



Palmer Park
Sports
Stadium,
Wokingham
Road,
Reading

Air Quality Assessment

November 2020

Ref: 20-6869



Quality Standards Control

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1. Introduction

Background

This report has been prepared to support a planning application for an extension of Palmer Park Sports Centre, to provide a swimming pool, gym, soft play area and associated facilities.

The proposed development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases, as well as expose future occupants to elevated pollution levels. As such, an Air Quality Assessment was required to determine baseline conditions and assess potential effects associated with the scheme.

Site Location and Context

The site is located at Palmer Park Sports Centre, off Wokingham Road, Reading RG6 1LF, at approximate National Grid Reference (NGR): 473860, 173070. Reference should be made to Figure 1 for a map of the site and surrounding area.

The development has the potential to cause impacts at sensitive locations. These may include fugitive dust emissions associated with construction works and road traffic exhaust emissions from vehicles travelling to and from the site during the operational phase. Further to this, the proposals may introduce future occupants to any existing air quality issues at the site. An Air Quality Assessment was therefore undertaken to determine baseline conditions, consider location suitability for the proposed end-use and consider potential effects because of the proposals. This is detailed in the following report.

2. Legislation and Policy

Legislation

The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO₂);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Particulate matter with an aerodynamic diameter of less than 2.5µm;
- Benzene; and,
- Carbon monoxide.

Target Values were also provided for an additional 5 pollutants. These include:

- Ozone;
- Arsenic;
- Cadmium;
- Nickel; and,
- Benzo(a)pyrene.

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

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

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (µg/m ³)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum

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

Table 2 summarises the advice provided in Local Air Quality Management Technical Guidance (LAQM.TG16)² on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-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

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

² Defra Local Air Quality Management (LAQM)), Technical Guidance 2016 (LAQM.TG (16)), Defra, 2018.

Dust Legislation

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

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

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

National Planning Policy

The revised National Planning Policy Framework³ (NPPF) was published in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

The purpose of the planning system is to contribute to the achievement of sustainable development. To ensure this, the NPPF recognises three overarching objectives, including the following of relevance to air quality:

"c) An environmental objective - to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

[...]

e) 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 [...]"

³ NPPF, Ministry of Housing, Communities and Local Government, 2019.

The NPPF specifically recognises air quality as part of delivering sustainable development and 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."

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

National Planning Practice Guidance

The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

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

Local Planning Policy

Reading Borough Local Plan

The Local Plan for the Reading Borough Council (RBC) is Reading Borough Local Plan 2020 - 2036⁵. A review of the document indicated the following main policy in relation to air quality that is relevant to the assessment:

⁴ <https://www.gov.uk/guidance/air-quality--3>.

⁵ Reading Borough Local Plan Adopted November 2019, Reading Borough Council, 2019

"EN15: Air Pollution

Development should have regard to the need to improve air quality and reduce the effects of poor air quality.

- i. Development that would detrimentally affect air quality will not be permitted unless the effect is to be mitigated. The following criteria should be taken into account:*
 - Whether the proposal, including when combined with the cumulative effect of other developments already permitted, would worsen air quality;*
 - Whether the development is within, or accessed via, an Air Quality Management Area; and*
 - Whether it can be demonstrated that a local worsening in air quality that would not detrimentally affect human health or the environment would be offset by an overall improvement in air quality, for instance through reduction in the need to travel.*
- ii. Where a development would introduce sensitive uses (such as residential, schools and nurseries, hospitals, care facilities) into, or intensify such uses within, an Air Quality Management Area, detrimental effects on that use will be mitigated. Mitigation measures should be detailed in any planning application. If there are significant detrimental effects that cannot be mitigated, the application should be refused.*
- iii. Where required, planning obligations will be used to secure contributions to measures to tackle poor air quality or for air quality monitoring.*

The implications of this plan were taken into consideration throughout the undertaking of the assessment.

3. Methodology

Introduction

The proposed development has the potential to cause air quality impacts during the construction and operation phases, as well as expose future occupants to elevated pollution levels. These issues have been assessed in accordance with the following methodology.

Construction Phase Fugitive Dust Emission Assessment

There is the potential for fugitive dust emissions to occur because of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management's 'Guidance on the assessment of dust from demolition and construction'⁶.

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

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

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

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

The assessment steps are detailed below.

Step 1

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

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

⁶ Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, 2016.

Step 2

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

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

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

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

Table 3 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	Total volume of building to be demolished greater than 50,000m ³ Potentially dusty material (e.g. concrete) On-site crushing and screening Demolition activities more than 20m above ground level
	Earthworks	Total site area greater than 10,000m ² Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) More than 10 heavy earth moving vehicles active at any one time Formation of bunds greater than 8m in height More than 100,000 tonnes of material moved
	Construction	Total building volume greater than 100,000m ³ On site concrete batching Sandblasting
	Trackout	More than 50 Heavy Duty Vehicle (HDV) trips per day Potentially dusty surface material (e.g. high clay content) Unpaved road length greater than 100m
Medium	Demolition	Total volume of building to be demolished between 20,000m ³ and 50,000m ³ Potentially dusty construction material Demolition activities 10m to 20m above ground level

Magnitude	Activity	Criteria
	Earthworks	Total site area 2,500m ² to 10,000m ² Moderately dusty soil type (e.g. silt) 5 to 10 heavy earth moving vehicles active at any one time Formation of bunds 4m to 8m in height Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	Total building volume 25,000m ³ to 100,000m ³ Potentially dusty construction material (e.g. concrete) On site concrete batching
	Trackout	10 to 50 HDV trips per day Moderately dusty surface material (e.g. high clay content) Unpaved road length 50m to 100m
Small	Demolition	Total volume of building to be demolished less than 20,000m ³ Construction material with low potential for dust release (e.g. metal cladding or timber) Demolition activities less than 10m above ground and during wetter months
	Earthworks	Total site area less than 2,500m ² Soil type with large grain size (e.g. sand) Less than 5 heavy earth moving vehicles active at any one time Formation of bunds less than 4m in height Total material moved less than 20,000 tonnes Earthworks during wetter months
	Construction	Total building volume less than 25,000m ³ Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	Less than 10 HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 4.

Table 4 Construction Dust - Factors Defining Sensitivity of an Area

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	Users expect of high levels of amenity High aesthetic or value property People expected to be present continuously for extended periods of time Locations where members of the public are exposed over a time period relevant to the AQO for PM₁₀. e.g. residential properties, hospitals, schools and residential care homes	Internationally or nationally designated site e.g. Special Area of Conservation
Medium	Users would expect to enjoy a reasonable level of amenity Aesthetics or value of their property could be diminished by soiling People or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	Nationally designated site e.g. Sites of Special Scientific Interest
Low	Enjoyment of amenity would not reasonably be expected Property would not be expected to be diminished in appearance Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, farmland, short term car parks and roads	Locally designated site e.g. Local Nature Reserve

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

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

These factors were considered during the undertaking of the assessment.

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 5.

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

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

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

Table 6 Construction Dust - Sensitivity of the Area to Human Health Impacts

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

Table 7 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 7 Construction Dust - Sensitivity of the Area to Ecological Impacts

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

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

Table 8 outlines the risk category from demolition activities.

Table 8 Construction Dust - Dust Risk Category from Demolition Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Low	Low	Negligible

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

Table 9 Construction Dust - Dust Risk Category from Earthworks and Construction Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table 10 outlines the risk category from trackout activities.

Table 10 Construction Dust - Dust Risk Category from Trackout Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Low	Negligible
Low	Low	Low	Negligible

Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM's guidance⁷ to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

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

Operation Phase Road Vehicle Exhaust Emission Assessment

The development has the potential to affect existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site, as well as expose future occupants to elevated pollution levels.

Potential Development Impacts

The development proposals have been screened against the following Institute of Air Quality Management (IAQM) indicative criteria for requiring an Air Quality Assessment.

1. A change in Light-Duty Vehicle⁸ (LDV) traffic flows on local roads with relevant receptors
 - more than 100 AADT within or adjacent to an AQMA
 - more than 500 AADT elsewhere

⁷ Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, 2016.

⁸ Cars and small vans <3.5t gross vehicle weight

2. A change in Heavy-Duty Vehicle⁹ (HDV) flows on local roads with relevant receptors
 - more than 25 AADT within or adjacent to an AQMA
 - more than 100 AADT elsewhere
3. A change in the alignment of roads by 5m or more and the road is within an AQMA
4. Introduction of a new junction or remove an existing junction near to relevant receptors
 - Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station
 - Where bus flows will change by:
 - (a) more than 25 AADT within or adjacent to an AQMA
 - (b) more than 100 AADT elsewhere
6. Has an underground car park with an extraction system within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Has one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.
 - includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.

Where IAQM indicative criteria for requiring an Air Quality Assessment was met, potential impacts were defined by predicting pollutant concentrations at sensitive locations using Design Manual for Roads and Bridges (DMRB)¹⁰ and/or ADMS-Roads dispersion modelling.

Where necessary, locations sensitive to potential changes in pollutant concentrations were identified within 200m of the highway network following the guidance provided within DMRB on the likely limits of pollutant dispersion from road sources. The criteria provided within LAQM.TG16 guidance¹¹ on where the AQOs apply, as summarised in Table 2, was utilised to determine appropriate receptor positions.

The significance of predicted air quality impacts was determined following the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'¹². Using this methodology impacts were defined based on the interaction between the predicted pollutant concentration in the Do Something (DS) or With Development scenario and the magnitude of change between the Do Minimum (DM) or Without Development and DS scenarios, as outlined in IAQM guidance.

⁹ Goods vehicles + buses >3.5t gross vehicle weight

¹⁰ DMRB Volume 11, Section 3, Part 1, LA 105, Highways England, 2019.

¹¹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹² Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Table 11 Significance of Road Vehicle Exhaust Emissions Impact

Concentration at Receptor in Assessment Year	Predicted Concentration Change as a Proportion of AQO (%)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

The matrix shown in IAQM guidance is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

Following the prediction of impacts at discrete receptor locations, the IAQM document¹³ provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

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

The IAQM guidance states that an assessment must conclude the likely significance of the predicted impact. It should be noted that this is a binary judgement of either it is **significant**, or it is **not significant**.

The determination of significance relies on professional judgement, and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM guidance¹⁴ suggests the provision of details of the assessor's qualifications and experience. These can be provided upon request.

Future Impacts

The proposed development has the potential to change air quality for existing residents. Pollutant concentrations were therefore quantified at representative receptor locations using dispersion modelling. The results were subsequently compared with the relevant AQOs to determine the potential for exposure of future occupants to elevated pollutant concentrations and identify appropriate mitigation, if necessary.

Modelling was undertaken for 2018 for verification purposes and 2019 to represent a worst-case opening year. The assessment was conducted in accordance with the methodology discussed below.

¹³ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹⁴ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.0.1). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and Defra.

The model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length (z_0); and,
- Monin-Obukhov length.

These are detailed in the following Sections.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour AADT flows and fleet composition, was obtained from the Department for Transport (DfT) traffic count website. The DfT data is deemed as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable estimate of traffic flow in the vicinity of the site.

Meteorological Data

Meteorological data used in the assessment was taken from Cippenham meteorological station over the period 1st January 2018 to 31st December 2018 (inclusive). Cippenham meteorological station is located approximately 24.5km to the east of the proposed development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for use in the dispersion model. Figure 3 shows the wind rose of the meteorological data used in the assessment.

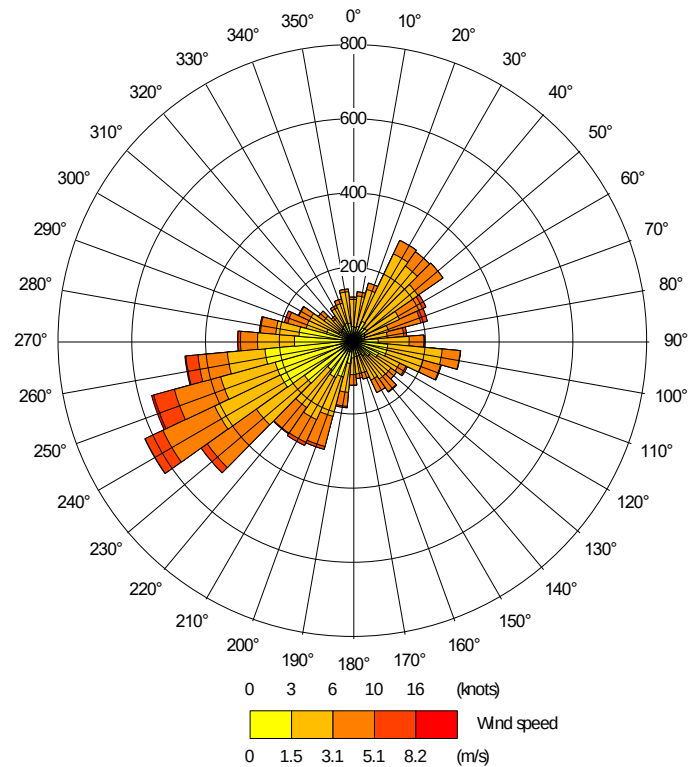


Figure 3: Wind Rose from Cippenham Meteorological Station for 2018

Roughness Length

A z_0 of 0.5m was used to describe the modelling extents. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'Parkland and open suburbia'.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents and the meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'Cities and large towns'.

Verification

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

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

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

Model verification was undertaken as per the methodology outlined in Defra's LAQM (TG16)¹⁵. For the purpose of this assessment model verification was undertaken for 2019 using traffic data, meteorological data and monitoring results from this year.

Future Exposure

The proposal has the potential to expose future occupants to poor air quality. To assess pollutant concentrations across the development site, consideration was made of the proximity of the site to major roads and background pollution concentrations.

Likely pollution concentrations at the development site were compared against the relevant AQOs to determine the potential for exposure of future occupants to elevated pollutant concentrations and identify any appropriate mitigation, if necessary.

¹⁵ Local Air Quality Management Technical Guidance (TG16), Defra, 2018.

4. Baseline

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

Local Air Quality Management

As required by the Environment Act (1995), RBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual concentrations of NO₂ are above AQOs within the council's administrative extents. As such, one AQMA has been declared which is described as:

"Exceedance of the annual mean NO₂ objective."

The development is located within the AQMA and there is the potential vehicles travelling to and from the site to increase pollution levels in this sensitive area. This has been considered throughout the assessment.

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

Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by RBC throughout their area of jurisdiction. Annual mean NO₂ results recorded in the vicinity of the development taken from readily available information online are shown in Table 12. Exceedances of the relevant AQOs are shown in **bold**.

Reference should be made to Figure 1 for a map of the monitoring sites.

Table 12 Monitoring Results - Annual Mean NO₂

Monitoring Site	Distance to Site (Km)	Monitor Type	Data Capture ^a (%)	Monitored NO ₂ Concentration (µg/m ³)		
				2016	2017	2018
AURN	0.4	Continuous Urban Background	99	34	29	26
DT2	0.4	Diffusion Tube Urban Background	100	19	18	18
DT3	0.4	Diffusion Tube Urban Background	100	18	19	19
DT4	0.4	Diffusion Tube Urban Background	100	19	18	18
DT7	0.5	Diffusion Tube Roadside	100	42	43	40

Monitoring Site	Distance to Site (Km)	Monitor Type	Data Capture ^a (%)	Monitored NO ₂ Concentration (µg/m ³)		
				2016	2017	2018
DT8	0.4	Diffusion Tube Roadside	100	42	44	39

Notes: ^a For latest year presented

As shown in Table 12, annual mean NO₂ concentrations were above or close to the relevant AQO at the nearest monitors, DT7 and DT8 to the development in recent years; however as these sites measure 'roadside' concentrations, they are not representative of the development site, which is approximately 160m from road. Concentrations recorded at Urban Background monitors, AURN Reading New Town, are more representative of the development site, which is away from major roads. Concentrations at these locations are below the relevant AQO.

Recent annual mean PM₁₀ results recorded closest to the development are shown in Table 13.

Table 13 Monitoring Results - Annual Mean PM₁₀

Monitoring Site	Distance to Site (Km)	Monitor Type	Data Capture ^a (%)	Monitored PM ₁₀ Concentration (µg/m ³)		
				2016	2017	2018
AURN	0.4	Continuous Urban Background	78	13	12	13

Notes: ^a For latest year presented

As shown in Table 13, annual mean PM₁₀ concentrations were below the relevant AQO in recent years.

Background Pollutant Concentrations

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR: 473500, 173500. Data for this location was downloaded from the DEFRA website for the purpose of this assessment and is summarised in Table 14.

Table 14 2020 Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m ³)
NO ₂	20.1
PM ₁₀	16.7

As shown in Table 14, predicted background concentrations are below the relevant AQOs at the development site.

Sensitive Receptors

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

5. Assessment

There is the potential for air quality impacts as a result of the construction and operation of the proposed development. These are assessed in the following Sections.

Construction Phase Fugitive Dust Emission Assessment

Construction Phase Sensitive Receptors

Receptors sensitive to potential dust impacts during demolition, earthworks and construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 15.

Table 15 Demolition, Earthworks and Construction Dust Sensitive Receptors

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

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access. These are summarised in Table 16.

Table 16 Trackout Dust Sensitive Receptors

Distance from Site Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Less than 20	1 - 10	0
Less than 50	10 - 100	0

There are no ecological receptors within 50m of the site or trackout boundary. As such, ecological impacts have not been assessed further within this report.

Several additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 17.

Table 17 Additional Area Sensitivity Factors to Potential Dust Impacts

Guidance	Comment
Whether there is any history of dust generating activities in the area	The desk top study did not indicate any dust generating activities in the local area

Guidance	Comment
The likelihood of concurrent dust generating activity on nearby sites	A review of the planning portal did not indicate any additional development proposals likely to result in concurrent dust generation in the vicinity of the site
Pre-existing screening between the source and the receptors	There is no significant screening around the site boundary
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is likely that it will extend over one year
Any known specific receptor sensitivities which go beyond the classifications given in the document	No specific receptor sensitivities identified during the baseline assessment

Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included places of work and residential properties. It should be noted that all receptors were assumed to be of **high** sensitivity to provide a robust assessment.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3, is shown in Table 18.

Table 18 Sensitivity of the Surrounding Area to Specific Dust Impacts

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

Step 1

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

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

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

Step 2

Demolition

Demolition will be undertaken at the start of the construction phase and will involve clearance of the existing structures on site.

Table 19 show the evaluation of the potential magnitude of impacts from demolition activities.

Table 19 Demolition Impact Magnitude

Category	Criteria	Evaluation
Large	Total volume of building to be demolished greater than 50,000m ³	Unlikely
	Potentially dusty material (e.g. concrete)	Unlikely
	On-site crushing and screening	Unlikely
	Demolition activities more than 20m above ground level	Unlikely
Medium	Total volume of building to be demolished between 20,000m ³ and 50,000m ³	Unlikely
	Potentially dusty construction material	Unlikely
	Demolition activities 10m to 20m above ground level	Unlikely
Small	Total volume of building to be demolished less than 20,000m ³	Unlikely
	Construction material with low potential for dust release (e.g. metal cladding or timber)	Unlikely
	Demolition activities less than 10m above ground and during wetter months	Unlikely

The potential magnitude of construction impacts from demolition activities is estimated to be **small**, due to the use of potentially dusty material.

Table 18 indicates the sensitivity of the area to dust soiling effects on people and property is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **negligible** risk site for dust soiling as a result of demolition activities.

Table 18 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **negligible** risk site for human health impacts as a result of demolition activities.

Earthworks

Table 19 show the evaluation of the potential magnitude of impacts from earthworks.

Table 20 Earthworks Impact Magnitude

Category	Criteria	Evaluation
Large	Total site area greater than 10,000m ²	Unlikely
	Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size)	Unlikely

Category	Criteria	Evaluation
	More than 10 heavy earth moving vehicles active at any one time	Unlikely
	Formation of bunds greater than 8m in height	Unlikely
	More than 100,000 tonnes of material moved	Unlikely
Medium	Total site area 2,500m ² to 10,000m ²	Likely
	Moderately dusty soil type (e.g. silt)	Unlikely
	5 to 10 heavy earth moving vehicles active at any one time	Unlikely
	Formation of bunds 4m to 8m in height	Unlikely
	Total material moved 20,000 tonnes to 100,000 tonnes	Unlikely
Small	Total site area less than 2,500m ²	Unlikely
	Soil type with large grain size (e.g. sand)	Unlikely
	Less than 5 heavy earth moving vehicles active at any one time	Unlikely
	Formation of bunds less than 4m in height	Unlikely
	Total material moved less than 20,000 tonnes	Unlikely
	Earthworks during wetter months	Unlikely

The potential magnitude of construction impacts from earthworks is estimated to be **medium**, due to the total site area.

Table 18 indicates the sensitivity of the area to dust soiling effects on people and property is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for dust soiling as a result of earthworks.

Table 18 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health impacts as a result of earthworks.

Construction

Table 19 show the evaluation of the potential magnitude of impacts from construction activities.

Table 21 Construction Impact Magnitude

Category	Criteria	Evaluation
Large	Total building volume greater than 100,000m ³	Unlikely
	On site concrete batching	Unlikely
	Sandblasting	Unlikely
Medium	Total building volume 25,000m ³ to 100,000m ³	Unlikely
	Potentially dusty construction material (e.g. concrete)	Likely
	On site concrete batching	Unlikely
Small	Total building volume less than 25,000m ³	Unlikely

Category	Criteria	Evaluation
	Construction material with low potential for dust release (e.g. metal cladding or timber)	Unlikely

The potential magnitude of impacts from construction activities is estimated to be **medium**, due to the use of potentially dusty material.

Table 18 indicates the sensitivity of the area to dust soiling effects on people and property is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for dust soiling as a result of construction activities.

Table 18 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health impacts as a result of construction activities.

Trackout

Table 19 show the evaluation of the potential magnitude of impacts from trackout.

Table 22 Trackout Impact Magnitude

Category	Criteria	Evaluation
Large	More than 50 Heavy Duty Vehicle (HDV) trips per day	Unlikely
	Potentially dusty surface material (e.g. high clay content)	Unlikely
	Unpaved road length greater than 100m	Unlikely
Medium	10 to 50 HDV trips per day	Unlikely
	Moderately dusty surface material (e.g. high clay content)	Unlikely
	Unpaved road length 50m to 100m	Unlikely
Small	Less than 10 HDV trips per day	Likely
	Surface material with low potential for dust release	Likely
	Unpaved road length less than 50m	Likely

The potential magnitude of impacts from trackout is estimated to be **small**, due to the low number of HDV trips per day.

Table 18 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **low** risk site for dust soiling as a result of trackout activities.

Table 18 indicates the sensitivity of the area to human health impacts is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **low** risk site for human health impacts as a result of trackout activities.

Summary of Potential Unmitigated Dust Risks

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

Table 23 Summary of Potential Unmitigated Dust Risks

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

As indicated in Table 23, the potential risk of dust soiling is **low** from demolition, construction, earthwork and trackout. The potential risk of human health impacts is the same as for Dust Soiling.

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

Step 3

The IAQM's guidance¹⁶ provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in Table 24. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan or similar if required by the LA.

Table 24 Fugitive Dust Emission Mitigation Measures

Issue / Control Measure	Site Risk		
	Low	Medium	High
General			
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	Not required	Highly recommended	
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager	Highly recommended		

¹⁶ Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, 2016.

Issue / Control Measure	Site Risk		
	Low	Medium	High
Display the head or regional office contact information	Highly recommended		
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM10 continuous monitoring and/or visual inspections.	Recommended	Highly recommended	
Site Management			
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Highly recommended		
Make the complaints log available to the local authority when asked	Highly recommended		
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.	Highly recommended		
Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.	Not required		Highly recommended
Monitoring			
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 100 m of site boundary, with cleaning to be provided if necessary.	Recommended		Highly recommended
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked	Highly recommended		
Increase the frequency of site inspections 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 dry or windy conditions.	Highly recommended		

Issue / Control Measure	Site Risk		
	Low	Medium	High
Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks, and construction.	Not required	Highly recommended	
Preparing and Maintaining the Site			
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Highly recommended		
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Recommended		
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period	Recommended	Highly recommended	
Avoid site runoff of water or mud.	Highly recommended		
Keep site fencing, barriers and scaffolding clean using wet methods.	Recommended	Highly recommended	
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below	Recommended	Highly recommended	
Cover, seed, or fence stockpiles to prevent wind whipping	Recommended	Highly recommended	
Operating Vehicle/Machinery and Sustainable Travel			
Ensure all vehicles switch off engines when stationary - no idling vehicles.	Highly recommended		
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable	Highly recommended		
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced 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)	Recommended		Highly recommended
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Not required	Highly recommended	

Issue / Control Measure	Site Risk		
	Low	Medium	High
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)	Not required	Recommended	Highly recommended
Operations			
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	Highly recommended		
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate	Highly recommended		
Use enclosed chutes and conveyors and covered skips.	Highly recommended		
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Highly recommended		
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.	Recommended	Highly recommended	
Waste Management			
Avoid bonfires and burning of waste materials	Highly recommended		
Measures Specific to Demolition			
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	Recommended		Highly recommended
Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Highly recommended		
Avoid explosive blasting, using appropriate manual or mechanical alternatives	Highly recommended		
Bag and remove any biological debris or damp down such material before demolition.	Highly recommended		
Measures Specific to Earthworks			

Issue / Control Measure	Site Risk		
	Low	Medium	High
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Not required	Recommended	Highly recommended
Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	Not required	Recommended	Highly recommended
Only remove the cover in small areas during work and not all at once	Not required	Recommended	Highly recommended
Measures Specific to Construction			
Avoid scabbling (roughening of concrete surfaces) if possible	Recommended		Highly recommended
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.	Recommended	Highly recommended	
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	Not required	Recommended	Highly recommended
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	Not required	Recommended	
Measures Specific to Trackout			
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	Recommended	Highly recommended	
Avoid dry sweeping of large areas.	Recommended	Highly recommended	
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Recommended	Highly recommended	
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Not required	Highly recommended	
Record all inspections of haul routes and any subsequent action in a site logbook.	Recommended	Highly recommended	

Issue / Control Measure	Site Risk		
	Low	Medium	High
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	Not required	Highly recommended	
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Recommended	Highly recommended	
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.	Not required	Highly recommended	
Access gates to be located at least 10 m from receptors where possible	Not required	Highly recommended	

Step 4

Assuming the relevant mitigation measures outlined in Table 24 are implemented, the residual impact from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM's guidance¹⁷.

Operation Phase Road Vehicle Exhaust Emission Assessment

Future Impacts

The development proposals have been screened against the following IAQM indicative criteria for requiring an Air Quality Assessment. It is considered likely that the development will generate additional traffic and this has been confirmed by the Transport Consultant.

1. Light-Duty Vehicle traffic flows on local roads with relevant receptors are likely to be greater than 100 AADT within or adjacent to an AQMA.
2. Heavy-Duty Vehicle flows on local roads with relevant receptors are likely to be less than 25 AADT within or adjacent to an AQMA.
3. There is no proposal to change in the alignment of roads by 5m or more, and the road is within an AQMA.
4. There is no proposal to introduce a new junction or remove an existing junction near to relevant receptors or introduce or change a bus station.
5. There is no proposal to have an underground car park or one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.

¹⁷ Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, 2016.

In accordance with the IAQM indicative criteria an air quality assessment of operation phase road traffic emissions is required and impacts at the receptors are assessed using dispersion modelling.

Table 25 show the modelled annual mean NO₂ concentrations at the receptors with and without the development and the potential magnitude of impacts in accordance with the IAQM guidance.

Table 25 Modelled Concentrations

	DM	DS	Change	Impact Descriptor
R1	30.2	30.3	0.1	Negligible
R2	30.6	30.7	0.1	Negligible

In both DM and DS scenarios, the predicted annual mean NO₂ concentrations are below the annual mean objective at all existing receptors.

Annual mean NO₂ concentrations are predicted to be below 60 µg/m³ at all existing receptors (below the short-term NO₂ objective). This indicates that the short term NO₂ objective is unlikely to be exceeded at these sites.

Therefore, it is considered that the overall impact of the proposed development on local air quality is defined as being **negligible**, which is not considered to be significant and would not affect the requirements of local planning policy (in terms of air quality).

Future Exposure

The local air quality monitoring data and Defra background mapping concentration indicated that the concentrations are likely to be within the air quality objective. In addition, the nature of the development, where members of the public might not be regularly exposed. Therefore, the future exposure of the poor air quality is unlikely with the development.

6. Conclusion

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation, as well as expose future occupants to any existing air quality issues. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.

During the construction phase of the development there is the potential for air quality impacts because of fugitive dust emissions from the site. These were assessed in accordance with the GLA methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by demolition, earthworks, construction and trackout activities was predicted to be **not significant**.

In accordance with the IAQM indicative criteria an air quality assessment of operation phase road traffic emissions is not required and impacts on air quality are considered **not significant**.

The proposed development is unlikely has the potential to expose future users to elevated pollution levels in the vicinity of the site during operation. The local monitoring and Defra background concentration indicates that future users are unlikely to be exposed to pollutant concentrations that exceed air quality objectives.

Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.



Figure 1 Site Location and Local Monitoring Sites

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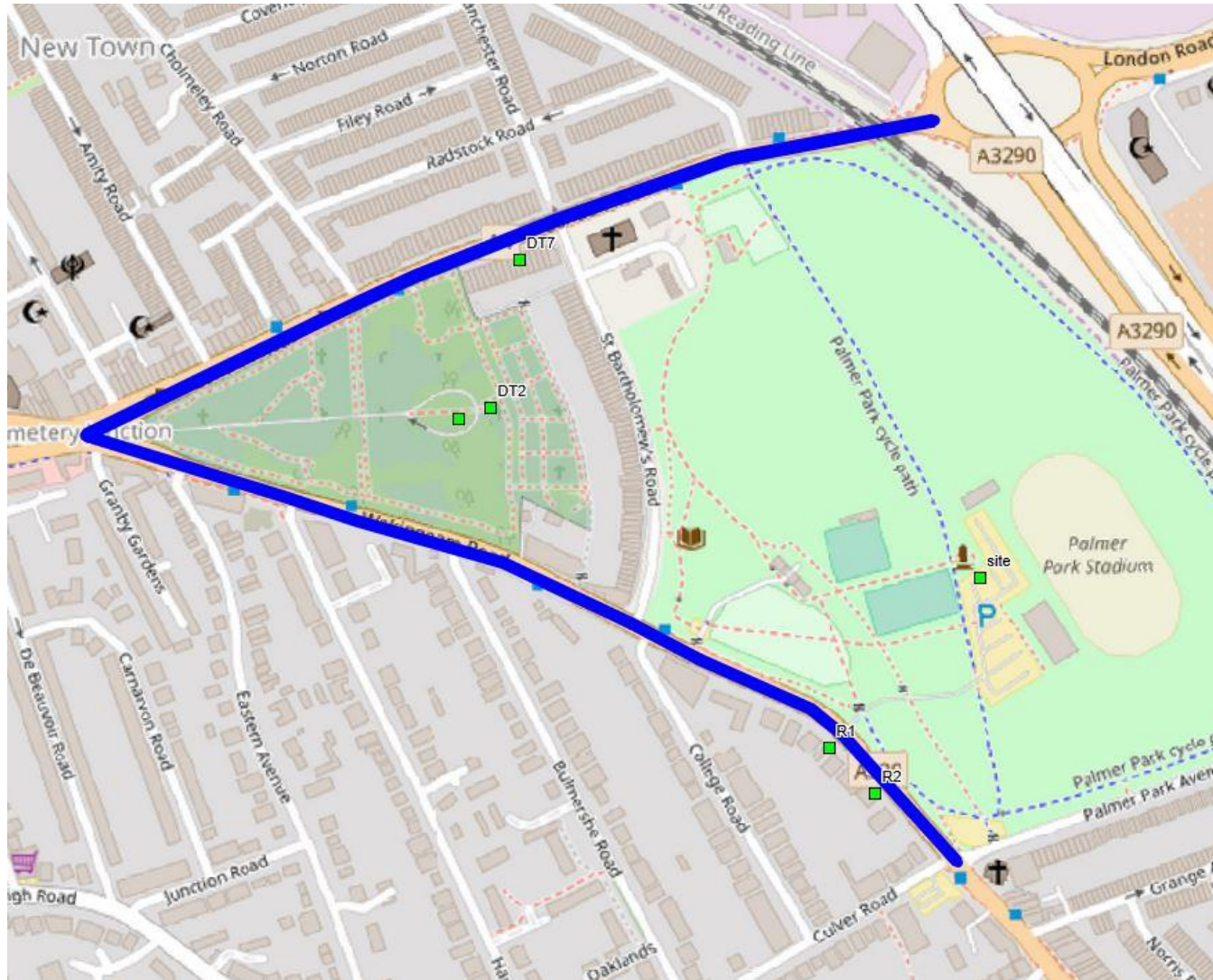


Figure 2 Modelled Receptors

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7. Appendices

Limitations and Assumptions

The assessment of the operational phase of the Proposed Development has adopted the following limitations and assumptions:

- Roads modelling has used traffic data provided by the Traffic and Transport consultants and Department of Transport Traffic Counts
- Local monitoring data available for 2018, same as verification year
- 2018 and 2019 Defra background pollution concentrations and Defra's vehicle emission rates have been assumed to provide a very conservative estimate for future years of assessment; and
- Worst case receptors have been assumed, which represent the anticipated location of maximum exposure of air pollutants within an area.

Traffic Data and EFT Emission Rates

The derived traffic data from the DfT and Transport Consultant are summarised in Table 26 and Table 27.

Table 26 Traffic Data Input

Road	2018 AADT LGV	2018 AADT HGV	2019 AADT LGV	2019 AADT HGV
A4	22,840	962	24,005	967
Wokingham Road	10,104	404	10,196	406

Table 27 Development Traffic

Development Flow	Two way AADT
Base	626
Two way + Development	850
Change	224

Assumptions:

- No speed survey data was available. Speed limits were used for each modelled road links
- 50:50 split of two-way traffic on Wokingham Road southbound and northbound
- Base year 2018 and 2019 was used for EFT tool for worst-case scenario.

Model Verification

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG (16) identifies several statistical procedures that are appropriate to evaluate model performance and assess the uncertainty.

The statistical parameters used in this assessment are:

- root mean square error (RMSE)
- fractional bias (FB)
- correlation coefficient (CC)

A brief explanation of each statistic is provided in Table 28, and further details can be found in LAQM.TG (16) Box A3.7 (Defra, 2016).

Table 28 Model Performance Statistics

Statistical Parameter	Comments	Ideal Value
RMSE	RMSE is used to define the average error or uncertainty of the model. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. For example, if model predictions are of an annual mean NO₂ objective of 40µg/m³ and the RMSE is 10µg/m³ or above, it is advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/m³ for the annual mean NO₂ objective.	0.01
FB	It is used to identify if the model shows a systematic tendency to over or under predict. FB values vary between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.	0.00
CC	It is used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship. This statistic can be particularly useful when comparing a large number of model and observed data points.	1.00

These parameters estimate how the model results agree or diverge from observations.

These calculations have been carried out prior to, and after, model adjustment and provide information on the improvement of the model predictions as a result of the application of the adjustment factor.

The verification process involves a review of the annual mean modelled pollutant concentrations against corresponding monitoring data to determine how closely the air quality model corresponds.

The acceptable limits of model verification are set out in LAQM.TG (16). Depending on the outcome it may be considered that there is no need to adjust any of the modelled results (LAQM.TG (16)).

Alternatively, the model may not correlate against the monitoring data. There is then a need to check all the input data to ensure that it is reasonable and accurately represented in the air quality modelling process.

Where all input data, such as traffic data, emissions rates, and background concentrations have been checked and considered reasonable, then the model requires adjustment to best align with the monitoring data. This may either be a single adjustment factor to be applied to the modelled concentrations across the study area, or a range of different adjustment factors to account for different zones in the study area e.g. motorways, local roads. Suitable monitoring locations were selected and used in the verification process, considering the site types, position of the diffusion tubes and representation of local air quality environment.

There are two locations at the study area available for traffic emission verification. The non-adjusted modelled versus monitored NO₂ concentrations at those locations determined as suitable for the verification process are presented in Table 29.

Table 29 Model Performance Statistics

Monitoring Location	X	Y	Height (m)	Monitored NO ₂ concentration (µg/m ³)	Monitored NO _x Road (µg/m ³)	Modelled NO _x Road (µg/m ³)	Adjustment Factor for Road NO _x
AURN	473441	173198	2.5	26	6.2	2.55	2.4
DT7	473490	173326	2.5	40	35.6	10.52	3.4

The initial comparison between the predicted concentrations and monitoring data illustrates that the model tends to under predict NO₂ concentrations over the modelled area.

Model adjustment was undertaken in accordance with LAQM.TG (16). Modelled Road NO_x concentrations predicted at sensitive receptors in the base and opening year scenarios were multiplied by the adjustment factor (3.3) to account for the under-prediction of Road NO_x by the model.