therefore adjusted using the verification factor obtained for NO_x as recommended in the guidance provided in LAQM.TG(16).

5.57 LAQM.TG(16) does not provide a method for the conversion of annual mean NO_2 concentrations to 1-hour mean NO_2 concentrations. However, research[19] has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m^3. Care has been taken to ensure that locations where the 1-hour mean objective is relevant are included in the assessment.

5.58 Quantitative assessment of the impacts on local air quality from road traffic emissions associated with the operation of the development have been completed against the current statutory standards and objectives set out in Table 5.1 for NO_2, PM_{10} and $PM_{2.5}$.

Assessment Criteria

5.59 The significance criteria used are specific to air quality and therefore differ from the criteria outlined in Chapter 1.0.

During Construction

5.60 The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity following the application of appropriate mitigation measures. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effects will normally be negligible.

During Operation

5.61 The significance of the predicted impacts has been determined following the advice provided in the EPUK & IAQM planning guidance, in combination with professional judgement. The guidance recommends that the impact at individual receptors is described by expressing the magnitude of incremental change in pollution concentrations as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion as summarised in Table 5.10.

Table 5.10 Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in concentration relative to Air Quality Assessment Level (AQAL) (a)			
	1	2-5	5-10	>10
75% or less of AQAL	Negligible	Negligible	Slight adverse	Moderate adverse
76-94% of AQAL	Negligible	Slight adverse	Moderate adverse	Moderate adverse
95-102% of AQAL	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
103-109% of AQAL	Moderate adverse	Moderate adverse	Substantial adverse	Substantial adverse
110% or more of AQAL	Moderate adverse	Substantial adverse	Substantial adverse	Substantial adverse
(a) Change in concentration of less than 0.5% of the AQAL is considered insignificant, however changes between 0.5% and 1% are rounded up to 1%.				

5.62 The EPUK & IAQM guidance notes that the criteria in Table 5.10 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK & IAQM guidance states that the assessment of overall

significance should be based on professional judgement, taking into account several factors, including:

- The existing and future air quality in the absence of the proposed 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.

5.63 The EPUK & IAQM guidance also provides significance criteria for short term impacts which are defined for averaging periods of 1-hour or less. The EPUK & IAQM guidance states that for point sources short-term impacts of less than 10% of the AQAL are described as 'negligible' regardless of existing air quality. Where short-term process concentrations are 11-20% of the AQAL the severity of the impact is described as 'slight'. Impacts of 21-50% and over 51% are described as 'moderate' and 'substantial' respectively.

5.64 In order to determine whether the impacts at ecological habitats are significant, the Environment Agency's (EA) guidance *'Air Emissions Risk Assessment for your Environmental Permit'* have been used. These are outlined in Table 5.11 below.

Table 5.11 Impact Descriptors for Individual Receptors

Ecological Habitat	Stage One	Stage Two
SPAs, SACs, Ramsar sites or SSSIs	The impact is considered insignificant if: • Short term PC < 10% short term critical level; and • Long term PC < 1% long term critical level	The impact is considered to be insignificant if: • Long term PC >1% and predicted environmental concentrations (PEC) <70% of the long term critical level.
Local Nature Sites (ancient woodlands, local wildlife sites, national and local nature reserves)	The impact is considered to be insignificant if: • Short term PC <100% short term critical level; and • Long term PC < 100% long term critical level	

Sensitive Receptors

5.65 LAQM.TG(16) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that

they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

5.66 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standards (i.e. 15 minute mean or 1 hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term standards (such as 24hour mean or annual mean) may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

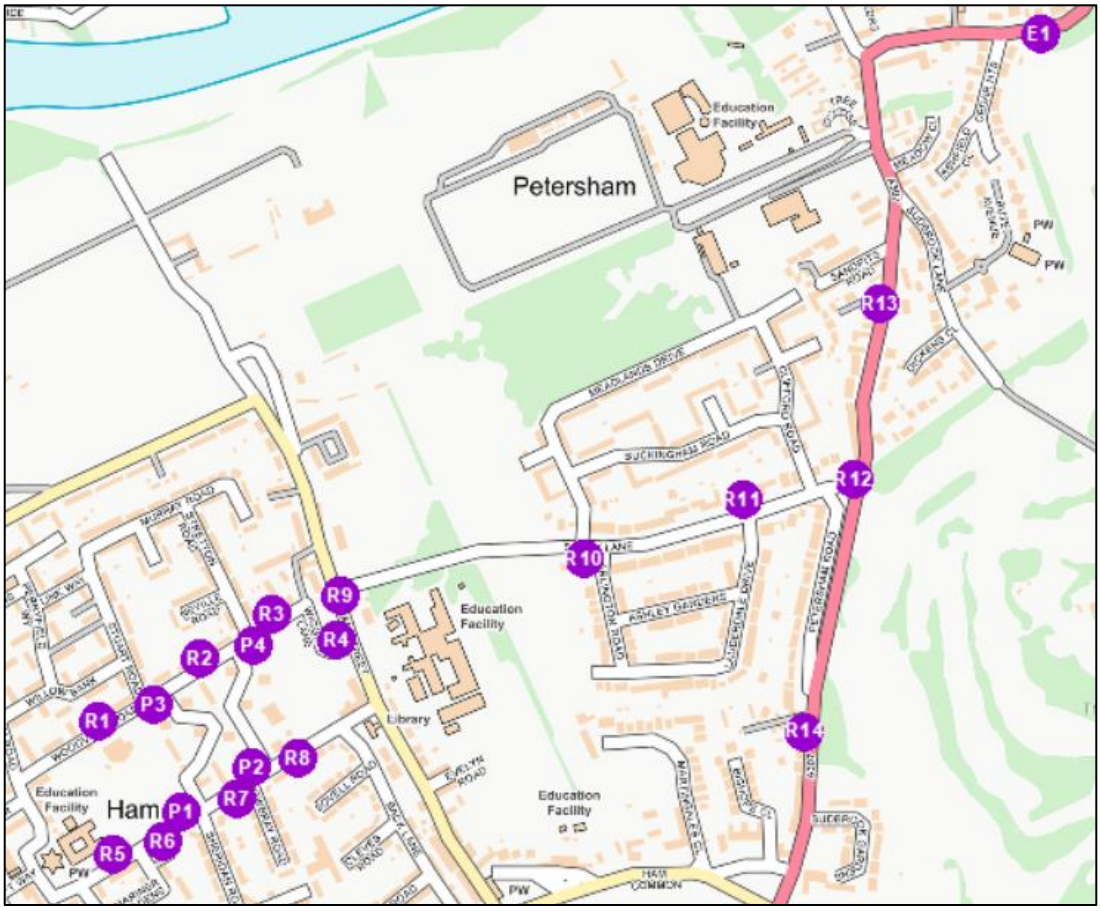
5.67 To assess the impact of emissions arising from the proposed development concentrations have been predicted at 14 existing sensitive receptors within the vicinity of the site which represent the location of nearby residential properties and St Paul's C of E Primary School. The modelling assessment also predicted concentrations at four of the facades of the proposed development. Further to this, the modelling also includes one receptor at Richmond Park SSSI. The location of the receptor is at the worst case location within the ecological site. Details of these sensitive receptors are presented in Table 5.12 and the locations are illustrated in Figure 5.1.

Table 5.12 Location of Sensitive Receptors

ID	Receptor	Type	Easting	Northing
R1	60 Woodville Road	Residential	516960.3	172347.1
R2	26 Woodville Road	Residential	517099.8	172432.8
R3	10 Woodville Road	Residential	517199.2	172493.8
R4	91 Ham Street	Residential	517287.8	172458.2
R5	St Richard's CE Primary School	School	516979.6	172164.7
R6	45 Ashburnham Road	Residential	517049.4	172181.2
R7	33 Ashburnham Road	Residential	517150.4	172239.5
R8	15 Ashburnham Road	Residential	517234.0	172295.2
R9	53 Ham Street	Residential	517292.6	172520.6
R10	37 Sandy Lane	Residential	517627.3	172570.9
R11	22 Sandy Lane	Residential	517845.0	172650.7
R12	237 Petersham Road	Residential	517998.2	172680.1
R13	185 Petersham Road	Residential	518034.3	172921.6
R14	299 Petersham Road	Residential	517930.8	172333.1

P1	Façade of the Proposed Development	Proposed Residential	517073.9	172223.3
P2	Façade of the Proposed Development	Proposed Residential	517170.3	172284.1
P3	Façade of the Proposed Development	Proposed Residential	517036.4	172368.7
P4	Façade of the Proposed Development	Proposed Residential	517173.8	172450.7
E1	Richmond Park SSSI	Ecological	518254.4	173291.4

Figure 5.1 Location of Receptors



ASSUMPTIONS AND LIMITATIONS

5.68 The air quality assessment is based on the traffic data that has been provided by project's traffic consultants, Velocity Transport Planning Ltd.

5.69 For the operational phase assessment, it should be noted that there are a number of potential sources of error, particularly in terms of model inputs, due to the complexities of pollutant dispersion and atmospheric chemistry. However, conservative estimates of

emission magnitudes and their significance should be produced as a number of worst case assumptions have been incorporated into the model.

5.70 Furthermore, it is noted that the model will only predict the potential effects at existing receptors close to the site due to the availability of traffic data. However, changes in traffic volumes will decrease with distance from the site as vehicles disperse onto the road network and/or reach their destinations. As a result, the largest, and often most significant, impacts tend to be experienced by those receptors closest to the site, with receptors further away experiencing smaller changes in pollutant concentrations.

BASELINE CONDITIONS

London Borough of Richmond upon Thames Review and Assessment of Air Quality

5.71 LBRuT regularly review and assess air quality within the borough in accordance with the requirements of Defra and as a result has declared the whole borough an AQMA due to exceedances of the NO_2 and PM_{10} objectives.

Automatic Monitoring Data

5.72 LBRuT operate three automatic monitoring sites within the borough. Bias adjusted data obtained from these sites is presented in Tables 5.13, 5.14 and 5.15.

Table 5.13 NO_2 Concentrations Measured at the Richmond Automatic Monitors

Monitoring Site	Statistic	2016	2017	2018	2019	2020
RI1 Castelnau Library, Barnes	Annual Mean (µg/m^3)	36	31	31	27	20
	Hourly Exceedences of 200 µg/m^3	0	0	0	0	0
RI2 Wetlands Centre, Barnes	Annual Mean (µg/m^3)	25	21	20	21	15
	Hourly Exceedences of 200 µg/m^3	0	0	0	0	0

5.73 Annual mean NO_2 concentrations recorded have been consistently below 40 µg/m^3 objective level in all five monitoring years presented. Large decreases in annual mean NO_2 concentrations were observed between 2019 and 2020. This is considered likely to be due to the travel restrictions associated with the COVID-19 pandemic.

5.74 Exceedances of the hourly NO_2 objective have not been recorded during the years of the monitoring presented, therefore the objective was met.

Table 5.14 PM_{10} Concentrations Measured at the Richmond Automatic Monitors

Monitoring Site	Statistic	2016	2017	2018	2019	2020
RI1 Castelnau Library, Barnes	Annual Mean (µg/m^3)	20	18	19	15	15
	Number of 24-hour means > 50 µg/m^3	7	4	1	3	0
RI2 Wetlands Centre, Barnes	Annual Mean (µg/m^3)	16	15	15	16	16
	Number of 24-hour means > 50 µg/m^3	3	3	0	3	0
Teddington AURN	Annual Mean (µg/m^3)	-	-	-	-	13
	Number of 24-hour means > 50 µg/m^3	-	-	-	-	2

5.75 Annual mean PM_{10} concentrations recorded have been consistently below 40 µg/m^3 objective level in all five monitoring years presented.

5.76 Exceedances of the 24-hour PM_{10} objective have been recorded during the five years of the monitoring presented, however the objective allows for 35 exceedances of the 50 µg/m^3 limit in any given year. Therefore, the objective was met in all five monitoring years.

Table 5.15 $PM_{2.5}$ Concentrations Measured at the Richmond Automatic Monitors

Monitoring Site	Statistic	2016	2017	2018	2019	2020
Teddington AURN	Annual Mean (µg/m^3)	-	10	11	12	8

5.77 Annual mean $PM_{2.5}$ concentrations recorded have been consistently below 25 µg/m^3 objective level in all four monitoring years presented.

Non-Automatic Monitoring Data

5.78 NO_2 is measured at a large number of locations within the borough using passive diffusion tubes.

5.79 There is one monitoring site in the vicinity of the application site, details of which are set out in Table 5.16.

Table 5.16 NO_2 Diffusion Tube Monitoring Data (µg/m³)

Site ID	Site Type	Distance to kerb (m)	2016	2017	2018	2019	2020
29 Petersham Rd, Ham (nr. Sandy Lane)	Kerbside	2	32	30	31	28	21

5.80 The diffusion tube data shows that annual mean NO_2 concentrations have met the objective the monitoring location, since 2016.

5.81 A large drop in annual mean NO_2 concentrations was observed between 2019 and 2020. This is considered likely to be due to the travel restrictions associated with the COVID-19 pandemic.

5.82 The proposed development site is located in a background location away from the main road network. NO_2 concentrations are therefore expected to be below those recorded at the local monitoring site. Concentrations at the proposed development site are therefore expected to be well below the annual mean objective.

5.83 It is not possible to monitor short-term NO_2 concentrations using diffusion tubes, however, as discussed previously, research has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations are below 60 µg/m³. Based on the monitoring data presented in Table 5.16, it is unlikely that the short-term objective is being exceeded at the monitoring site or at the proposed development site.

Defra Background Maps

5.84 Information on background concentrations in the vicinity of the site has been obtained from the Defra background pollutant maps. The 2018 Defra background maps provide estimated concentrations for the years 2018 to 2030. For the purposes of this assessment 2019 background concentrations have been used. The average pollutant concentrations from the grid squares representing the assessment area (grid square 517500, 172500) have been extracted from the maps which include the modelled receptors and road links included in the modelling assessment.

5.85 The average background concentration for each pollutant is presented in Table 5.17 below.

5.86 The data shows background concentrations of all three pollutants to be well below the relevant annual mean objective.

Table 5.17 Estimated Annual Mean Background Concentrations from Defra Maps (µg/m³)

Pollutant	2018 Background Concentration	Air Quality Standard
NO_x	26.4	-
NO_2	18.5	40
PM_{10}	15.8	40
$PM_{2.5}$	10.9	25

POTENTIAL IMPACTS

During Construction

5.87 The construction phase is divided into three distinct phases as set out in Chapter 3.0 of this ES.

Area Sensitivity

5.88 The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. The construction works will be completed in three phases; throughout the construction phase a number of properties on site will be occupied. A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 5.18.

Table 5.18 Sensitivity of Receptors and the Local Area to Dust Impacts

Receptor	Distance from Site Boundary (m)	Approx. Number of Receptors	Sensitivity to Health Impacts (a)		Sensitivity to Dust Soiling Impacts	
			Receptor	Area	Receptor	Area
Phase 1						
Residential Properties	<20 m	1-10	High	Low	High	Medium
	<50 m	10-100	High	Low	High	Medium
School	100-350 m	>100	High	Low	High	Low
Medical Centre	100-350 m	10-100	High	Low	High	Low
Overall Sensitivity of the Area (Phase One)			**Low**		**Medium**	

Phase 2						
Residential Properties	<20 m	1-10	High	Low	High	Medium
	<50 m	10-100	High	Low	High	Medium
School	100-350 m	>100	High	Low	High	Low
Medical Centre	100-350 m	10-100	High	Low	High	Low
Overall Sensitivity of the Area (Phase Two)			**Low**		**Medium**	
Phase 3						
Residential Properties	<20 m	10-100	High	Low	High	High
School	100-350 m	>100	High	Low	High	Low
Medical Centre	100-350 m	10-100	High	Low	High	Low
Overall Sensitivity of the Area (Phase Three)			**Low**		**High**	
a) Estimated background PM_{10} concentrations is 15.8 µg/m^3						

5.89 Construction traffic will travel along Woodville Road and Ashburnham Road to gain access to the site. Within the IAQM guidance it indicates that impacts from trackout as a result of construction vehicles moving on the road network can result in impacts up to 500m from the site access points and within 20m of the roadside. There are more than ten sensitive receptors along the roads within this distance, therefore the sensitivity of the surrounding area to dust soiling as a result of trackout is considered to be high although given background PM_{10} concentrations the sensitivity in relation to human health would be low.

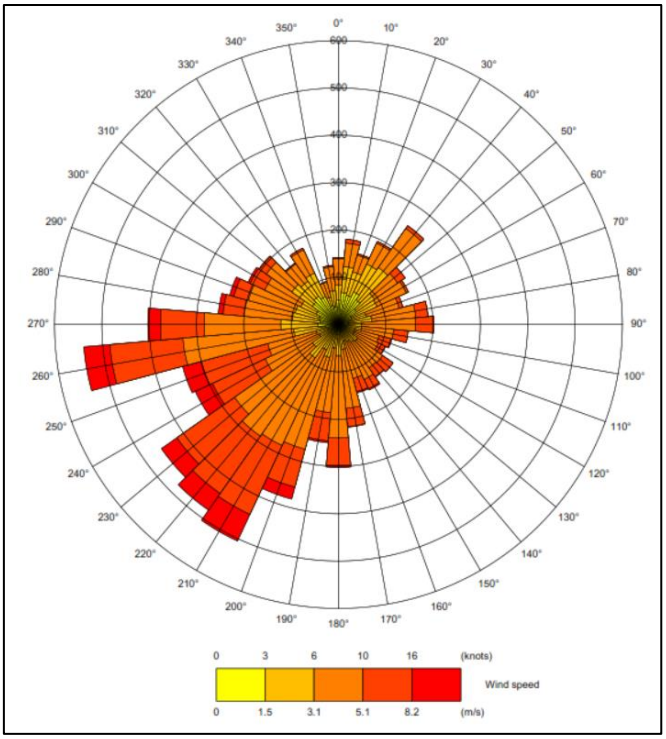
5.90 There are no dust-sensitive habitat sites within 50m of the proposed development nor within 50m of the route used by construction vehicles, therefore the impact of dust and particulate matter emissions on ecologically sensitive receptors has not been considered further in this assessment.

5.91 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

5.92 A wind rose from Heathrow Airport is provided in Figure 5.2, which shows that the prevailing wind is from the southwest, therefore receptors to the northeast of the proposed development site are the most likely to experience dust impacts from the

proposed development. The area to the northeast of the site is predominantly residential. The highest risk of impacts is expected to occur in this location.

Figure 5.2 Windrose for Heathrow Airport Meteorological Station (2019)



Dust Emissions Magnitude

Phase 1

5.93 The buildings to be demolished within Phase 1 have a volume of less than 20,000m^3 and a height of less than 20m. Due to the scale of the demolition works, the emissions magnitude during Phase 1 is considered to be 'small'.

5.94 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. Due to the size of the area of the Phase 1 works, it is considered to be 'medium' in terms of emissions magnitude based on the IAQM guidance.

5.95 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. The volume of the buildings to be constructed during Phase 1 is between 25,000m^3 and 100,000m^3. Based on the size of the Phase 1 works and the proposed construction materials, the dust emission magnitude is considered to be 'medium'.

5.96 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. The number of HGV movements (leaving the site) is likely to be 25 per day, therefore dust emission magnitude due to trackout is considered to be 'medium'.

Phase 2

5.97 The buildings to be demolished within Phase 2 have a volume of less than 20,000m^3 and a height of less than 20m. Due to the scale of the demolition works, the emissions magnitude during Phase 2 is considered to be 'small'.

5.98 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. Due to the size of the area of the Phase 2 works, it is considered to be 'medium' in terms of emissions magnitude based on the IAQM guidance.

5.99 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. The volume of the buildings to be constructed during Phase 2 is between 25,000m^3 and 100,000m^3. Based on the size of the Phase 2 works and the proposed construction materials, the dust emission magnitude is considered to be 'medium'.

5.100 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. The number of HGV movements (leaving the site) is likely to be 25 per day, therefore dust emission magnitude due to trackout is considered to be 'medium'.

Phase 3

5.101 The buildings to be demolished within Phase 3 have a volume of less than 20,000m^3 and a height of less than 20m. Due to the scale of the demolition works, the emissions magnitude during Phase 3 is considered to be 'small'.

5.102 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. Due to the size of the area of the Phase 3works, it is considered to be 'large' in terms of emissions magnitude based on the IAQM guidance.

5.103 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. The volume of the buildings to be constructed during Phase 3 is between 25,000m^3 and 100,000m^3. Based on the size of the Phase 3 works and the proposed construction materials, the dust emission magnitude is considered to be 'medium'.

5.104 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. The number of HGV

movements (leaving the site) is likely to be 25 per day, therefore dust emission magnitude due to trackout is considered to be 'medium'.

Dust Risk Effects

5.105 A summary of the potential dust risk effects prior to mitigation are presented in Table 5.19 below.

Table 5.19 Summary of Dust Risk Effects Prior to Mitigation

Source	Dust Soiling Effects	PM_{10} Effects
Phase 1		
Demolition	Low Risk	Negligible Risk
Earthworks	Medium Risk	Low Risk
Construction	Medium Risk	Low Risk
Trackout	Medium Risk	Low Risk
Phase 2		
Demolition	Low Risk	Negligible Risk
Earthworks	Medium Risk	Low Risk
Construction	Medium Risk	Low Risk
Trackout	Medium Risk	Low Risk
Phase 3		
Demolition	Medium Risk	Negligible Risk
Earthworks	High Risk	Low Risk
Construction	Medium Risk	Low Risk
Trackout	Medium Risk	Low Risk

5.106 The greatest potential for dust nuisance problems to occur will generally be within 200m of the construction site perimeter. There may be limited incidences of increased dust deposited on property beyond this distance.

5.107 By following the mitigation measures outlined within this Chapter, the impact will be substantially minimised. Residual impacts are therefore considered to be **Negligible** (Not Significant)**.**

During Operation

NO_2 Concentrations

5.108 A summary of predicted annual mean NO_2 concentrations at the selected sensitive receptor locations is presented in Table 5.20.

Table 5.20 Predicted 2030 Annual mean NO_2 Concentrations at Selected Receptors (µg/m^3)

Receptor	2030 Without Development	2030 With Development	Concentration Change due to Development (as a % of the objective)	Significance
R1	18.9	18.9	0.2	Negligible
R2	18.8	18.9	0.2	Negligible
R3	18.9	18.9	0.1	Negligible
R4	19.5	19.6	0.2	Negligible
R5	19.0	19.0	0.1	Negligible
R6	19.2	19.3	0.2	Negligible
R7	19.1	19.1	0.1	Negligible
R8	19.3	19.4	0.2	Negligible
R9	20.8	21.0	0.5	Negligible
R10	19.4	19.5	0.2	Negligible
R11	19.4	19.5	0.1	Negligible
R12	24.1	24.3	0.3	Negligible
R13	23.2	23.3	0.2	Negligible
R14	21.3	21.3	0.0	Negligible
P1	-	19.0	-	-
P2	-	19.0	-	-
P3	-	19.0	-	-
P4	-	19.0	-	-

5.109 The results of the modelling indicate that predicted annual mean NO_2 concentrations are well below (less than 75%) the objective of 40 µg/m^3 at all selected receptors both with and without the proposed development operational.

5.110 The operation of the proposed development is predicted to result in a slight increase in NO_2 concentrations at the existing sensitive receptors included in the assessment. The impact of the proposed development is predicted to be **Negligible** (Not Significant) based on the IAQM criteria.

5.111 As discussed previously, LAQM.TG(16) does not include a conversion between annual and hourly mean NO_2, however research has determined that where the annual mean NO_2 concentration is below 60µg/m^3, it is unlikely that the hourly mean NO_2 objective will be breached. As the predicted annual mean NO_2 concentrations are well below 60µg/m^3 it is considered extremely unlikely that the operation of the proposed development will lead to any breaches of the hourly mean AQS objective level at the existing receptors.

5.112 Within the site itself, annual mean NO_2 concentrations are predicted to be well below the relevant AQAL. It is also expected that the hourly mean objective level within the site will be met. The impact with regards to new exposure is therefore also considered to be **Negligible** (Not Significant).

PM_{10} Concentrations

5.113 A summary of predicted annual mean PM_{10} concentrations at the selected sensitive receptor locations is presented in Table 5.21.

Table 5.21 Predicted 2030 Annual mean PM_{10} Concentrations at Selected Receptors (µg/m^3)

Receptor	2030 Without Development	2030 With Development	Concentration Change due to Development (as a % of the objective)	Significance
R1	16.0	16.0	0.1	Negligible
R2	16.0	16.0	0.1	Negligible
R3	16.0	16.0	0.1	Negligible
R4	16.3	16.3	0.1	Negligible
R5	16.0	16.1	0.0	Negligible
R6	16.1	16.2	0.1	Negligible
R7	16.1	16.1	0.1	Negligible
R8	16.2	16.2	0.1	Negligible

R9	16.8	16.9	0.2	Negligible
R10	16.2	16.3	0.1	Negligible
R11	16.2	16.3	0.1	Negligible
R12	18.1	18.2	0.1	Negligible
R13	18.1	18.1	0.1	Negligible
R14	17.2	17.2	0.0	Negligible
P1	-	16.1	-	-
P2	-	16.1	-	-
P3	-	16.0	-	-
P4	-	16.0	-	-

5.114 The results of the modelling indicate that predicted annual mean PM_{10} concentrations are well below (less than 75%) the objective of 40 µg/m^3 at all selected receptors both with and without the proposed development operational.

5.115 Once operational, the proposed development is predicted to result in a slight increase in PM_{10} concentrations at the existing sensitive receptors included in the assessment. The change in PM_{10} concentrations is less than 0.5% of the objective, therefore impact of the development would therefore be **Negligible** (Not Significant) based on the IAQM criteria.

5.116 LAQM.TG(16) provides a relationship between predicted annual mean concentrations and the likely number of exceedances of the short-term (24-hour mean) PM_{10} objective of 50 µg/m^3 (N), where:

- N = -18.5 + 0.00145 x annual mean^3 + (206/annual mean).

5.117 The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m^3.

5.118 Based on the above approach, the maximum number of days where PM_{10} concentrations are predicted to exceed 50µg/m^3 is less than 2 at the selected receptors with a change of less than one day as a result of the operation of the development. The impact on '24-hour' PM_{10} concentrations on existing receptors is also considered to be **Negligible** (Not Significant).

5.119 Within the site itself, annual mean PM_{10} concentrations are predicted to be well below the relevant AQAL. It is also expected that the hourly mean objective level within the site will be met. The impact with regards to new exposure is therefore also considered to be **Negligible** (Not Significant)**.**

$PM_{2.5}$ Concentrations

5.120 A summary of predicted annual mean $PM_{2.5}$ concentrations at the selected sensitive receptor locations is presented in Table 5.22.

Table 5.22 Predicted 2030 Annual mean $PM_{2.5}$ Concentrations at Selected Receptors (µg/m³)

Receptor	2030 Without Development	2030 With Development	Concentration Change due to Development (as a % of the objective)	Significance
R1	11.0	11.0	0.1	Negligible
R2	10.9	11.0	0.1	Negligible
R3	11.0	11.0	0.1	Negligible
R4	11.1	11.1	0.1	Negligible
R5	11.0	11.0	0.0	Negligible
R6	11.0	11.1	0.1	Negligible
R7	11.0	11.0	0.0	Negligible
R8	11.1	11.1	0.1	Negligible
R9	11.4	11.5	0.2	Negligible
R10	11.1	11.1	0.1	Negligible
R11	11.1	11.1	0.1	Negligible
R12	12.2	12.2	0.1	Negligible
R13	12.1	12.1	0.1	Negligible
R14	11.6	11.6	0.0	Negligible
P1	-	11.0	-	-
P2	-	11.0	-	-
P3	-	11.0	-	-
P4	-	11.0	-	-

5.121 The results of the modelling indicate that predicted annual mean $PM_{2.5}$ concentrations are well below (less than 75%) the objective of 25 µg/m³ at all selected receptors both with and without the proposed development operational.

5.122 Once operational, the proposed development is predicted to result in a slight increase in $PM_{2.5}$ concentrations at the existing sensitive receptors included in the assessment. The

change in $PM_{2.5}$ concentrations is less than 0.5% of the objective, therefore impact of the development would therefore be **Negligible** (Not Significant) based on the IAQM criteria.

5.123 Within the site itself, annual mean $PM_{2.5}$ concentrations are predicted to be well below the relevant AQAL. It is also expected that the hourly mean objective level within the site will be met. The impact with regards to new exposure is therefore also considered to be **Negligible** (Not Significant)**.**

Ecological Receptors

Oxides of Nitrogen

5.124 Predicted NOx concentrations at receptors under each scenario are set out in Table 5.23. The process contribution (PC) has been added to background concentrations to give the total concentration of NOx at each receptor. The increased PC as a result of the proposed development has also been expressed as a percentage of the Critical Level (CL).

5.125 Within the SSSI, the proposed development is predicted to result in an increase in NO_x concentrations of up to 0.2 µg/m^3, which equates to 0.7% of the CL. As the increase is less than 1% of the CL the impact is considered to be **Negligible** (Not Significant) in accordance with the EA's significance criteria.

Table 5.23 Impact of Proposed Development on Oxides of Nitrogen within Richmond Park SSSI (µg/m^3)

Recept	Backgr. NO_x	2030		Concentration Change due to Development	Increased Contribution as a percentage of the CL (30 µg/m^3)
		Without Develop.	With Develop.		
E1	26.4	37.5	37.7	0.2	0.7

N-deposition

5.126 Data presented on the APIS (Air Pollution Information System) website gives the current N-deposition rate within the Richmond Park SSSI of 16.5 kgN/ha/yr. The proposed development is predicted to increase N-deposition rates by a maximum of 0.1 kgN/ha/yr, which equates to 0.7% of the CL_d. The impact is very small in comparison to the background N-deposition rate and the CL_d, therefore the impact of the proposed development on N-deposition rates is considered to be **Negligible** (Not Significant).

Table 5.24 Impact of Proposed Development on Nitrogen Deposition within Richmond Park SSSI

Receptor	2030		Change due to Development	Increased Contribution as a percentage of the CL_d (8kgN/ha/yr))
	Without Development N-depostion (kgN/ha/yr)	With Development N-depostion (kgN/ha/yr)		
E1	19.7	19.8	0.1	0.7

Air Quality Neutral Assessment

Transport Emissions

5.127 The Air Quality Neutral Assessment for transport emissions compares the expected emissions from traffic generation with benchmarked emissions derived from the Air Quality Neutral Planning Support Update[20].

5.128 As detailed in Table 5.25, Transport Emission Benchmarks (TEB) of 703.5 $kgNO_x.annum^{-1}$ and 121.0 $kgPM_{10}.annum^{-1}$ were calculated.

Table 5.25 Calculation of Benchmarked Emissions for Transportation

Land Use Class	No of dwellings / GFA	NO_x		PM_{10}	
		TEB	Benchmarked Emissions (kg/annum)	TEB	Benchmarked Emissions (kg/annum)
C3	452 dwellings	1553	705.3	267	121.0

5.129 An estimated 380 additional daily trips were assessed by the project's Transport Consultants (Velocity Transport Ltd) as being generated by the proposed development. Based on this information, the emissions generated have been calculated as 558.2 $kgNO_x.annum^{-1}$ and 95.8 $kgPM_{10}.annum^{-1}$, as detailed in Table 5.26. These are well below their respective TEBs.

Table 5.26 Transportation Air Quality Neutral Calculation

Parameter	C3
Annual Trips	138,700
Average Distance Travelled per Trip (km)	11.4
Annual Distance Travelled (km)	1,581,180
NO_x Emission Factor (g/km)	0.3530

Parameter	C3
PM_{10} Emission Factor (g/km)	0.0606
NO_x Calculated Development Emission (kg/annum)	558.2
PM_{10} Calculated Development Emission (kg/annum)	95.8

Building Emissions

5.130 Space heating and hot water will be provided to the proposed development by air source heat pumps. The building emissions are therefore considered to be Air Quality Neutral.

MITIGATION

During Construction

5.131 The control of dust emissions from construction site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, large-scale operations have been successfully undertaken without impacts to nearby properties.

5.132 A high risk of dust soiling impacts and a low risk of human health (PM_{10}) effects is predicted at adjacent receptors during construction of the proposed development. Appropriate mitigation measures for the site have been identified following the IAQM guidance and based on the risk effects presented in Table 5.19. These measures have been incorporated into the Construction Environmental Management Plan (CEMP) submitted with the application (Appendix 3.1) and will approved by LBRuT prior to commencement of any work on site.

Highly Recommended Measures

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of the person accountable for air quality and dust issues on the site boundary (i.e. The environment manager/engineer or site manager);
- Display the head or regional office contact information on the site boundary;
- Record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- Make the complaints log available to the local authority when asked;

- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site and the action(s) taken to resolve the situation in the log book;
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided if necessary;
- Carry out regular site inspections to monitor compliance with the dust management plan, record inspection results and make inspection log available to lbrut when asked;
- Increase frequency of site inspection by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;
- Fully enclose site or specific operations where there is a high potential for dust production and the activities are being undertaken for an extensive period;
- Avoid site runoff of water or mud;
- 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, unless being re-used on site. If being re-used on site, cover as detailed below;
- Cover, seed or fence stockpiles to prevent wind whipping;
- Ensure all vehicles switch off engines when stationary - no idling vehicles;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum speed limit of 15mph on surfaces and 10mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate);
- Produce a Construction Logistic Plan to manage the sustainable delivery of goods and materials;

- Implement a travel plan that supports and encourages sustainable travel by construction staff (public transport, cycling, walking and car-sharing);
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. Suitable local exhaust ventilation systems;
- Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- 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, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- Avoid bonfires and burning of waste materials;
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable;
- Only remove the cover in small areas during work and not all at once;
- Avoid scabbing (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;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- Use water-assisted dust sweepers on the access and local roads, to remove, as necessary, any material tracked out of the site;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving the site are covered to prevent the escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surfaces as soon as reasonably practicable;

- Record all inspections of haul routes and any subsequent action in a site log book;
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud);
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit; and
- Access gates to be located at least 10 m from receptors where possible.

During Operation

5.133 The proposed development is predicted to result in a **Negligible** (Not Significant) impact on NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of additional traffic movements along the public highway. No mitigation of operational impacts is therefore considered necessary.

RESIDUAL IMPACTS

During Construction

5.134 The greatest potential for dust nuisance problems to occur will generally be within 200m of the construction site perimeter. There may be limited incidences of increased dust deposited on property beyond this distance.

5.135 By following the mitigation measures outlined within this Chapter, and contained in the CEMP, the impact will be substantially minimised. Residual impacts are therefore considered to be **Negligible** (Not Significant)**.**

During Operation

5.136 Residual impacts during operation would be **Negligible** (Not Significant).

Table 5.27 Summary of Residual Impacts

Description of Impact/Receptor	Significance of Impact/Receptor	Mitigation Measure	Residual Impact
During Construction			
Dust	Negligible	Mitigation measures follow the IAQM guidance. These measures are incorporated into a CEMP and approved by LBRuT prior to commencement of any work on site.	Negligible (Not Significant)
During Operation			
Change in pollutant concentrations as a result of emissions from road vehicles generated by the operation of the development	Negligible	No mitigation required	Negligible (Not Significant)

CUMULATIVE IMPACTS

During Construction

5.137 With the successful implementation of the detailed mitigation measures outlined below the significance of dust impacts beyond the site boundary will be **Negligible** (Not Significant). On this basis the contribution from the proposed development to the cumulative impact of dust generated by other sites in the area will also be **Negligible** (Not Significant).

During Operation

5.138 Traffic associated with other committed and strategic developments in the area have been included in the future (2030) baseline flows and therefore the cumulative effects on local air quality are intrinsic to the assessment.

SUMMARY AND CONCLUSION

5.139 An air quality impact assessment has been carried out to assess both construction and operational impacts of the proposed development.

5.140 An assessment of the potential impacts during the construction phase has been carried out. This has shown that during this phase of the proposed development releases of dust

and PM_{10} are likely to occur during site activities, particularly during demolition activities. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases may be effectively mitigated and the resultant impacts are considered to be **Negligible** (Not Significant).

5.141 The ADMS Roads model has been used to assess the operational impacts associated with the proposed development. This has shown that operational traffic associated with the development would have a **Negligible** (Not Significant) impact on local air quality.

5.142 Future occupants of the proposed development would not be exposed to pollutant concentrations above the relevant objective levels, therefore the impact of the proposed development with regards new exposure to air quality is considered to be **Negligible** (Not Significant).

5.143 Traffic generated by the proposed development is predicted to have a **Negligible** (Not Significant) impact on N-deposition rates and airborne NO_x concentrations within the Richmond Park SSSI.

5.144 The assessment has taken into account the cumulative effects of other committed developments in the area. The cumulative impacts are therefore **Negligible** (Not Significant)**.**

REFERENCES

1 Air Quality Directive 2008/50/EC

2 The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

3 The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

4 The Air Quality Standards Regulations 2016 – Statutory Instrument 2016 No. 1184

5 DEFRA, (2016); Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance. TG16

6 DEFRA, (2007); The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. DEFRA.

7 DEFRA (1995); Part IV The Environment Act 1995.

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

9 Ministry of Housing, Communities and Local Government (2019). Planning Practice Guidance: Air Quality

10 Greater London Authority (2018) London Environment Strategy.

11 Greater London Authority (2021) The London Plan.

12 Mayor of London (July 2014): The control of dust and emissions during construction and demolition – Supplementary Planning Guidance

13 London Borough of Richmond upon Thames (2018) Local Plan.

14 Environmental Planning UK & Institute of Air Quality Management. Land-use Planning and Development Control: Planning for Air Quality, January 2017

15 Institute of Air Quality Management (2014); 'Guidance on the assessment of dust from demolition and construction version 1.1'.

16 Institute of Air Quality Management, (2016), Guidance on the Assessment of Dust from Demolition and Construction V1.1.

17 https://uk-air.defra.gov.uk/

18 https://uk-air.defra.gov.uk/

19 D Laxen and B Marner (2003); 'Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites',

20 Air Quality Consultants & Environ (2014). Air Quality Neutral Planning Support Update