



Caversham
Road,
Reading,
RG1 7BT

Air Quality Assessment

September
2020



Ref: 20-7332

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1. INTRODUCTION	5
Background	5
Site Location and Context	5
2. LEGISLATION AND POLICY	6
UK Legislation	6
Local Air Quality Management.....	7
Dust.....	7
National Planning Policy.....	8
National Planning Practice Guidance.....	9
Local Planning Policy	9
3. BASELINE.....	11
Local Air Quality Management.....	11
Air Quality Monitoring	11
Background Pollutant Concentrations	12
4. METHODOLOGY.....	13
Construction Phase Fugitive Dust Emissions	13
Step 1	13
Step 2	13
Step 3	19
Step 4	19
Operational Phase Future Exposure	19
Dispersion Model	20
Assessment Area	20
Traffic Flow Data	20
Street Canyons	22
Emission Factors.....	23
Meteorological Data	24
Roughness Length	24
Monin-Obukhov Length.....	24
Background Concentrations	24
NO _x to NO ₂ Conversion	25
Verification.....	25
Operational Phase Road Traffic Emissions	27

5. ASSESSMENT	29
Construction Phase Fugitive Dust Emissions	29
Step 1	29
Step 2	31
Step 3	32
Step 4	34
Operational Phase Future Exposure	34
Nitrogen Dioxide	34
Particulate Matter	35
Operational Phase Road Traffic Exhaust Emissions	35
6. MITIGATION	36
7. CONCLUSION	37

1. Introduction

Background

This report has been prepared to support the planning application for a residential development at 45 Caversham Road, Reading.

The proposals may lead to the exposure of future residents to elevated pollution levels and cause air quality impacts during the construction and operational phases. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions at the site, consider its suitability for the proposed end-use and assess potential effects associated with the scheme.

Site Location and Context

The site is located on land at 45 Caversham Road, Reading, at approximate National Grid Reference (NGR): 471119, 173758. Reference should be made to Figure 1 for a map of the site and surrounding area.

The proposals comprise the demolition of the existing Avis Car Hire centre and subsequent construction of 40 residential units.

Reading Borough Council (RBC) have 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 users to poor air quality. As such, concentrations at the site have been assessed in the following report in order to consider location suitability for the proposed end-use and define any requirement for mitigation. Potential impacts associated with construction and operation of the scheme have also been considered using standard methodologies.

2. Legislation and Policy

UK 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:

- 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 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.

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 AQS for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

Table 2 summarises the advice provided in DEFRA guidance² 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 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

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016), such as construction

² Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

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). 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 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. 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 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 [...]"

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

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

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

The Reading Borough Local Plan⁵ was adopted by RBC on 4th November 2019. It provides the legal framework for the development and use of land within Reading for the period up to 2036. It also provides the context for determining local planning applications. Review of the Local Plan identified the following policy of relevance to this assessment.

"EN15: Air Quality

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

1. *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;*

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

⁵ Reading Borough Local Plan, RBC, 2019.

- *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 policy were taken into consideration throughout the undertaking of the assessment.

3. Baseline

Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for the 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 mean concentrations of NO₂ are above the AQO within the borough. As such, one AQMA has been declared. This 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."

The development is located within the AQMA. As such, there is the potential for vehicles travelling to and from the site to increase pollution levels in this sensitive area, as well as the exposure of future residents to poor air quality. These issues have 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. Recent results recorded in the vicinity of the development are shown in Table 3. Exceedences of the relevant AQO are shown in **bold**.

Table 3 Monitoring Results - NO₂

Monitoring Site	Monitored NO ₂ Concentration (µg/m ³)		
	2017	2018	2019
Sackville Street	37	38	32
33 Caversham Road	45	44	35
Malcolm Place	43	39	52

As shown in Table 3, annual mean NO₂ concentrations were above the AQO at the Malcolm Place monitor in 2017 and 2019. As the site is located at a roadside position within an AQMA, elevated concentrations would be expected. Levels at the Sackville Street and 33 Caversham Road monitors were below the AQO during 2019. Reference should be made to Figure 2 for a map of the survey positions.

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

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: 471500, 173500. Data for this location was downloaded from the DEFRA website⁶ for the purpose of this assessment and is summarised in Table 4.

Table 4 Background Pollutant Concentrations

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)		
	2019	2020	2022
NO ₂	34.38	33.26	32.02
PM ₁₀	18.80	18.31	17.77

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

⁶ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

4. Methodology

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 factors were assessed in accordance with the following methodology, which was agreed with Ross Jarvis, Environmental Protection Officer at RBC, on 8th June 2020.

Construction Phase Fugitive Dust Emissions

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.

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.

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,

⁷

Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

- 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 5.

Table 5 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
	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

Magnitude	Activity	Criteria
Small	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
	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 6.

Table 6 Construction Dust - Examples of 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 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

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 7.

Table 7 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 8 outlines the criteria for determining the sensitivity of the area to human health impacts.

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

Receptor Sensitivity	Background 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

Receptor Sensitivity	Background 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
	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 9 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 9 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 10 outlines the risk category from demolition activities.

Table 10 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 11 outlines the risk category from earthworks and construction activities.

Table 11 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 12 outlines the risk category from trackout activities.

Table 12 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 guidance⁸ 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**.

Operational Phase Future Exposure

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

⁸ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Modelling was undertaken for 2019 for verification purposes and 2022 to represent the development opening year.

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.

Additional options can also be selected within the ADMS-Roads interface to take account of site specific characteristics that may affect model output, such as canyons.

The relevant inputs are detailed in the following Sections.

Assessment Area

The assessment area was defined based on the development location and roads likely to impact pollutant levels across the site. Ambient concentrations were predicted over NGR: 471020, 173645 to 471220, 173845. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.

It should be noted that although the grid only covered the proposed site, road links were extended in order to ensure the impact of all relevant vehicle emissions in the vicinity of the development were considered.

Reference should be made to Figure 3 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as Heavy Duty Vehicle (HDV) proportion, was obtained from the Department for Transport (DfT)⁹. 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 2019. It should be noted that the DfT is referenced in DEFRA guidance¹⁰ as being a

⁹ <https://roadtraffic.dft.gov.uk/#6/55.254/-5.284/basemap-regions-countpoints>.

¹⁰ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

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.

Traffic data was not available for Great Knollys Street, which is situated adjacent to the site. It was considered necessary to include emissions from this road within the model in order to provide a robust assessment. As such, based on experience of similar modelling areas, a nominal AADT flow of 1,000 was applied to the relevant links in lieu of other data sources. As Great Knollys Street is an unclassified road, this is anticipated to overestimate traffic and provide worst-case pollutant predictions.

Baseline traffic data was converted to the site opening year utilising a factor obtained from TEMPro (version 7.2). This software package has been developed by the DfT to calculate traffic growth throughout the UK.

Road widths and vehicle speeds were estimated from aerial photography and UK highway design standards. A summary of the traffic data is provided in Table 13.

Table 13 Traffic Data

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Mean Vehicle Speed (km/h)	Road Width (m)
		2019	2022			
L1	A329 Caversham Road, Northbound (NB)	14,308	14,994	3.19	50	7.3
L2	A329 Caversham Road, NB - Slip road	3,577	3,749	3.19	40	6.3
L3	A329 Caversham Road, NB - Canyon	17,885	18,743	3.19	20	7.6
L4	A329 Caversham Road, NB	17,885	18,743	3.19	40	9.3
L5	Great Knollys Street - Canyon	1,000	1,000	2.00	30	9.3
L6	Great Knollys Street	1,000	1,000	2.00	30	9.3
L7	A329 Caversham Road, Southbound (SB)	14,308	14,994	3.19	50	8.9
L8	A329 Caversham Road, SB - Canyon	17,885	18,743	3.19	40	7.6
L9	A329 Caversham Road, SB	17,885	18,743	3.19	20	7.1
L10	A329 Caversham Road, SB - Slip road	3,577	3,749	3.19	40	5.9
L11	A329 Caversham Road, NB - South of junction	17,885	18,743	3.19	20	7.6
L12	A329 Caversham Road, NB - Slow Phase (SP) south of junction	17,885	18,743	3.19	20	7.6
L13	A329 Caversham Road, NB - SP north of junction	17,885	18,743	3.19	20	7.6
L14	Great Knollys Street - East of junction	1,000	1,000	2.00	30	9.3
L15	A329 Caversham Road, SB - Junction	17,885	18,743	3.19	40	7.6

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

Street Canyons

Where buildings or walls surround roads, pollutant dispersion patterns are altered which can lead to high pollutant concentrations. These street canyons can significantly influence air quality along a road and therefore it is important to take consideration of their effects when undertaking dispersion modelling.

The release of ADMS-Roads version 4.0.1.0 in December 2015 incorporated a number of new features including an advanced street canyon module, which have been retained in version 5.0.0.1. Advanced street canyon modelling allows a number of parameters to be included in the dispersion model in order to predict pollutant dispersion patterns which better reflect air flow within complex urban geometries.

Canyons have five principle effects on dispersion which can influence pollutant concentrations. These are:

- Pollutants are channelled along street canyons;
- Pollutants are dispersed across street canyons by circulating flow at road height;
- Pollutants are trapped in recirculation regions;
- Pollutants leave the canyon through gaps between buildings - as if there was no canyon; and,
- Pollutants leave the canyon from the canyon top.

The combined modelling of these effects will result in concentration patterns unique to each canyon. The parameters used in this assessment are outlined in Table 14. It should be noted that where buildings are only present on one side of the road, parameters were purposely included at 0m.

Table 14 Baseline Canyon Parameters

Link	Parameter (m)					
	Canyon Width to Left	Average Height of Buildings to Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Building Length Right
L2	8.2	9.0	43.4	0.0	0.0	0.0
L3	9.1	9.0	29.5	0.0	0.0	0.0
L4	8.2	12.0	74.6	0.0	0.0	0.0
L8	0.0	0.0	0.0	8.5	20.0	46.4
L9	0.0	0.0	0.0	8.5	12.0	67.7

The proposals will alter the topography of the existing street canyon at the site. As such, the parameters utilised in the baseline assessment were amended along the relevant links in the future year model to take account of the potential changes in street geometry. The parameters are shown in Table 15.

Table 15 Future Year Canyon Parameters

Link	Parameter (m)					
	Canyon Width to Left	Average Height of Buildings to Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Building Length Right
L2	8.2	9.0	43.4	0.0	0.0	0.0
L3	9.1	9.0	29.5	0.0	0.0	0.0
L4	8.2	12.0	74.6	0.0	0.0	0.0
L5	7.6	15.6	61.0	0.0	0.0	0.0
L8	0.0	0.0	0.0	8.5	20.0	46.4
L9	0.0	0.0	0.0	8.5	12.0	67.7
L11	9.1	14.9	20.4	0.0	0.0	0.0

A choice of two modes is provided for use in the advanced canyon module. Standard mode assumes that each road is part of a continuous network of roads with similar canyon properties. Network mode analyses the road network to determine transport of pollutants between adjoining street canyons, allows for varying concentrations along the canyon and accounts for transport of pollutants out of the end of a canyon. Network mode is considered most accurate for detailed local analysis and as such was selected for use in the model.

Emission Factors

In 2016 Air Quality Consultants Ltd (AQC) produced a spreadsheet entitled 'Calculator Using Realistic Emissions for Diesels' (CURED, version V1A ad V2A). This provided an alternative emissions calculator which took account of the large amount of evidence from real-world emissions tests showing that the European Environment Agency's COPERT and DEFRA's Emissions Factor Toolkit (EFT) were incorrect¹¹.

DEFRA released EFT (v8.0.1) in December 2017. This included COPERT 5 vehicle emission factors and fleet information, which now better reflect the predictions made by CURED V1A and V2A. However, AQC noted there remained some uncertainty regarding how well the future vehicle fleet will perform in the real world. As such, in January 2018 AQC released CURED V3A¹². This has been formulated to simulate failure of Euro 6d to provide any benefits over and above those of Euro6c, providing a more pessimistic view of the performance of post-2019 diesel cars and vans.

In May 2019 DEFRA released EFT (v9.0). Whilst a new version of CURED has not yet been developed, AQC have released a technical note providing a comparison of the new EFT (v9.0) with EFT (v8.0.1)

¹¹ Emissions of Nitrogen Oxides from Modern Diesel Vehicles, AQC, 2016.

¹² Development of the CURED V3A Emissions Model, AQC, 2018.

and CURED V3A. This concluded that the most recent version of CURED provides more pessimistic emission factors than both versions of the EFT.

EFT (v10.0) was released in August 2020. Although this is considered to provide more realistic estimates of future vehicle emissions, factors were still lower than those provided by CURED v3A. As such, CURED v3A was utilised in the dispersion modelling in order to provide a worst-case representation of development opening year oxides of nitrogen (NO_x) emission factors.

As PM₁₀ emission factors do not require adjustment, factors were calculated for the relevant traffic flows using the EFT (version 10.1) produced by DEFRA.

Meteorological Data

Meteorological data used in the assessment was taken from Heathrow Airport meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). Heathrow Airport is located at NGR: 506947, 176515, which is approximately 34.1km 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.

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 utilised meteorological data.

Roughness Length

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 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'cities, woodlands'.

A z_0 of 0.3m was used to describe the meteorological site. This 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

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'.

A minimum Monin-Obukhov length of 100m was used to describe conditions at 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 >100 million'.

Background Concentrations

Background concentrations provided by DEFRA were used in the assessment to represent annual mean NO₂ levels in the vicinity of the site, as shown in Table 16.

In order to avoid 'double-counting' of road vehicle exhaust emissions, the proportion of the relevant background concentrations from primary A roads and minor roads within the grid square was removed in accordance with the methodology outlined in DEFRA guidance¹³. 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 16.

Table 16 Background Pollutant Concentrations

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)	
	Total Predicted 2019 Background	Predicted Background with Sectors Removed
NO ₂	34.38	30.74

Background PM₁₀ concentrations for use in the assessment were obtained from the DEFRA mapping study for the grid square containing the site, as shown in Table 4.

The background concentrations from 2019 were utilised in preference to the opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance¹⁴.

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.

For the purpose of this assessment model verification was undertaken for 2019 using traffic data, meteorological data and monitoring results from this year.

RBC undertook monitoring of NO₂ concentrations at two locations within the vicinity of roads included within the model during 2019. Results were obtained and the road contributions to total NO_x

¹³ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

¹⁴ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

concentrations calculated following the methodology contained within DEFRA guidance¹⁵. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table 17.

Table 17 NO_x Verification - Monitoring Results

Monitoring Location	Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
33 Caversham Road	35	8.56
Malcolm Place	52	46.34

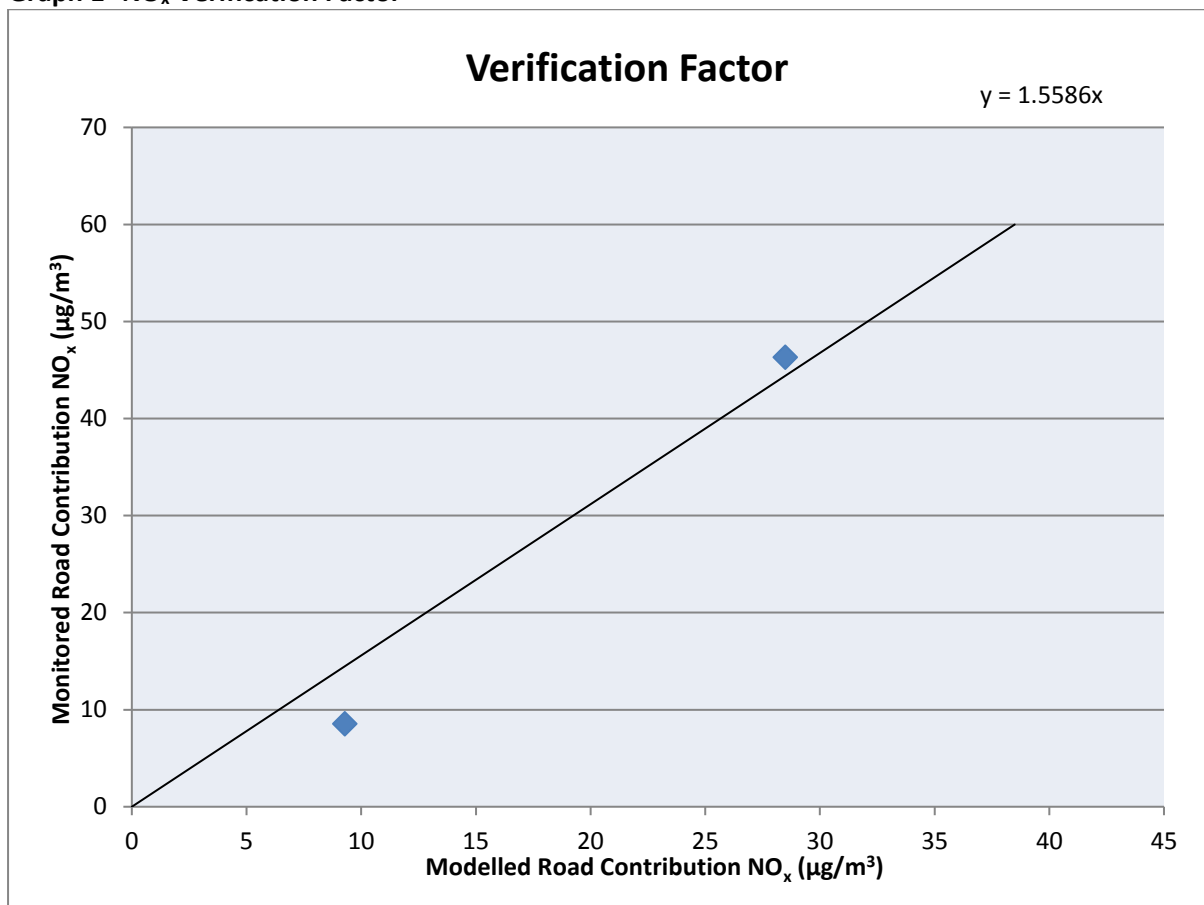
The annual mean road NO_x concentrations predicted from the dispersion model and the road NO_x concentrations calculated from the 2019 monitoring results are summarised in Table 18.

Table 18 NO_x Verification - Modelling Results

Monitoring Location	Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
33 Caversham Road	8.56	9.29
Malcolm Place	46.34	28.49

The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 1.5586 was required to be applied to all road NO_x modelling results, as shown in Graph 1.

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

Graph 1 NO_x Verification Factor


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 lieu of more accurate data in accordance with the methodology provided within the DEFRA guidance¹⁶.

Operational Phase Road Traffic Emissions

The development has the potential to increase concentrations of NO₂ and PM₁₀ as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. A screening assessment was therefore undertaken using the criteria contained within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'¹⁷ guidance to determine the potential for trips generated by the development to affect local air quality.

The following criteria are provided to help establish when an assessment of potential impacts on the local area is likely to be considered necessary:

- A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (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;

¹⁶ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

¹⁷ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

- 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.

Should these criteria not be met, then the IAQM guidance¹⁸ considers air quality impacts associated with a scheme to be **not significant** and no further assessment is required.

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 guidance¹⁹.

¹⁸ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹⁹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

5. Assessment

Construction Phase Fugitive Dust Emissions

Step 1

The undertaking of activities such as demolition, excavation, 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 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.

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 19.

Table 19 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	10 - 100	0
Less than 50	More than 100	0
Less than 100	More than 100	-
Less than 350	More than 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 20.

Table 20 Trackout Dust Sensitive Receptors

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

There are no ecological receptors within 50m of the development boundary or the access route within 500m of the site entrance. As such, ecological impacts have not been assessed further within this report.

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 21.

Table 21 Additional Area Sensitivity Factors to Potential Dust Impacts

Guidance	Comment
Whether there is any history of dust generating activities in the area	A review of the planning portal and Google Maps imagery indicated that Garrard Street Car Park is currently being demolished (planning reference: 182168) approximately 145m east of the site. It is possible that this may have caused dust generation in the area over recent months
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 3, the predominant wind bearing at the site is from the south-west. As such, receptors to the north-east 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

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.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 4, is shown in Table 22.

Table 22 Sensitivity of the Surrounding Area to Potential Dust Impacts

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

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

Step 2

Demolition

Demolition will be undertaken at the start of the construction phase and will involve demolition of the existing Avis Car Hire centre. As such, the total building volume to be demolished is estimated to be less than 20,000m³. In accordance with the criteria outlined in Table 5, the magnitude of potential dust emissions from demolition is therefore **small**.

Table 22 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 **medium** risk site for dust soiling as a result of demolition.

Table 22 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 demolition.

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The proposed development site covers 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**.

Table 22 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 earthworks.

Table 22 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 earthworks.

Construction

The total building volume to be developed is likely to 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**.

Table 22 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 construction activities.

Table 22 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 construction activities.

Trackout

Based on the site area, it is anticipated that the unpaved road length will be less than 50m. In accordance with the criteria outlined in Table 5, the magnitude of potential dust emissions from trackout is therefore **small**.

Table 22 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 12, the development is considered to be a **low** risk site for dust soiling as a result of trackout activities.

Table 22 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 12, 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

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
Dust Soiling	Medium	Low	Low	Low
Human Health	Negligible	Negligible	Negligible	Negligible

As indicated in Table 23, the potential risk of dust soiling is **medium** from demolition and **low** from earthworks, construction and trackout. The potential risk of human health impacts is **negligible** from demolition, earthworks, construction and trackout.

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 guidance²⁰ 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.

²⁰ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Table 24 Fugitive Dust Emission Mitigation Measures

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
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, 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
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 Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site Fully enclose site or specific operations where there is a high potential for dust production and they are active for an extensive period Avoid site runoff of water or mud 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
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water where possible) 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
Demolition	Ensure effective water suppression is used during demolition operations

Issue	Control Measure
	Avoid explosive blasting Bag and remove any biological debris or damp down such material before demolition
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	Avoid dry sweeping of large areas Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport Implement a wheel washing system, if required

Step 4

Assuming the relevant mitigation measures outlined in Table 24 are implemented, the residual impacts from all dust generating activities are predicted to be **not significant**, in accordance with the IAQM guidance²¹.

Operational Phase Future Exposure

The proposed development has the potential to expose future residents to elevated pollution levels. Dispersion modelling was undertaken with the inputs described in Section 4 to quantify pollutant concentrations at the site. Reference should be made to Figures 5 to 9 for graphical representations of the results.

Nitrogen Dioxide

As shown in Figure 5, annual mean NO₂ concentrations were predicted to be above the annual mean AQO of 40µg/m³ at the façade fronting Caversham Road at ground floor. The maximum level was 47.09µg/m³.

As shown in Figure 6, annual mean NO₂ concentrations were predicted to be above the annual mean AQO of 40µg/m³ at the façade fronting Caversham Road at first floor. The maximum level was 44.67µg/m³.

As shown in Figure 7, annual mean NO₂ concentrations were predicted to be above the annual mean AQO of 40µg/m³ at the façade fronting Caversham Road at second floor. The maximum level was 40.61µg/m³.

As shown in Figure 8, annual mean NO₂ concentrations were predicted to be below the annual mean AQO of 40µg/m³ at the façade fronting Caversham Road at third floor. The maximum level was 37.64µg/m³.

²¹ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2017.

Based on the assessment results, it is recommended that mitigation is implemented to ensure future occupants are not exposed to NO₂ concentrations above the relevant AQO in the affected areas. Specific measures are described in Section 6.0.

Particulate Matter

As shown in Figure 9, annual mean PM₁₀ concentrations were predicted to be below the AQO of 40µg/m³ at all locations across the development. The maximum level at the façade fronting Caversham Road was 21.35µg/m³. As such, future residents are not predicted to be exposed to PM₁₀ concentrations above the AQO.

It should be noted that pollutant levels decrease with distance from pollutant sources. As PM₁₀ concentrations were predicted to be below the relevant AQOs at ground floor level, further assessment above this height was not considered necessary.

Operational Phase Road Traffic Exhaust Emissions

Any vehicle movements associated with the development will generate exhaust emissions on the local and regional road networks. Anticipated trip generation from the existing and proposed site uses was provided by the Transport Consultants for the project. This is summarised in Table 25

Table 25 Daily Vehicle Trip Generation

Land Use	Daily Vehicle Trip Generation
Avis Car Hire Centre	263
Proposed Development	95
Net Vehicle Movements	-168

As shown in Table 25, there is anticipated to be a significant reduction in vehicle movements as a result of the development due to the change in land use from commercial to residential.

Based on the above information, the proposals are not predicted to result in an increase of LDV flows of more than 100 AADT on any individual road link, include significant highway realignment or the introduction of a junction and there will not be more than 25 HDV movements per day. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **not significant**, in accordance with the IAQM²² screening criteria shown in Section 4.

²² Land Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

6. Mitigation

The dispersion modelling results indicated predicted annual mean NO₂ concentrations were above the AQO at the proposed building façade fronting Caversham Road from ground to second floor level. As such, mitigation is required to ensure a supply of clean air for future residents of the affected location. This should be provided in the form of a mechanical ventilation system for apartments fronting Caversham Road. Reference should be made to Figure 10 for a plan of the units that require mitigation.

The air inlet should be positioned away from Caversham Road or on the roof of the building. This will ensure the air supply is taken from a location where predicted concentrations were below the AQO. Alternatively, if there are design issues associated with providing inlets at the designated locations, a NO₂ absorption filter could be included within the system to reduce pollutant concentrations within the airstream prior to entering the residential units.

The affected units should also incorporate a high specification of air tightness on the windows fronting Caversham Road, so that when these are closed, ventilation is provided by clean air from the mechanical system. The arrangement will ensure the apartments are kept under positive pressure by providing air into the rooms rather than removing it. This will naturally inhibit the movement of air from outside into the apartments during periods of open windows as well as flushing the internal environment after closure.

Mechanical ventilation is suggested within the IAQM²³ guidance document and as such is considered a suitable solution for a development of this size and nature.

²³ Land Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

7. Conclusion

This report has been prepared to support the planning application for a residential development at 45 Caversham Road, Reading.

The proposed development may lead to the exposure of future residents to elevated pollution levels and cause air quality impacts during the construction and operational phases. As such, an Air Quality Assessment was undertaken 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.

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 demolition, earthworks, construction and trackout was predicted to be **not significant**.

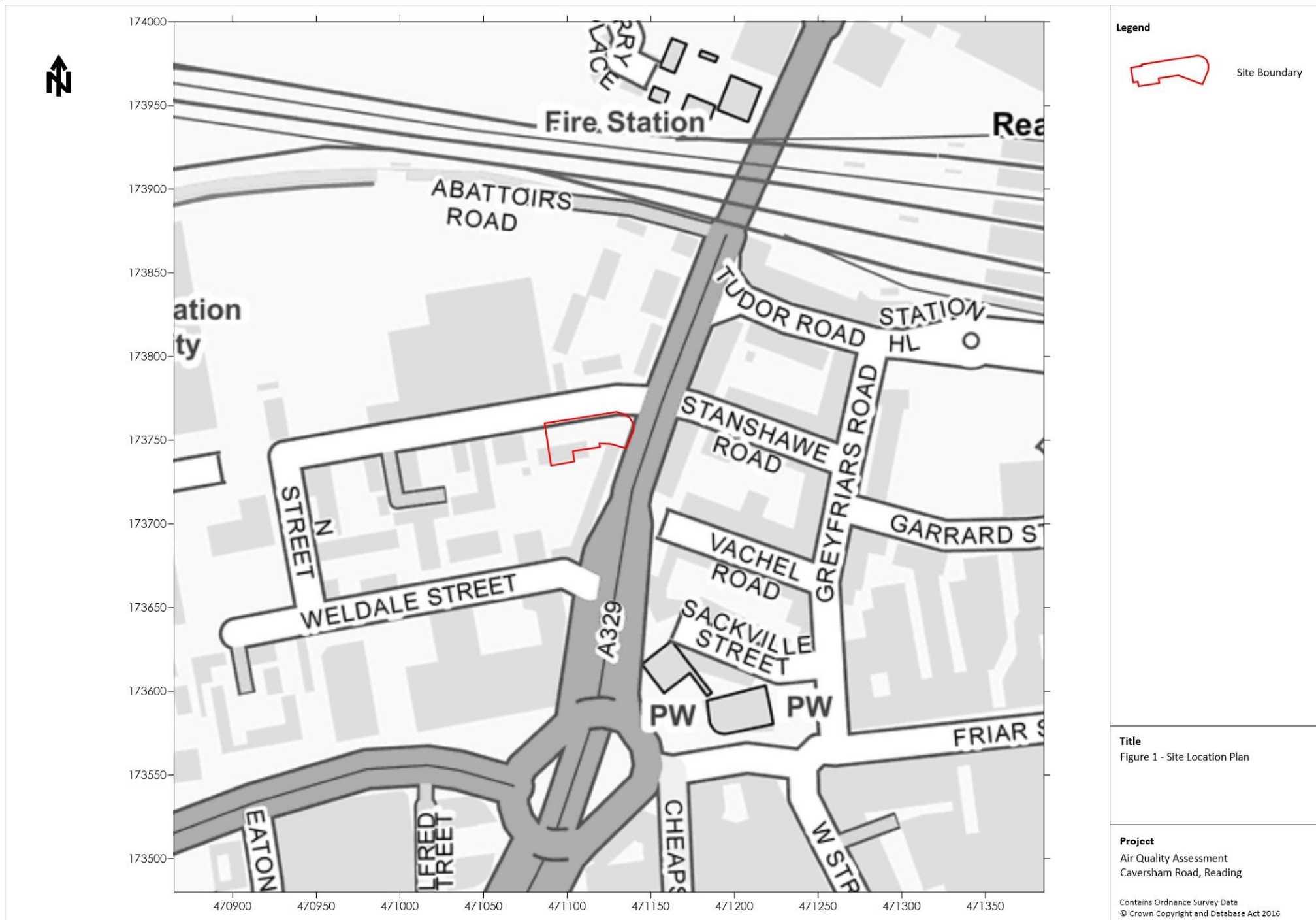
The proposal has the potential to expose future residents to elevated pollution levels. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict concentrations as a result of emissions from the local highway network. Results were subsequently verified using monitoring data collected by RBC.

The results of the dispersion modelling assessment indicated elevated NO₂ concentrations along the Caversham Road building façade at ground, first and second floor level. As such, suitable mitigation in the form of mechanical ventilation has been specified for the affected apartments. This is suggested within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance²⁴ document and as such is considered a suitable solution for the proposed development

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 IAQM guidance. This indicated that road traffic exhaust impacts were predicted to be **not significant**.

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.

²⁴ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.



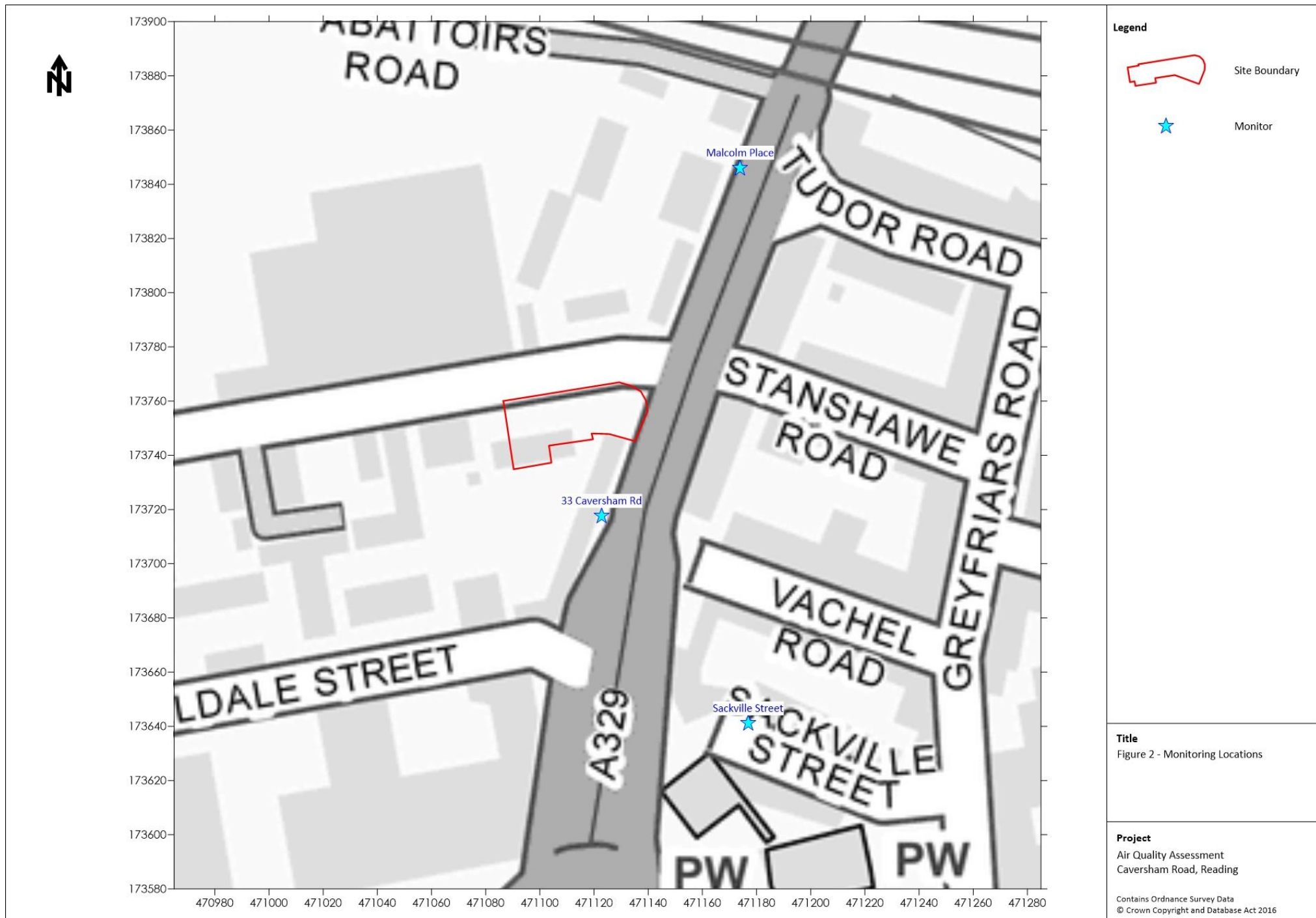
Legend

 Site Boundary

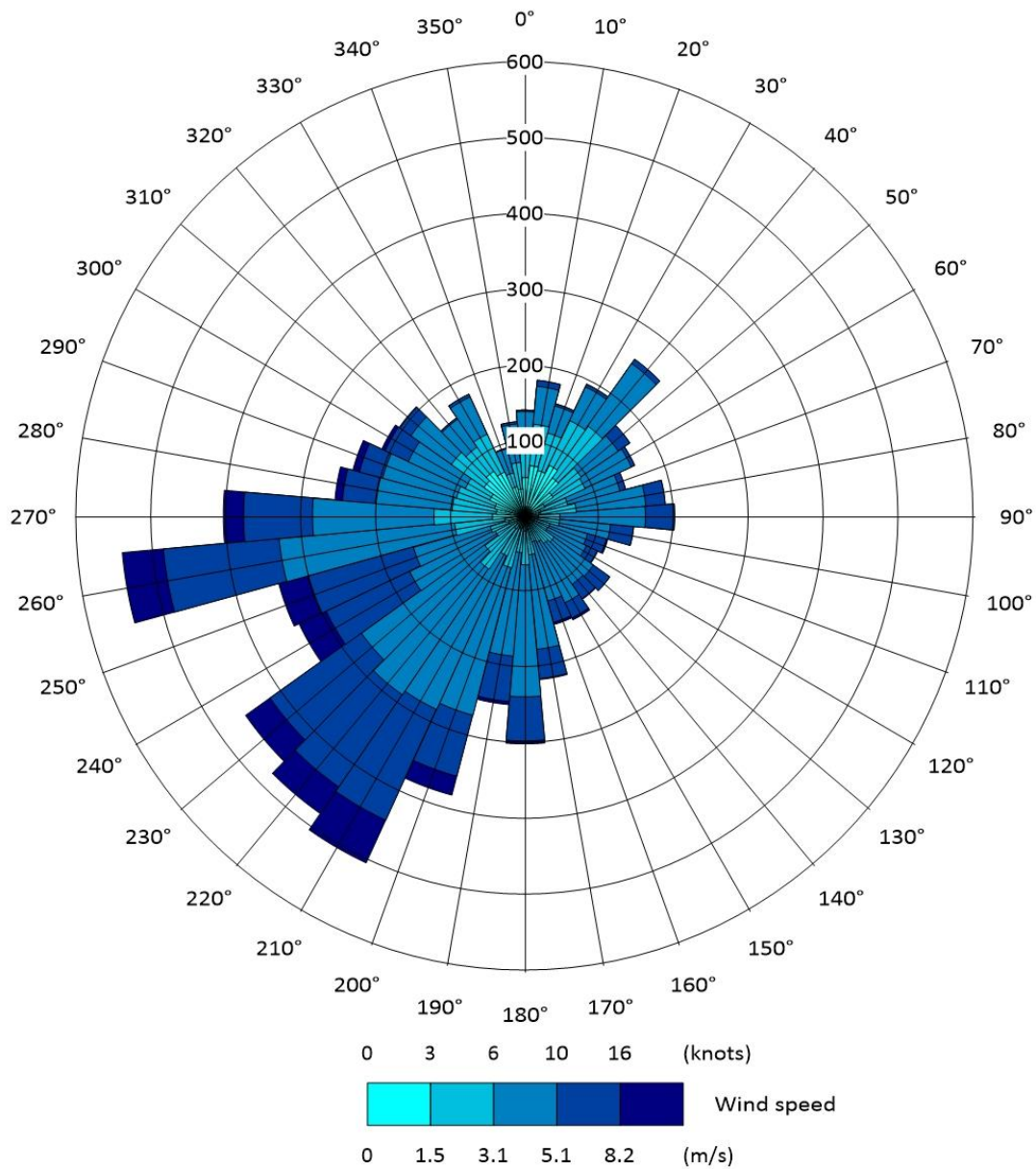
Title
Figure 1 - Site Location Plan

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Title
Figure 4 - Wind Rose of 2019
Heathrow Airport Meteorological Data

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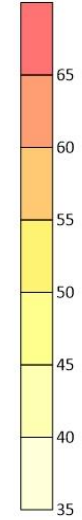
Legend



Site Boundary



Residential Units



Predicted Annual Mean NO₂ Concentrations (µg/m³)

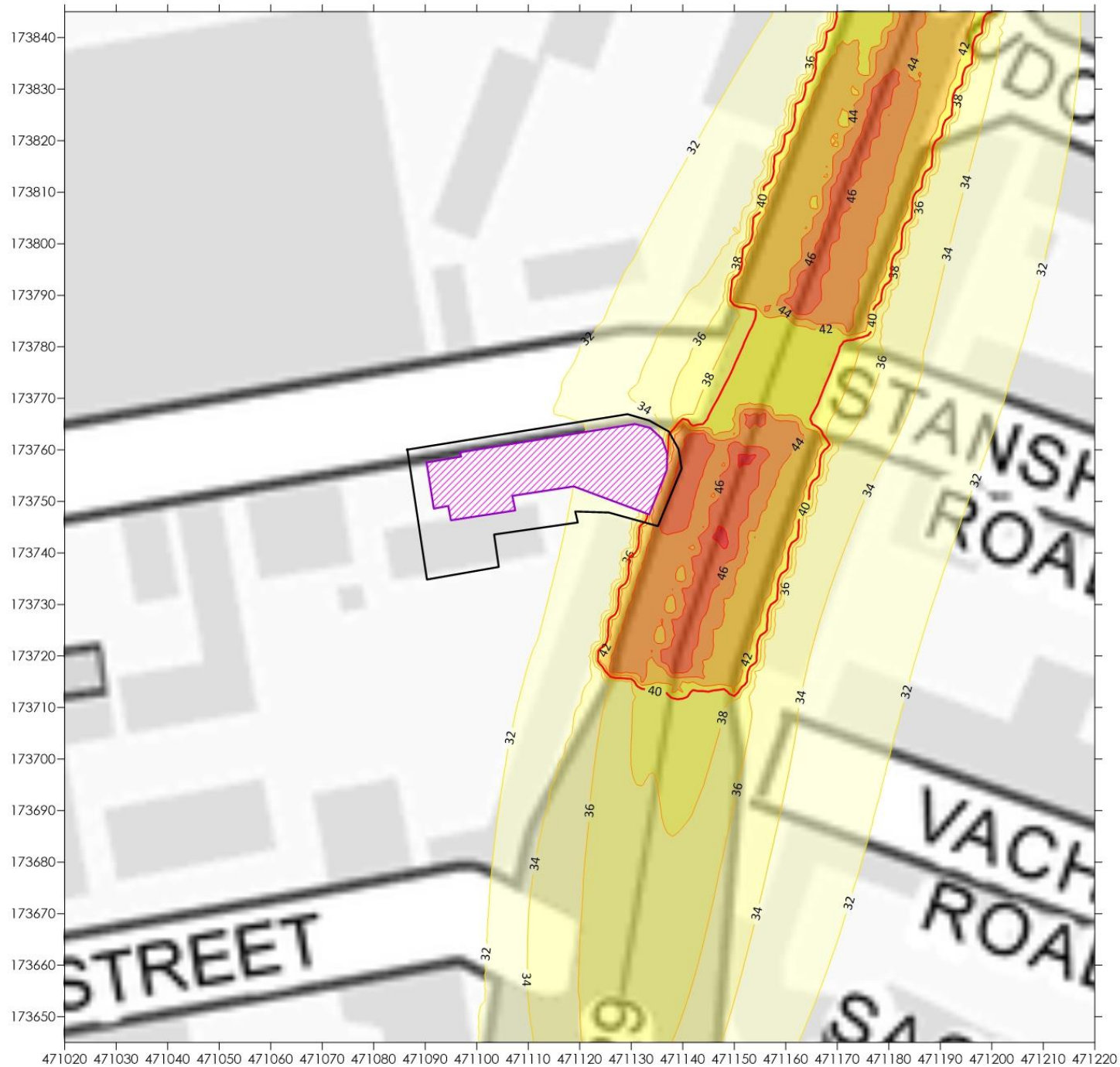
Title

Figure 5 - Predicted Annual Mean NO₂ Concentrations (µg/m³)
Ground Floor

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Site Boundary



Residential Units



Predicted Annual
Mean NO₂
Concentrations
(µg/m³)

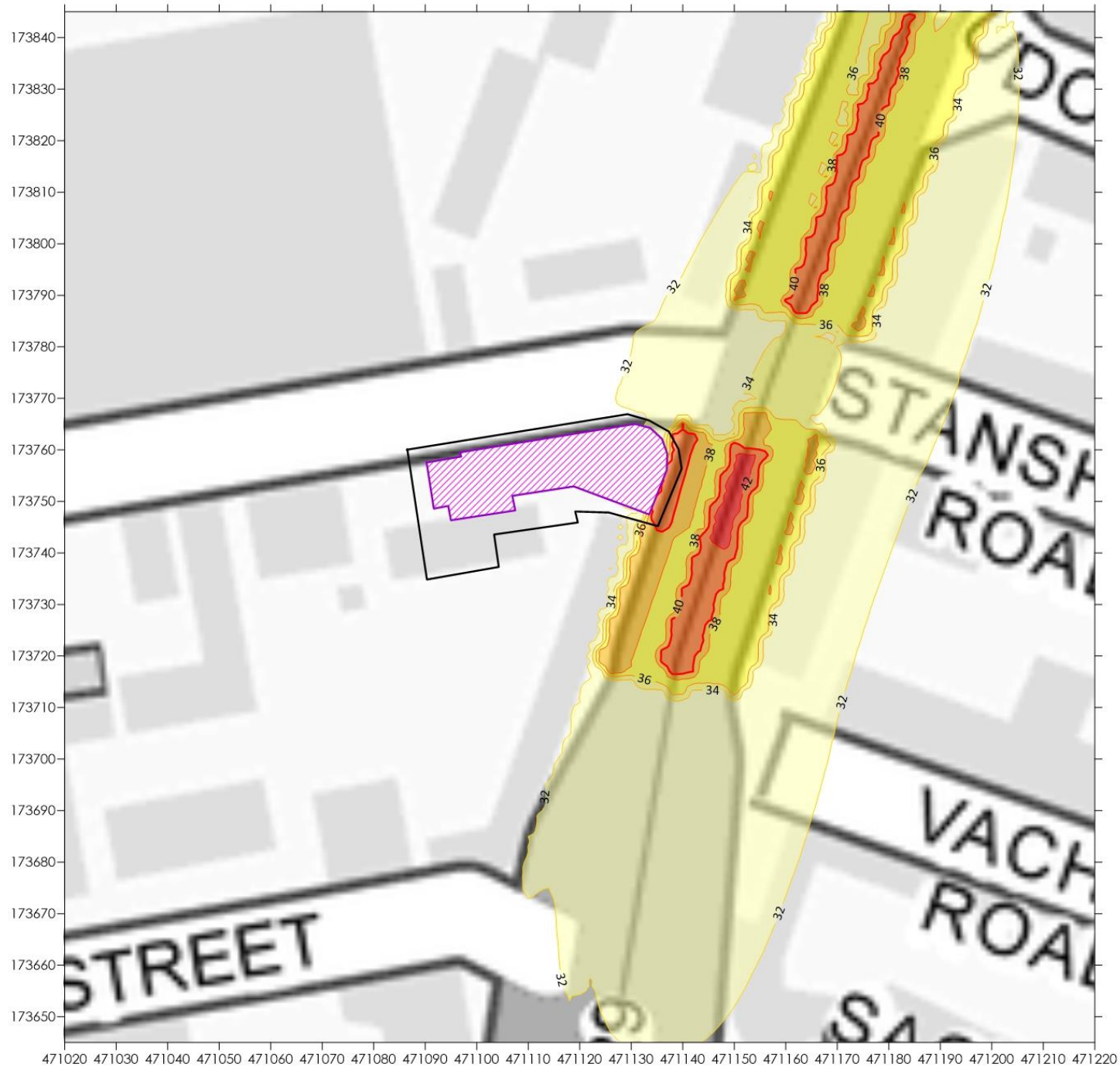
Title

Figure 6 - Predicted Annual Mean NO₂
Concentrations (µg/m³)
First Floor

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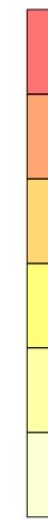
Legend



Site Boundary



Residential Units



Predicted Annual Mean NO₂ Concentrations (µg/m³)

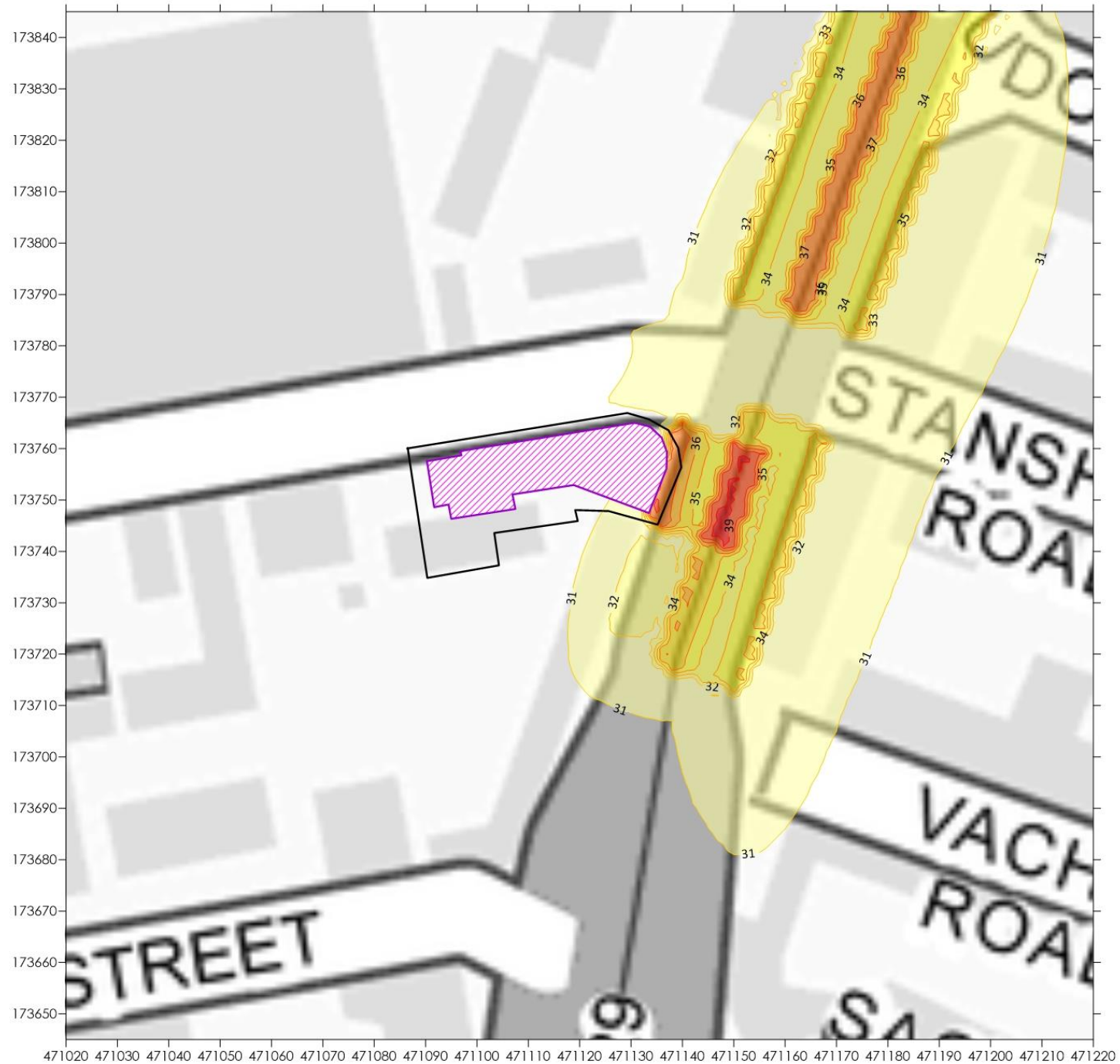
Title

Figure 7 - Predicted Annual Mean NO₂ Concentrations (µg/m³)
Second Floor

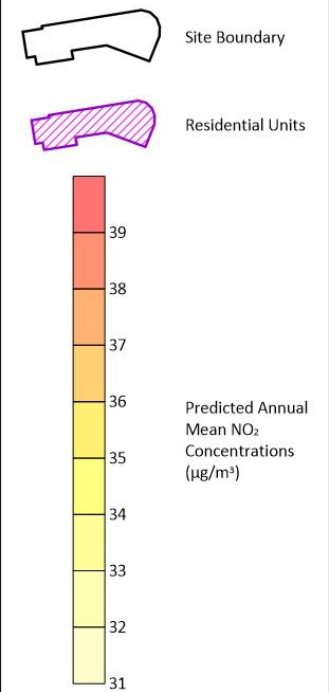
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Title

Figure 8 - Predicted Annual Mean NO₂ Concentrations (µg/m³) Third Floor

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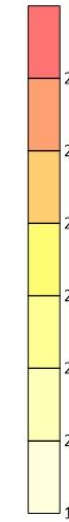
Legend



Site Boundary



Residential Units



Predicted Annual
Mean PM₁₀
Concentrations
($\mu\text{g}/\text{m}^3$)

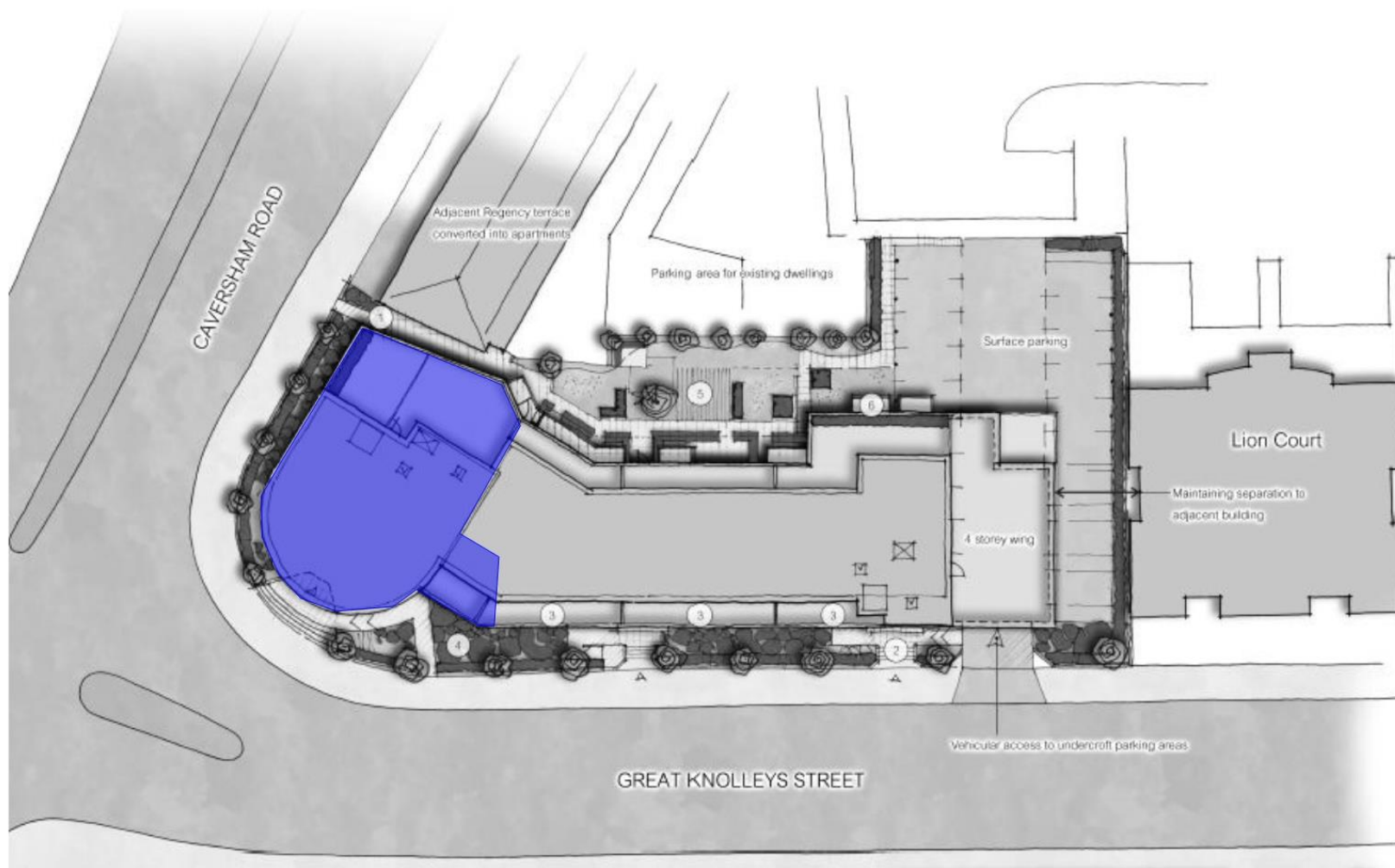
Title

Figure 9 - Predicted Annual Mean PM₁₀
Concentrations ($\mu\text{g}/\text{m}^3$)
Ground Floor

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Legend



Residential Units
Requiring Mitigation

Title

Figure 10 - Units Requiring Mitigation
at Ground, First and Second Floor Level

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