



Land at East Street, Reading

Air Quality Assessment

5628.9

10th October 2018

Revision A



Air Quality Assessment

New Century Place, Reading

5628.9

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2 Summary

- 2.1 This report has been prepared in support of a student accommodation development on land at New Century Place, Reading.
- 2.2 Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of earthworks, construction and trackout activities. The results were utilised to identify suitable mitigation for inclusion in a Construction Environmental Management Plan or similar. It is considered that the use of these good practice control measures would ensure impacts are minimised throughout construction.
- 2.3 In order to assess the potential for exposure of future occupants to poor air quality, dispersion modelling was undertaken to predict pollutant concentrations across the site. The outputs were subsequently verified using local monitoring data. Review of the results indicated predicted pollution levels were below the national air quality standards across the site. As such, mechanical ventilation is not required from an air quality perspective.
- 2.4 During the operational phase of the development there is the potential for air quality impacts as a result of traffic exhaust emissions associated with vehicle movements generated by future occupants. These were assessed by comparing the number of anticipated trips against the relevant screening criteria. Due to the low number of journeys anticipated to be produced by the proposal, impacts were not predicted to be significant.
- 2.5 Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposal, subject to the inclusion of the specified mitigation.

3 Introduction

Background

- 3.1 This report has been prepared in support of a student accommodation development on land at New Century Place, Reading.
- 3.2 The development may lead to the exposure of future occupants to poor air quality, as well as adverse impacts at sensitive positions during construction and operation. As such, an Air Quality Assessment was required to determine baseline conditions at the site, consider location suitability for the proposed end-use and assess potential effects associated with the scheme.

Site Location and Context

- 3.3 The site is located at New Century Place, off East Street, Reading, at approximate National Grid Reference (NGR): 471858, 173169. Reference should be made to Figure 1 for a map of the site and surrounding area.
- 3.4 The proposals comprise the development of a five storey building to provide a number of student accommodation rooms and associated infrastructure.
- 3.5 Reading Borough Council (RBC) has declared an Air Quality Management Area (AQMA) due to exceedences of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO₂). The development is located within the AQMA. Subsequently, there are concerns that the proposals will introduce future occupants to poor air quality and necessitate the inclusion of mechanical ventilation. As such, concentrations at the site have been assessed in the following report to consider location suitability for the proposed end-use and define any requirement for mitigation. Potential impacts associated with the construction and operational phases of the scheme have also been considered using standard screening methodologies.

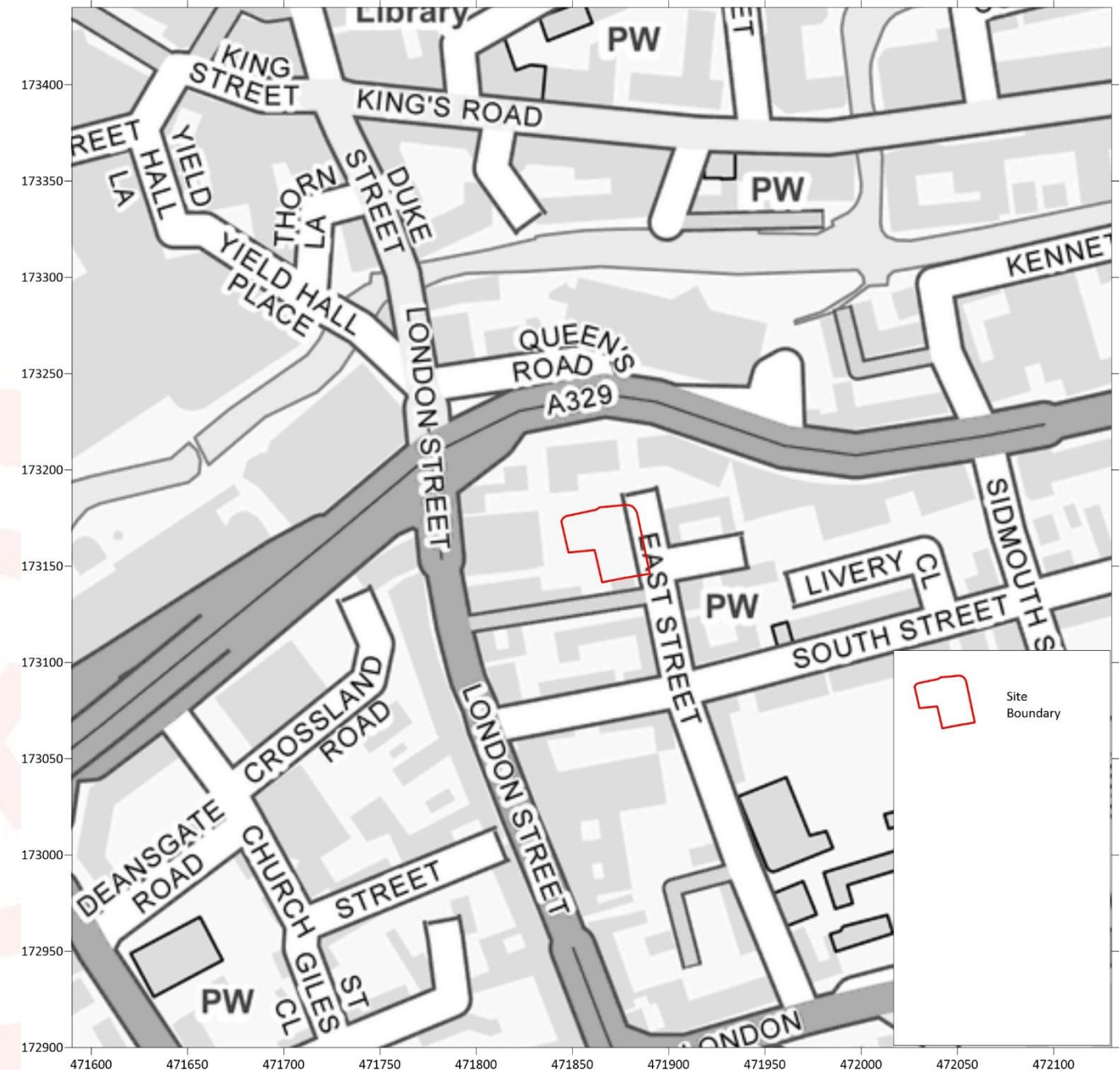


Figure 1: Site Location

4 Legislation and Policy

European Directives

4.1 European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new Air Quality Limit Values (AQLVs) for particulate matter with an aerodynamic diameter of less than 2.5µm. The consolidated Directives include:

- Directive 1999/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for NO₂, oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

4.2 The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

UK Legislation

4.3 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 5 pollutants.

4.4 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 2007[1]. The AQS sets out AQOs that are maximum ambient pollutant

concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

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

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

Table 1: Air Quality Objectives

4.6 Table 2 summarises the advice provided in DEFRA guidance[2] on where the AQOs for pollutants considered within this report 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

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
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

Table 2: Examples of Where the Air Quality Objectives Apply

Local Air Quality Management

- 4.7 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 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.

Dust

- 4.8 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."

- 4.9 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

- 4.10 The revised National Planning Policy Framework[3] (NPPF) was published in July 2018 and sets out the Government's planning policies for England and how these are expected to be applied.
- 4.11 The purpose of the planning system is to contribute to the achievement of sustainable development. In order 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 adaption to climate change, including moving to a low carbon economy."*
- 4.12 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 both 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 [...]"

- 4.13 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."

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

National Planning Practice Guidance

- 4.15 The National Planning Practice Guidance[4] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:
1. Why should planning be concerned about air quality?
 2. What is the role of Local Plans 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 be relevant to a planning decision?
6. Where to start if bringing forward a proposal where air quality could be a concern?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?
9. How do considerations about air quality fit into the development management process?

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

Local Planning Policy

- 4.17 The Reading Borough Local Development Framework: Core Strategy[5] was adopted by RBC on 29th January 2008. It provides the legal framework for the development and use of land within Reading for the period up to 2023. It also provides the context for determining local planning applications.

- 4.18 A review of the Core Strategy indicated the following policy of relevance to the report:

"Sustainable Development

Living within Environmental Limits (Environmental Objectives)

[...]

4. Minimise air, water, soil/ground and noise pollution and address the factors that contribute to climate change, recognising the heightened knowledge of the severity of climate change related impacts.

[...]"

Development will only be permitted where it would not be damaging to the environment through air, land, noise or light pollution; where it would preserve or ideally enhance ground and surface water quality; and where existing water resources, sewerage and wastewater treatment infrastructure are adequate to support the proposed development.

Proposals for development that are sensitive to the effects of air, noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.

Development will be permitted on land affected by contamination where it can be demonstrated, to the satisfaction of the LPA, that the contamination can be satisfactorily remediated so that it is suitable for the proposed end use."

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



5 Baseline

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

Local Air Quality Management

5.2 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 mean concentrations of NO₂ are above the AQO within the borough. As such, one AQMA has been declared and is described as follows:

"An area covering Reading Town Centre, areas along the major radial road routes into Reading (including J11 of the M4) and along the railway lines where they pass through built up areas."

5.3 The development is located within the AQMA. As such, there is the potential for any emissions associated with the proposals to cause air quality effects within this sensitive area. This has been considered throughout the assessment.

5.4 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

5.5 Monitoring of pollutant concentrations is undertaken by RBC throughout their area of jurisdiction. Recent results recorded in the vicinity of the development are shown in Table 3.

Monitoring Site	Monitored NO ₂ Concentration (µg/m ³)		
	2015	2016	2017
Kings Oak Flats, Queens Road	33	33	31

Table 3: Monitoring Results

5.6 As shown in Table 3, annual mean NO₂ concentrations were below the AQO at the Kings Oak Flats diffusion tube between 2015 and 2017. Reference should be made to Figure 2 for a map of the survey position.

5.7 RBC do not undertake PM₁₀ monitoring within the vicinity of the site.

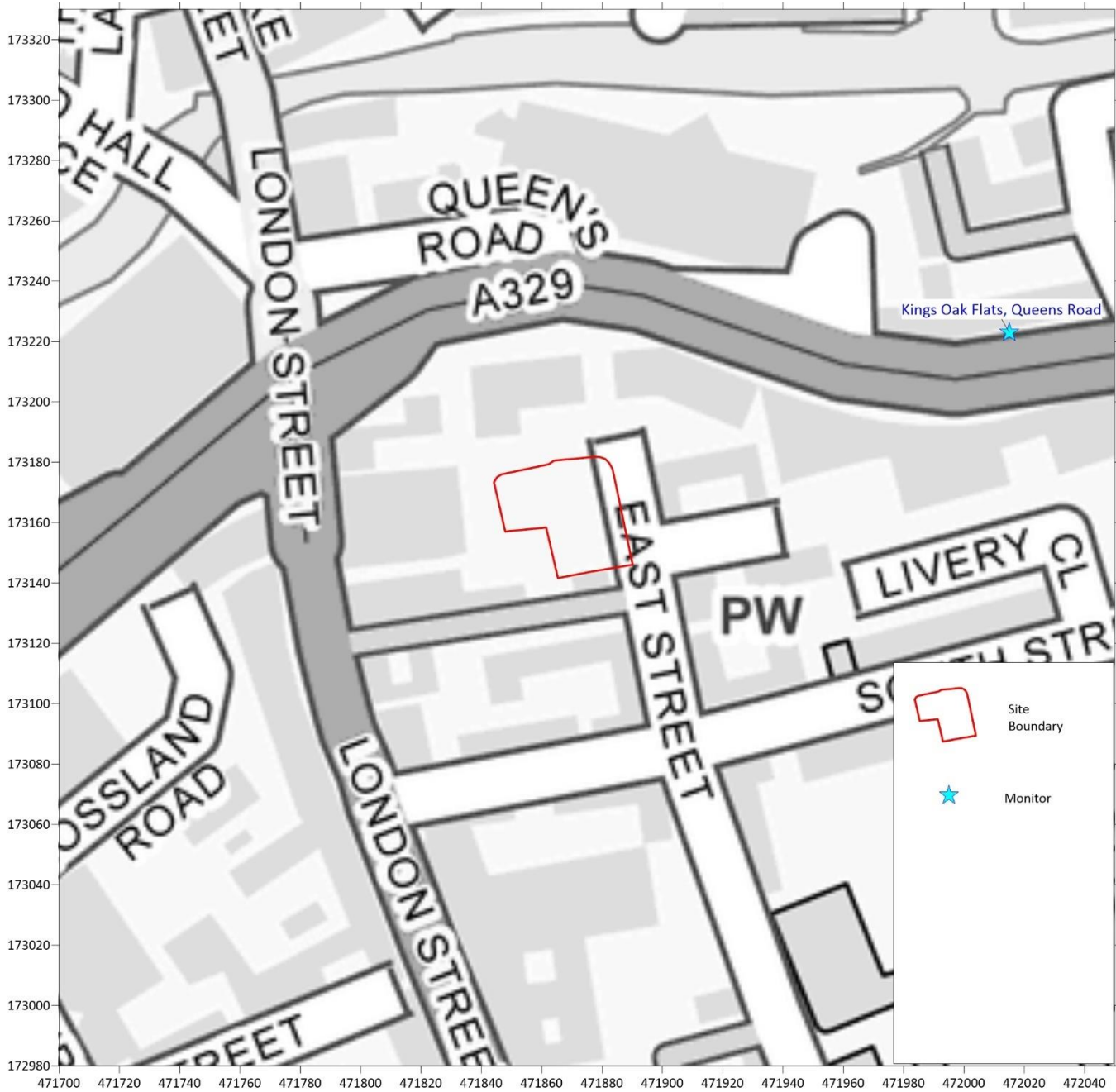


Figure 2: Monitoring Locations

Background Pollutant Concentrations

5.8 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: 471500, 173500. Data for this location was downloaded from the DEFRA website[6] for the purpose of the assessment and is summarised in Table 4.

Pollutant	Predicted Background Concentration (µg/m³)		
	2017	2018	2020
NO ₂	28.47	27.45	25.32
PM ₁₀	15.64	15.40	14.94

Table 4: Background Pollutant Concentrations

5.9 As shown in Table 4, predicted background NO₂ and PM₁₀ concentrations are below the relevant AQOs at the development site.

6 Methodology

6.1 The proposed development has the potential to cause air quality impacts during the construction and operational phases, as well as expose future occupants to elevated pollution levels. These issues have been assessed in accordance with the following methodology which was agreed with Ross Jarvis, Senior Environmental Health Officer at RBC, on 25th September 2018.

Construction Phase Fugitive Dust Emissions

6.2 There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V1.1'[7].

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

- Earthworks;
- Construction; and,
- Trackout.

6.4 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.

Step 1

6.5 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.

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

Step 2

6.7 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).

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

6.9 Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 5.

Magnitude	Activity	Criteria
Large	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

Magnitude	Activity	Criteria
Medium	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	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

Table 5: Construction Dust - Magnitude of Emission

6.10 Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 6.

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 PM ₁₀ . 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 wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	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

Table 6: Construction Dust - Factors Defining Sensitivity of an Area

6.11 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.

6.12 These factors were considered during the undertaking of the assessment.

6.13 The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 7.

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 7: Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property

6.14 Table 8 outlines the criteria for determining the 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	Greater than 32µg/m ³	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32µg/m ³	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	Less than 24µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

Table 8: Construction Dust - Sensitivity of the Area of Human Health Impacts

6.15 Table 9 outlines the criteria for determining the 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

Table 9: Construction Dust - Sensitivity of the Area to Ecological Impacts

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

6.17 Table 10 outlines the 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: Construction Dust - Dust Risk Category from Earthworks and Construction Activities

6.18 Table 11 outlines the 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

Table 11: Construction Dust - Dust Risk Category from Trackout Activities

Step 3

6.19 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[7] 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

6.20 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**.

Operational Phase Future Exposure

6.21 The proposed development has the potential to expose future occupants to poor air quality. In order to assess pollutant levels across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

6.22 Modelling was undertaken for 2017 for verification purposes and 2020 to represent the development opening year.

Dispersion Model

6.23 Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.1.1.0). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

6.24 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.

6.25 These are detailed in the following Sections.

Assessment Area

- 6.26 Ambient concentrations were predicted over the area NGR: 471690, 173000 to 472030, 173340. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.
- 6.27 Reference should be made to Figure 3 for a graphical representation of the assessment grid extents.



Figure 3: ADMS-Roads Inputs

Traffic Flow Data

- 6.28 Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, was obtained from the Department for Transport (DfT). The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 1999 to 2017. It should be noted that the DfT web tool is referenced in DEFRA guidance[2] as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.
- 6.29 The baseline traffic data was converted to the appropriate assessment year utilising a factor obtained from TEMPro (Version 7.2). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.
- 6.30 Road widths were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the assessment is provided in Table 12.

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Mean Vehicle Speed (km/h)	Road Width (m)
		2017	2020			
L1	Queen's Road eastbound (EB) west of approach to London Street	9,484	9,968	4.05	45	3.3
L2	Queen's Road EB approach to London Street	9,484	9,968	4.05	25	6.3
L3	Queen's Road westbound (WB) west of exit from London Street	9,484	9,968	4.05	45	7.5
L4	Queen's Road WB exit from London Street	9,484	9,968	4.05	25	7.1
L5	Queen's Road EB exit from London Street	9,838	10,340	1.76	25	7.6
L6	Queen's Road EB between London Street and Sidmouth Street	9,838	10,340	1.76	45	7.9

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Mean Vehicle Speed (km/h)	Road Width (m)
		2017	2020			
L7	Queen's Road EB at Sidmouth Street	9,838	10,340	1.76	25	5.9
L8	Queen's Road WB approach to London Street	9,838	10,340	1.76	25	7.6
L9	Queen's Road WB between London Street and Sidmouth Street	9,838	10,340	1.76	45	7.4
L10	Queen's Road WB at Sidmouth Street	9,838	10,340	1.76	25	3.8
L11	London Street approach to Queen's Road	6,514	6,846	10.06	25	11.9
L12	London Street	6,514	6,846	10.06	35	8.9

Table 12: Traffic Data

6.31 Reference should be made to Figure 3 for a graphical representation of the road link locations.

Emission Factors

6.32 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (Version 8.0.1). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

6.33 There is current uncertainty over NO₂ concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2017 emission factors were utilised in preference to the development opening year in order to provide robust concentration predictions. As predictions for 2017 were verified, it is considered results are a robust indication of worst case concentrations for the future year.

Meteorological Data

6.34 Meteorological data used in the assessment was taken from Heathrow Airport meteorological station over the period 1st January 2017 to 31st December 2017 (inclusive). Heathrow Airport meteorological station is located at NGR: 506947,

176515, which is approximately 35.2km east of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

6.35 All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 4 for a wind rose of the utilised meteorological data.

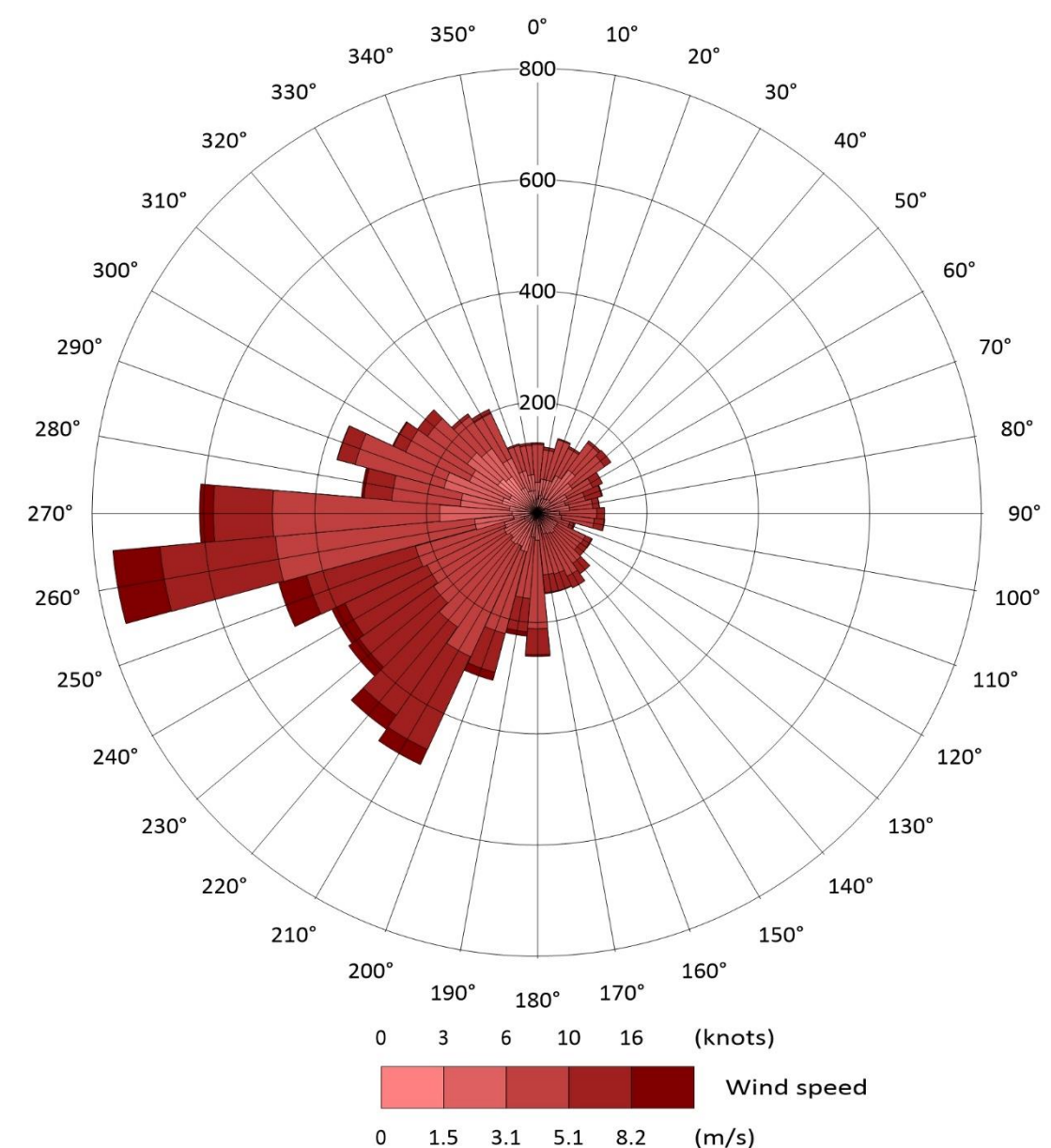


Figure 4: Wind Rose of 2017 Heathrow Airport Meteorological Data

Roughness Length

6.36 The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1m 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 'cities, woodlands'.

6.37 A z_0 of 0.3m was used to describe the meteorological site. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural areas (max)'.

Monin-Obukhov Length

6.38 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. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

6.39 A minimum Monin-Obukhov length of 100m was used to describe the meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'large conurbations > 1 million'.

Background Concentrations

6.40 Background concentrations provided by DEFRA were used in the assessment to represent annual mean NO_2 and PM_{10} levels in the vicinity of the site. In order to avoid 'double-counting' of road vehicle emissions, the proportion of the relevant background concentrations from primary A roads and minor roads, as well as brake and tyres and road abrasion, within the grid square was removed in accordance with the methodology outlined in DEFRA guidance[2]. These sectors were considered to be most representative of those being modelled within ADMS-Roads. Background concentrations before and after adjustment are shown in Table 13.

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)	
	Total Predicted 2017 Background	Predicted Background with Sectors Removed
NO_2	28.47	24.07

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)	
	Total Predicted 2017 Background	Predicted Background with Sectors Removed
PM_{10}	15.64	14.89

Table 13: Background Pollutant Concentrations

6.41 Similarly to emission factors, background concentrations from 2017 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO_2 Conversion

6.42 Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 6.1) provided by DEFRA, which is the method detailed within DEFRA guidance[2].

Verification

6.43 The predicted results from a dispersion model may differ from measures 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.

6.44 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.

6.45 For the purpose of the assessment model verification was undertaken for 2017 using traffic data, meteorological data and monitoring results from this year.

6.46 RBC undertook monitoring of NO_2 concentrations at one location in the vicinity of roads included within the modelling extents during 2017. A result was obtained and

the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance[2]. The monitored annual mean NO₂ concentration and calculated road NO_x concentration is summarised in Table 14.

Monitoring Location	Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
Kings Oak Flats, Queens Road	31	13.97

Table 14: NO_x Verification - Monitoring Result

6.47 The annual mean road NO_x concentration predicted from the dispersion model and the road NO_x concentration calculated from the 2017 monitoring result is summarised in Table 15.

Monitoring Location	Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
Kings Oak Flats, Queens Road	13.97	9.36

Table 15: NO_x Verification - Modelling Result

6.48 The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated a verification factor of 1.4928 was required to be applied to all modelling results.

6.49 Monitoring of PM₁₀ concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust PM₁₀ model predictions in accordance with DEFRA guidance[2].

Operational Phase Road Traffic Emissions

6.50 The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken using the criteria contained within the Highways Agency 'Design Manual for Roads and Bridges' (DMRB)[8] and IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'[9] guidance documents to determine the potential for trips generated by the development to affect local air quality.

6.51 The DMRB[8] provides the following criteria for determination of road links potentially affected by changes in traffic flow:

- Daily AADT flows change by 1,000 or more;
- Daily HDV AADT flows change by 200 or more;
- Daily average speed changes by 10km/hr or more; or,
- Peak hour speed changes by 20km/hr or more.

6.52 The IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance document[9] provides the following criteria to help establish when an assessment of potential impacts on the local area is likely to be considered as necessary:

- A change of Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- A change of HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- Realignment of roads where the change is 5m or more and the road is within an AQMA; or,
- Introduction of a new junction or removal of an existing junction near to relevant receptors.

6.53 Should these criteria not be met, then the DMRB[8] and IAQM guidance[9] documents consider air quality impacts associated with a scheme to be **negligible** and no further assessment is required.

6.54 Should screening of the relevant data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the change in pollutant concentrations as a result of the proposed development. The significance of predicted impacts can then be determined in accordance with the methodology outlined in the IAQM guidance[9].

7 Assessment

Construction Phase Fugitive Dust Emissions

Step 1

- 7.1 The undertaking of activities such as 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 on the local road network also have the potential to result in the re-suspension of dust from haul roads and highway surfaces.
- 7.2 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.
- 7.3 Receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 16.

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

Table 16: Earthworks and Construction Dust Sensitive Receptors

- 7.4 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 17.

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

Table 17: Trackout Dust Sensitive Receptors

- 7.5 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.
- 7.6 A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 18.

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
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 pre-existing screening between the site and surrounding receptors
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	As shown in Figure 4, the predominant wind bearing at the site is from the south-west. As such, receptors to the north-east of the development are most likely to be affected by dust releases
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 possible 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

Table 18: Additional Area Sensitivity Factors

- 7.7 Based on the criteria shown in Table 6, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties. As such, users would expect to enjoy a reasonable level of amenity, aesthetics or the value of their property could be diminished by soiling and people would be expected to be present for extended periods of time.

7.8 The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 4, is shown in Table 19.

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

Table 19: Sensitivity of the Surrounding Area to Specific Dust Impacts

7.9 The potential risk of dust impacts at the identified receptors is considered in the following Sections.

Step 2

Earthworks

7.10 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The proposed development site is estimated to cover an area of less than 2,500m². In accordance with the criteria outlined in Table 5, the magnitude of potential dust emissions from earthworks is therefore **small**.

7.11 Table 19 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 earthworks.

7.12 Table 19 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 10, the development is considered to be a **negligible** risk site for human health impacts as a result of earthworks.

Construction

7.13 It is estimated that the total building volume will be less than 25,000m³. In accordance with the criteria outlined in Table 5, the magnitude of potential dust emissions from construction is therefore **small**.

7.14 Table 19 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 construction activities.

7.15 Table 19 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 10, the development is considered to be a **negligible** risk site for human health impacts as a result of construction activities.

Trackout

7.16 Based on the site area and existing hard standing, it is anticipated that the unpaved road length is likely to be less than 50m. In accordance with the criteria outlined in Table 5, the magnitude of potential dust emissions from earthworks is therefore **small**.

7.17 Table 19 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 11, the development is considered to be a **low** risk site for dust soiling as a result of trackout activities.

7.18 Table 19 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 11, the development is considered to be a **negligible** risk site for human health impacts as a result of trackout activities.

Summary of Potential Unmitigated Dust Risks

7.19 A summary of the risk from each dust generating activity is provided in Table 20.

Potential Impact	Unmitigated Dust Risk		
	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low
Human Health	Negligible	Negligible	Negligible

Table 20: Summary of Potential Unmitigated Dust Risks

7.20 As indicated in Table 20, the potential risk of dust soiling is **low** from earthworks, construction and trackout. The potential risk of human health impacts is **negligible** from earthworks, construction and trackout.

7.21 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

7.22 The IAQM guidance[7] 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 21. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the LA.

Issue	Control Measure
Communications	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 Display the head or regional office contact information Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
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 Make the complaints log available to the LA upon request 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 log book
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the LA upon request Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions

Issue	Control Measure
Site preparation	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible Fully enclose site or specific operations where there is a high potential for dust production and they are active for an extensive period 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
Operating vehicle/ machinery and sustainable travel	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 Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques Use enclosed chutes and conveyors and covered skips Minimise drop heights and use fine water sprays wherever appropriate Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods
Waste management	Avoid bonfires or burning of waste materials
Construction	Avoid scabbling (roughening of concrete surfaces) if possible Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out
Trackout	Use water assisted dust sweepers on access and local roads, if required Implement a wheel washing system, if necessary

Table 21: Fugitive Dust Emission Mitigation Measures

Step 4

7.23 Assuming the relevant mitigation measures outlined in Table 21 are implemented, the residual impact from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[7].

Operational Phase Future Exposure

7.24 The proposed development has the potential to expose future occupants to elevated pollution levels. Dispersion modelling was therefore undertaken with the inputs described in Section 6.0 to quantify pollutant concentrations at the site. Reference should be made to Figure 5 and Figure 6 for graphical representations of the results for NO₂ and PM₁₀, respectively.

7.25 As shown in Figure 5, annual mean NO₂ concentrations were predicted to be below the AQO of 40µg/m³ at all locations across the site. The maximum level at the boundary was 27.19µg/m³. As such, future occupants are not predicted to be exposed to NO₂ concentrations above the AQO.

7.26 As shown in Figure 6, annual mean PM₁₀ concentrations were predicted to be below the AQO of 40µg/m³ at all locations across the site. The maximum level at the boundary was 15.36µg/m³. As such, future occupants are not predicted to be exposed to PM₁₀ concentrations above the AQO.

7.27 Based on the assessment results, the site is considered to be suitable for the proposed end use from an air quality perspective without the requirement for mitigation techniques such as mechanical ventilation.

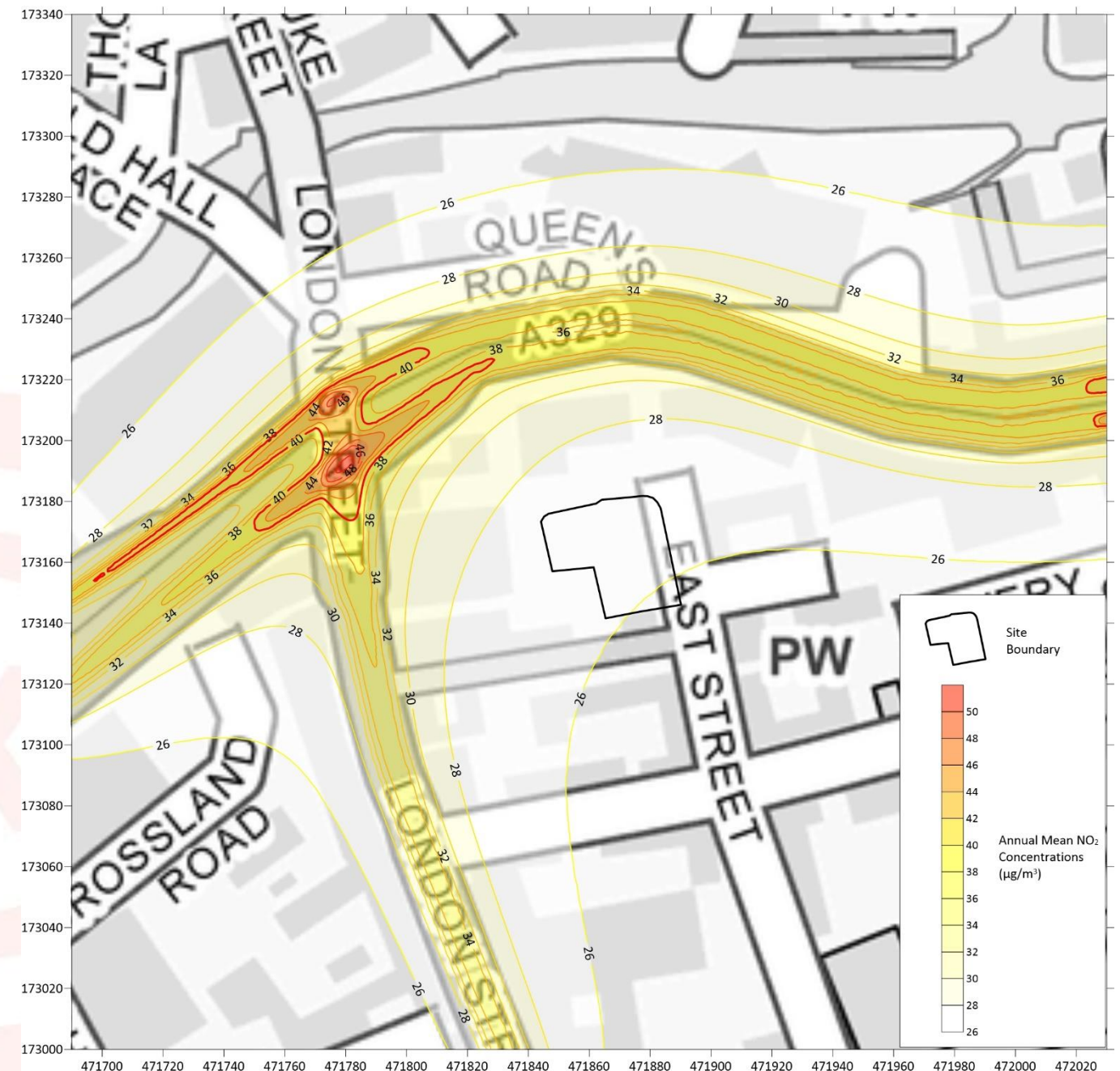


Figure 5: Annual Mean NO₂ Concentration (µg/m³)

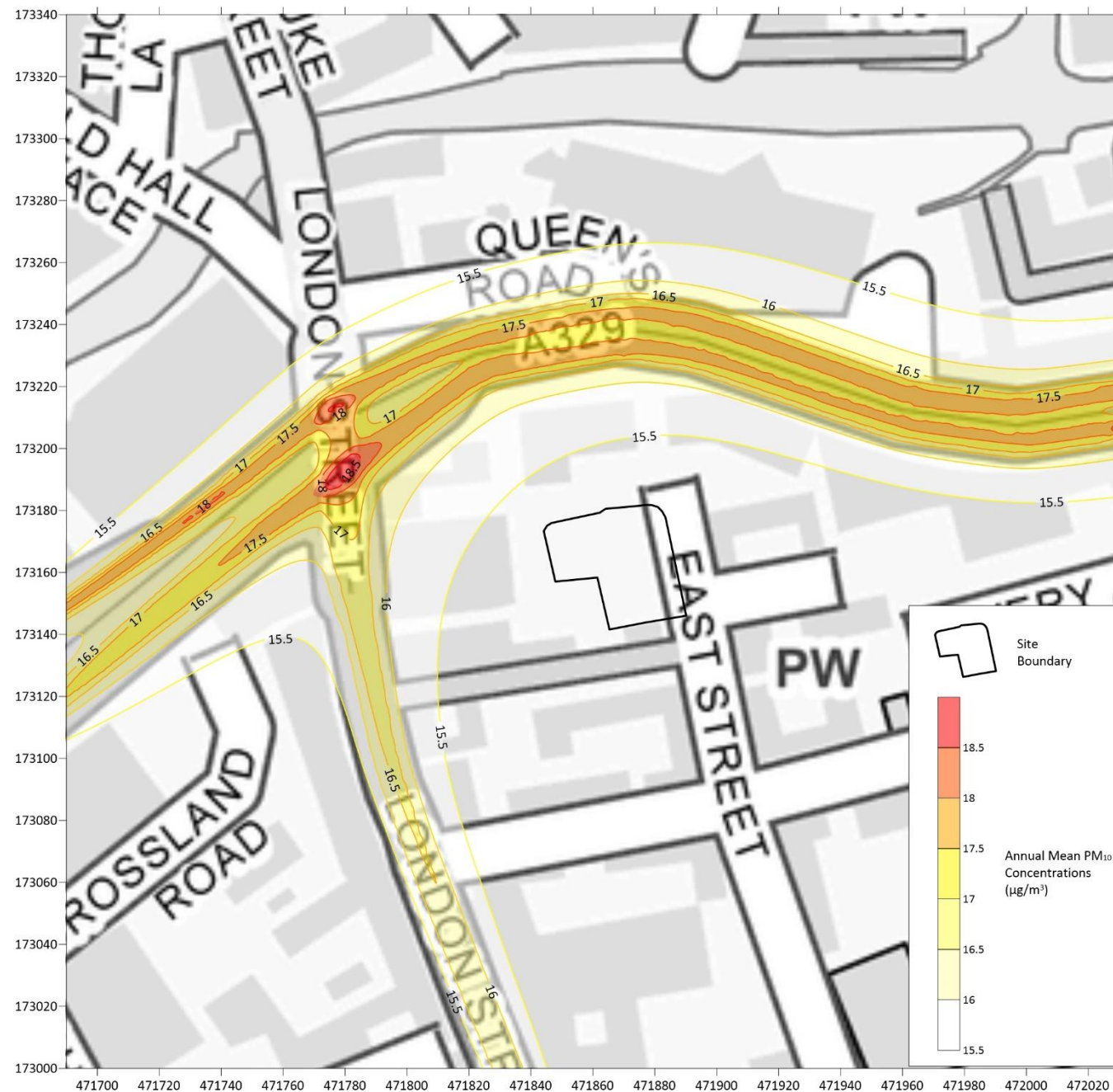


Figure 6: Annual Mean PM₁₀ Concentration (µg/m³)

Operational Phase Road Traffic Emissions

7.28 Any vehicle movements associated with future occupants travelling to and from the site will generate exhaust emissions on the local and regional road networks. Predicted trip generation was provided by Transport Planning Associates, the Transport Consultants for the project. This indicated that the proposed development is anticipated to generate 12 daily vehicle movements.

7.29 Based on the provided information, the proposals are not predicted to result in an increase in AADT flows of more than 1,000, produce over 200 HDV movements per day or significantly affect average speeds on the local road network. Additionally, the scheme is not predicted to result in an increase of LDV flows of more than 100, include significant highway realignment or the introduction of a junction and there will not be a requirement for more than 25 HDV deliveries per day. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **negligible**, in accordance with the DMRB[8] and IAQM[9] screening criteria shown previously.

8 Conclusion

- 8.1 This report has been prepared in support of a student accommodation development on land at New Century Place, Reading.
- 8.2 The proposed development has the potential to expose future occupants to elevated pollution levels and cause air quality impacts during the construction and operational phases. As such, an Air Quality Assessment was required in order to determine baseline conditions at the site, consider its suitability for the proposed end-use and assess potential air quality effects as a result of the scheme.
- 8.3 During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by earthworks, construction and trackout activities was predicted to be **not significant**.
- 8.4 The proposals have the potential to expose future occupants to poor air quality. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict pollutant concentrations at the development location associated with emissions from the local highway network. Results were subsequently verified using monitoring data obtained from RBC.
- 8.5 The results of the dispersion modelling assessment indicated that predicted annual mean NO₂ and PM₁₀ concentrations were below the relevant AQOs across the development. As such, the site is considered suitable for the proposed use from an air quality perspective without the inclusion of mechanical ventilation.
- 8.6 During the operational phase of the development there is the potential for air quality impacts as a result of traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed against the screening criteria provided within the DMRB and IAQM guidance documents. Due to the low number of trips anticipated to be produced by the proposals, **negligible** impacts were predicted.
- 8.7 Based on the assessment results, air quality issues are not considered a constraint to planning consent for the development, subject to the inclusion of the specified mitigation measures.

9 References

- 1 The AQS for England, Scotland, Wales and Northern Ireland, DEFRA, 2007
- 2 Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018
- 3 NPPF, Ministry of Housing, Department for Communities and Local Government, 2018
- 4 <http://planningguidance.planningportal.gov.uk>
- 5 Reading Borough Local Development Framework: Core Strategy, RBC, 2015.
- 6 <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>
- 7 Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016
- 8 DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007
- 9 Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017