

Pam Brown Associates



AIR QUALITY ASSESSMENT

**BRIDGE STREET
READING
RG4 8AA**

June 2017

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READING
RG4 8AA**

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1.0 INTRODUCTION

1.1 BACKGROUND

Pam Brown Associates was commissioned to undertake an Air Quality Assessment in support of a planning application for the extension and refurbishment of Riverside Dental Centre, situated off Bridge Street, Reading.

The development may lead to the exposure of future occupants to poor air quality, as well as adverse impacts at sensitive locations. 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 impacts associated with the scheme.

1.2 SITE LOCATION AND CONTEXT

Riverside Dental Centre is situated off Bridge Street, Reading, at approximate National Grid Reference (NGR): 471161,174722. Reference should be made to Figure 1 for a map of the site and surrounding area.

The proposals involve the construction of a three storey extension to Riverside Dental Centre. The new structure will comprise a patient waiting zone, reception area, office space, seminar chamber and six treatment rooms. The current building is to be refurbished to provide two new residential apartments at first and second floor level, with office and laboratory facilities at ground floor. Reference should be made to Figure 2 for proposed site layout.

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 residents to poor air quality. As such, concentrations at the site have been assessed in the following report in order to consider suitability for the proposed end-use and define any requirement for mitigation. Potential impacts associated with the scheme have also been considered using standard screening methodologies.



2.0 LEGISLATION AND POLICY

2.1 EUROPEAN DIRECTIVES

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.

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.

2.2 UK LEGISLATION

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.

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.

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



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

Table 1. Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	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 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 facades 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 facade), 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 facade), 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 on 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

² Local Air Quality Management (TG16), DEFRA, 2016.



2.3 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.

2.4 NATIONAL PLANNING POLICY

The National Planning Policy Framework³ (NPPF) was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to the proposed development:

"The planning system should contribute to and enhance the natural and local environment by: [...]

Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

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

2.5 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 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 neighborhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to a planning decision?

³ NPPF, Department for Communities and Local Government, 2012.

⁴ <http://planningguidance.planningportal.gov.uk>



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?

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

2.6 LOCAL PLANNING POLICY

The Reading Borough Local Development Framework: Core Strategy⁵ was adopted 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.

Local Planning Policy

Review of the Core Strategy indicated the following policies which are relevant to air quality:

"Sustainable Development

Living within Environmental Limits (Environmental Objectives)

[...]

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.

[...]"

'Policy CS34: Pollution and Water Resources

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.

⁵ Reading Borough Local Development Framework: Core Strategy, RBC, 2015.



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."

These policies have been considered throughout the assessment.

3.0 BASELINE

3.1 INTRODUCTION

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

3.2 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, which is described as:

"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 the exposure of future residents to poor air quality and vehicles travelling to and from the site to increase pollution levels in this sensitive area. 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.

3.3 AIR QUALITY MONITORING

Monitoring of pollutant concentrations is undertaken by RBC using continuous and periodic methods 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)		
	2014	2015	2016
14, Church Road	40.62	34.00 (31)a	36.24

NOTE: A) Data in bracket shows mean annualised in accordance with DEFRA guidance⁶

⁶ Local Air Quality Management (TG16), DEFRA, 2016.



As shown in Table 3, the annual mean AQO for NO₂ was exceeded at the 14, Church Road diffusion tube in 2014. In more recent years, NO₂ concentrations have decreased at the survey position. Reference should be made to Figure 3 for a map of the monitoring position. RBC do not undertake PM₁₀ monitoring within the vicinity of the site.

3.4 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, 174500. Data for this location was downloaded from the DEFRA website⁷ for the purpose of the assessment and is summarised in Table 4.

Table 4. Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m ³)		
	2016	2017	2019
NO ₂	25.12	24.39	22.95
PM ₁₀	17.39	17.19	16.81

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

4.0 METHODOLOGY

4.1 INTRODUCTION

The proposed development has the potential to expose future residents to poor air quality and increase pollution levels as a result of operational phase vehicle exhaust emissions. These issues were considered in accordance with the following methodology.

4.2 POTENTIAL EXPOSURE

Dispersion modelling was undertaken in order to predict NO₂ and PM₁₀ concentrations across the site 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.

Modelling was undertaken for 2016 to allow verification against recent monitoring results and 2019 to represent the development opening year.

The model requires input data that details the following parameters:

- Assessment area;

⁷ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013>



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

These are detailed in the following Sections.

Assessment Area

Ambient concentrations were predicted over the area NGR: 471000, 174600 to 471300, 174900 at the following heights:

- 4m - First Floor; and,
- 7m - Second Floor.

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 4 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Baseline 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)⁸. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network in Great Britain for the years 1999 to 2016. It should be noted that the DfT web tool is referenced in DEFRA guidance⁹ 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.

The baseline traffic data was converted to the opening year of the development utilising factors obtained from TEMPro (Version 7.2). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.

⁸ <http://www.dft.gov.uk/traffic-counts/>.

⁹ Local Air Quality Management (TG16), DEFRA, 2016.



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 5.

Table 5. Traffic Data

Link		24-hour AADT Flow		HDV Proportion of Fleet (%)	Mean Vehicle Speed (km/h)	Road Width(m)
		2016	2019			
L1	A4074 Church Road	11,199	11,749	4.18	40	6.5
L2	A4074 Church Road Slow Phase (SP)	11,199	11,749	4.18	20	7.0
L3	A4074 Church Road SP between Slip Road and Junction	11,199	11,749	4.18	20	10.9
L4	A4155 Church Street SP	9,887	10,372	2.63	20	14.6
L5	A4155 Church Street	9,887	10,372	2.63	40	8.5
L6	A4155 Bridge Street SP between Slip Road and Junction	14,132	14,825	4.13	20	9.6
L7	A4155 Bridge Street Slip Road	14,132	14,825	4.13	40	3.1
L8	A4155 Bridge Street SP	28,263	29,651	4.13	20	9.3
L9	A4155 Bridge Street	28,263	29,651	4.13	40	9.1

Reference should be made to Figure 4 for a graphical representation of the road link locations.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 7.0). This has been produced by DEFRA and incorporates updated COPERT4v11 vehicle emission factors and fleet information.

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, 2016 emission factors were utilised in preference to the development opening year in order to provide robust concentration predictions. As predictions for 2016 were verified, it is considered results are a robust indication of worst case concentrations during the operation of the proposals.

Meteorological Data

Meteorological data used in the assessment was taken from Heathrow Airport meteorological station over the period 1st January 2016 to 31st December 2016 (inclusive). Heathrow Airport is located at NGR: 506947, 176515, which is approximately 35km 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 5 for a wind rose of the utilised meteorological data.

Roughness Length

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

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

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 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

Background NO_2 and PM_{10} concentrations for use in the assessment were obtained from the DEFRA mapping study for the grid square containing the development site, as shown in Table 4.

Similarly to emission factors, background concentrations from 2016 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

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 5.1) provided by DEFRA, which is the method detailed within DEFRA guidance¹⁰.

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,

¹⁰ Local Air Quality Management (TG16), DEFRA, 2016.



- 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 the assessment model verification was undertaken for 2016 using traffic data, meteorological data and monitoring results from this year.

Diffusion tube monitoring of NO₂ concentrations was undertaken at one location within the modelling extents during 2016. The result was obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance¹¹. The monitored annual mean NO₂ concentration and calculated road NO_x concentration is summarised in Table 6.

Table 6. Verification - Monitoring Result

Monitoring Location	Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
14, Church Road	36.64	24.35

The annual mean road NO_x concentration predicted from the dispersion model and the calculated 2016 road NO_x monitoring result is summarised in Table 7.

Table 7. Verification – Modelling Result

Monitoring Location	Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
14, Church Road	24.35	8.41

The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated a verification factor of 2.8938 was required to be applied to all modelling results.

Monitoring of PM10 concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust model predictions of these species in lieu of more accurate data in accordance with DEFRA guidance¹².

4.3 POTENTIAL DEVELOPMENT IMPACTS

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 during the operational phase. A screening assessment was therefore undertaken using the criteria contained within the Highways Agency 'Design Manual for Roads and Bridges' (DMRB)¹³ and Institute of Air Quality Management (IAQM) 'Land-Use Planning &

¹¹ Local Air Quality Management (TG16), DEFRA, 2016.

¹² Local Air Quality Management (TG16), DEFRA, 2016.

¹³ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.



Development Control: Planning for Air Quality¹⁴ guidance documents to determine the potential for trips generated by the development to affect local air quality.

The DMRB¹⁵ provides the following criteria for determination of road links potentially affected by changes in traffic flow:

- 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.

The IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance¹⁶ document provides the following criteria 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 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.

Should these criteria not be met, then the DMRB¹⁷ and IAQM guidance¹⁸ documents consider air quality impacts associated with a scheme to be negligible 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.

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

¹⁵ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

¹⁶ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹⁷ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

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

¹⁹ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.



5.0 ASSESSMENT

5.1 INTRODUCTION

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

5.2 POTENTIAL 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 4.0 to quantify concentrations at the site. The results are summarised in the following Sections.

It should be noted that the proposals include class D1 - non-residential institutions and B1- office spaces. These are not considered sensitive land uses for annual mean AQOs in accordance with the DEFRA guidance²⁰. As such, the exposure assessment focused on concentrations at the residential apartments, which are to be located within the existing building at first floor level and above.

Reference should be made to Figure 6, 7 and 8 for graphical representations of the results.

Nitrogen Dioxide

Figure 6 displays the contour plot for predicted annual mean NO₂ concentrations at first floor height. This indicates the annual mean NO₂ AQO of 40µg/m³ is exceeded at the building façade. The maximum predicted level was 40.06µg/m³.

Figure 7 displays the contour plot for predicted annual mean NO₂ concentrations at second floor height. This indicates the annual mean NO₂ AQO of 40µg/m³ is achieved at the building façade. The maximum predicted level was 31.00µg/m³.

Based on the assessment results, annual mean NO₂ concentrations are predicted to exceed the relevant AQO at first floor height. Mitigation to reduce potential exposure of future residents to elevated levels is therefore provided in Section 6.

Particulate Matter

Figure 8 displays the contour plot for predicted annual mean PM₁₀ concentrations at first floor height. This indicates the annual mean PM₁₀ AQO of 40µg/m³ is achieved at the building façade. The maximum predicted level was 19.85µg/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 annual mean PM₁₀ concentrations were predicted to be below the relevant AQO at first floor level, further assessment above this height was not considered necessary.

5.3 POTENTIAL DEVELOPMENT IMPACTS

Any additional vehicle movements associated with the development will generate exhaust emissions on the local and regional road networks. Anticipated trip generation

²⁰ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.



from the scheme was not available at the time of the assessment. However, the proposals do not include the provision of any car parking spaces. As such, it is unlikely that the development will result in significant traffic generation on the local road network.

Based on the provided information, the proposals are not anticipated 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 development is not considered likely to result in an increase of LDV flows of more than 100 AADT on any individual road link within the AQMA, 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 DMRB²¹ and IAQM²² screening criteria shown in Section 4.3

6.0 MITIGATION

There are a number of mitigation options available to reduce or off-set potential air quality impacts. However, all techniques have financial implications and may therefore affect scheme viability. As such, they should only be included if necessary.

The dispersion modelling results indicated predicted annual mean NO₂ concentrations above the AQO at the proposed apartment at first floor level. As such, mitigation is required to ensure a supply of clean air for future residents. This should be provided in the form of a mechanical ventilation system. The air inlet should be positioned on the northern, southern and/or western façade at second floor height. 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 unit.

The proposed apartment should also incorporate a high specification of air tightness on the windows fronting Bridge Street, so that when these are closed, the affected unit would be ventilated by clean air from the mechanical system. The arrangement will ensure the apartment is 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 apartment during periods of open windows as well as flushing the internal environment after closure.

Mechanical ventilation is suggested within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance document²³ and as such is considered a suitable solution for a development of this size and nature.

As NO₂ annual mean concentrations were predicted to be below the relevant AQO at second floor height, mitigation is not required for the proposed apartment at this level.

It should be noted that the proposals include class D1 - non-residential institutions and B1- office spaces. These are not considered sensitive land uses for annual mean

²¹ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

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

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



AQOs in accordance with DEFRA guidance²⁴. As such, mitigation is not necessary for the areas of the development where these land uses are proposed.

7.0 CONCLUSION

Pam Brown Associates was commissioned to undertake an Air Quality Assessment in support of a planning application for the extension and refurbishment of Riverside Dental Centre, situated off Bridge Street, Reading.

The development may lead to the exposure of future residents to elevated pollution levels, as well as adverse air quality effects at sensitive locations. As such, an Air Quality Assessment was required in order to determine baseline conditions, consider site suitability for the proposed end-use and assess potential impacts as a result of the scheme.

Dispersion modelling was undertaken using ADMS-Roads in order to predict pollutant concentrations as a result of emissions from the local highway network. Outputs were subsequently verified using monitoring data obtained from RBC.

The results of the dispersion modelling assessment indicated that predicted annual mean NO₂ concentrations were above the relevant AQO at first floor level. As such, suitable mitigation in the form of mechanical ventilation has been specified for the residential apartment fronting Bridge Street. This is suggested within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance document and as such is considered a suitable solution for a development of this size and nature.

Levels of PM₁₀ were predicted to be below the relevant AQO at all locations across the site. As such, future residents are unlikely to be exposed to elevated PM₁₀ concentrations as a result of 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 the DMRB and IAQM guidance documents. Due to the low anticipated trip generation associated with the proposals, road traffic impacts were predicted to be negligible.

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.

Pam Brown Associates
June 2017

²⁴ Local Air Quality Management (TG16), DEFRA, 2016.



Limitations

The conclusions reached within this report are restricted to those that can be determined from the available data and may be subject to amendment in the light of additional information becoming available. The findings are limited to the scope of the assessment and terms and purpose under which this was commissioned.

The information provided by third parties is presented in good faith; however, PBA cannot accept any responsibility/liabilities for the information derived from these and/or for discrepancies or inaccuracies found in the data.

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8.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NGR	National Grid Reference
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 0µm
RBC	Reading Borough Council
SP	Slow Phase
z ₀	Roughness length

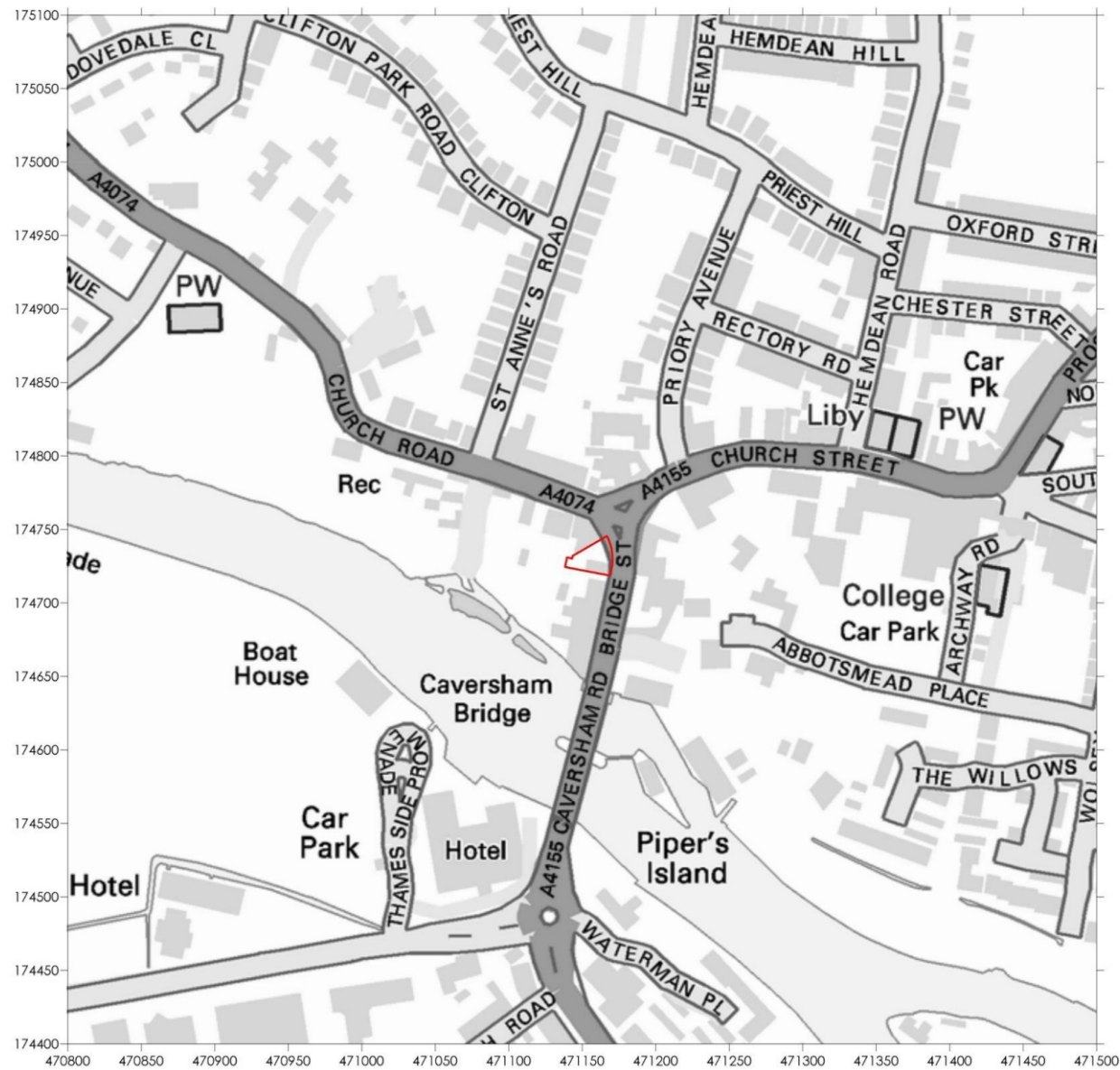


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FIGURES



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Project:

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Reading
RG4 8AA

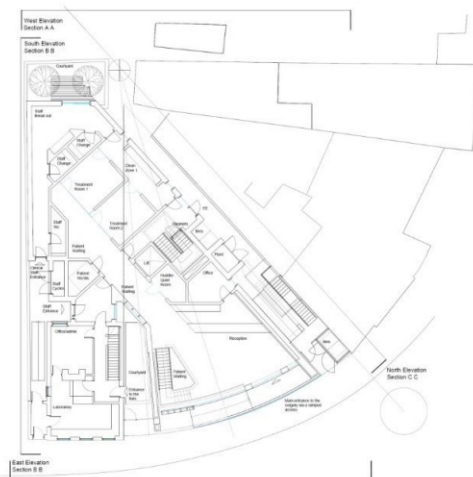
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Site Location Plan

Scale: NTS

Job No.: 1691-17

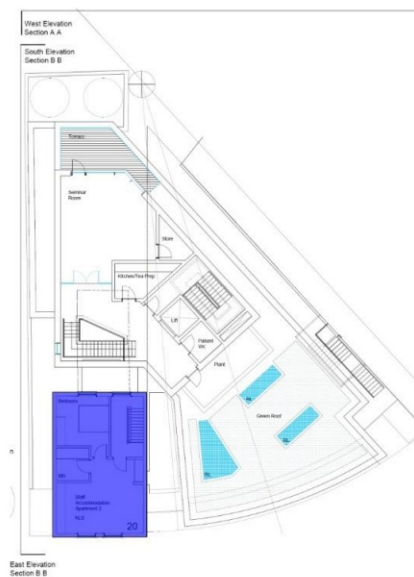
Figure 1



Ground Floor



Second Floor



Third Floor

Legend



Residential Area



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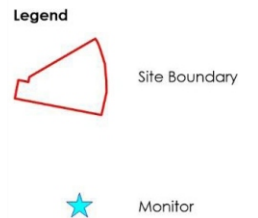
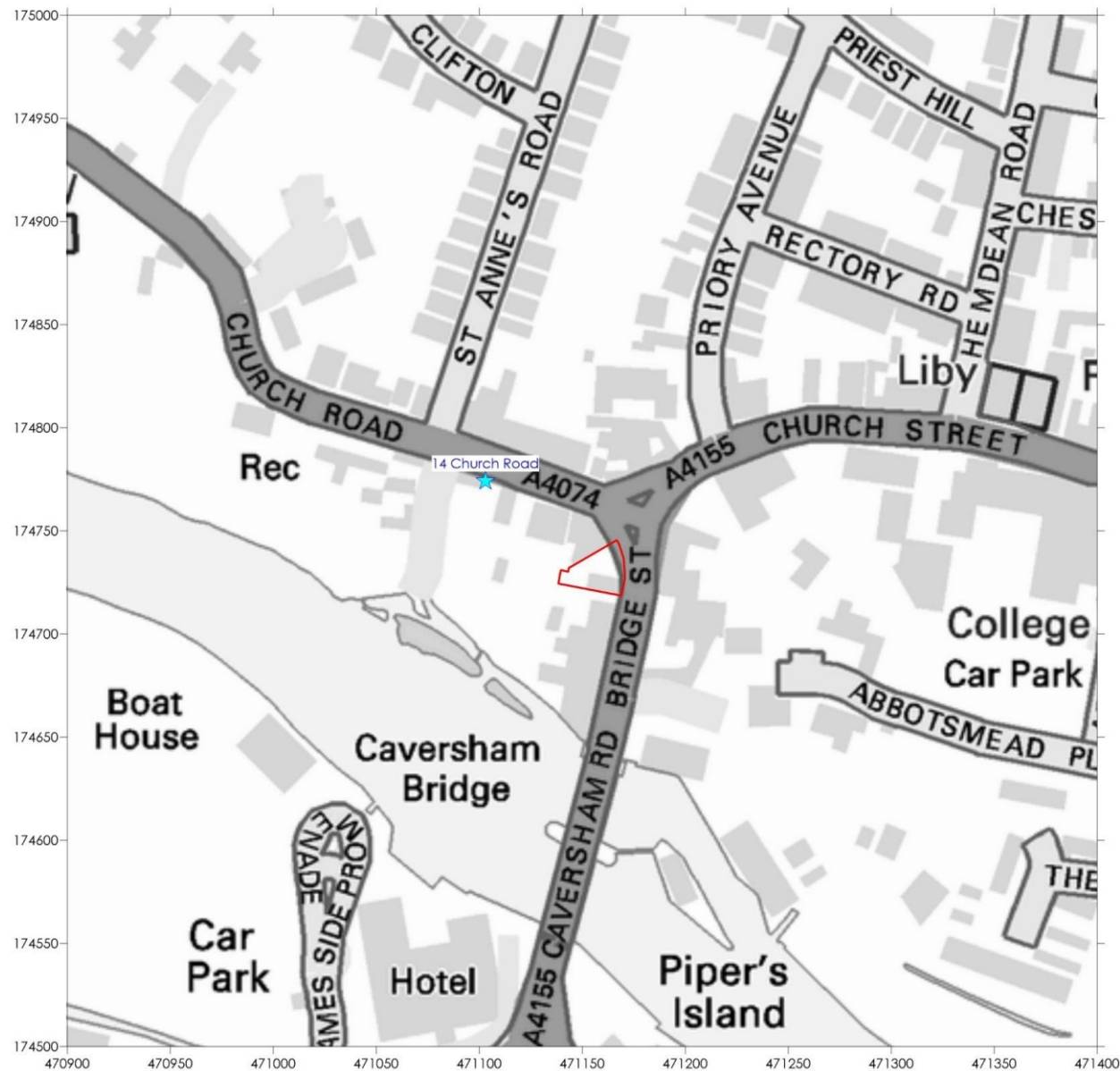
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Proposed Site Layouts

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Figure 2



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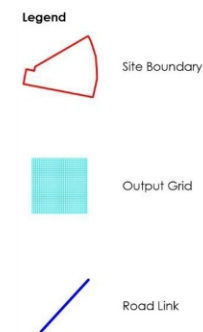
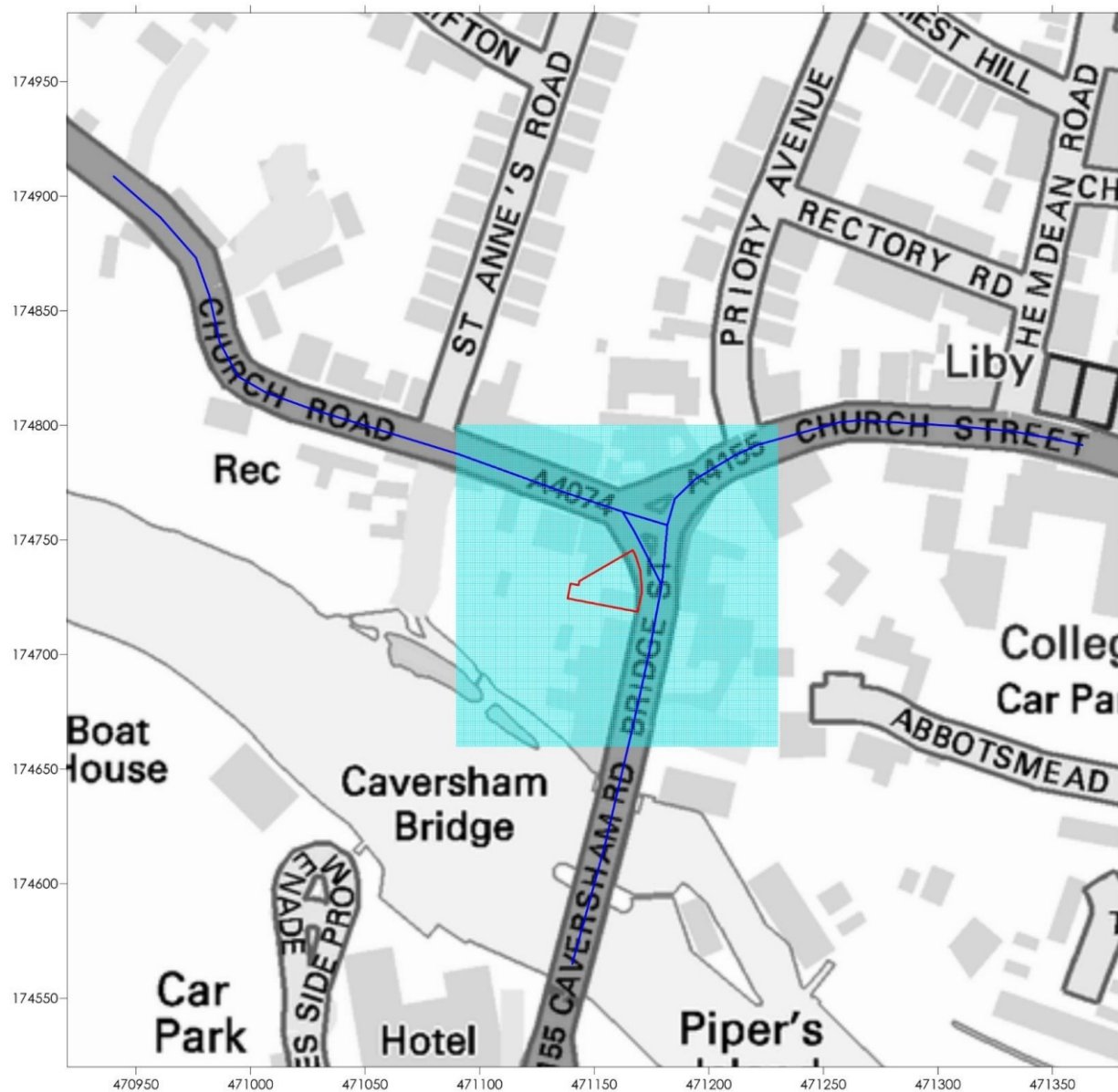
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Monitoring Location

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Figure 3



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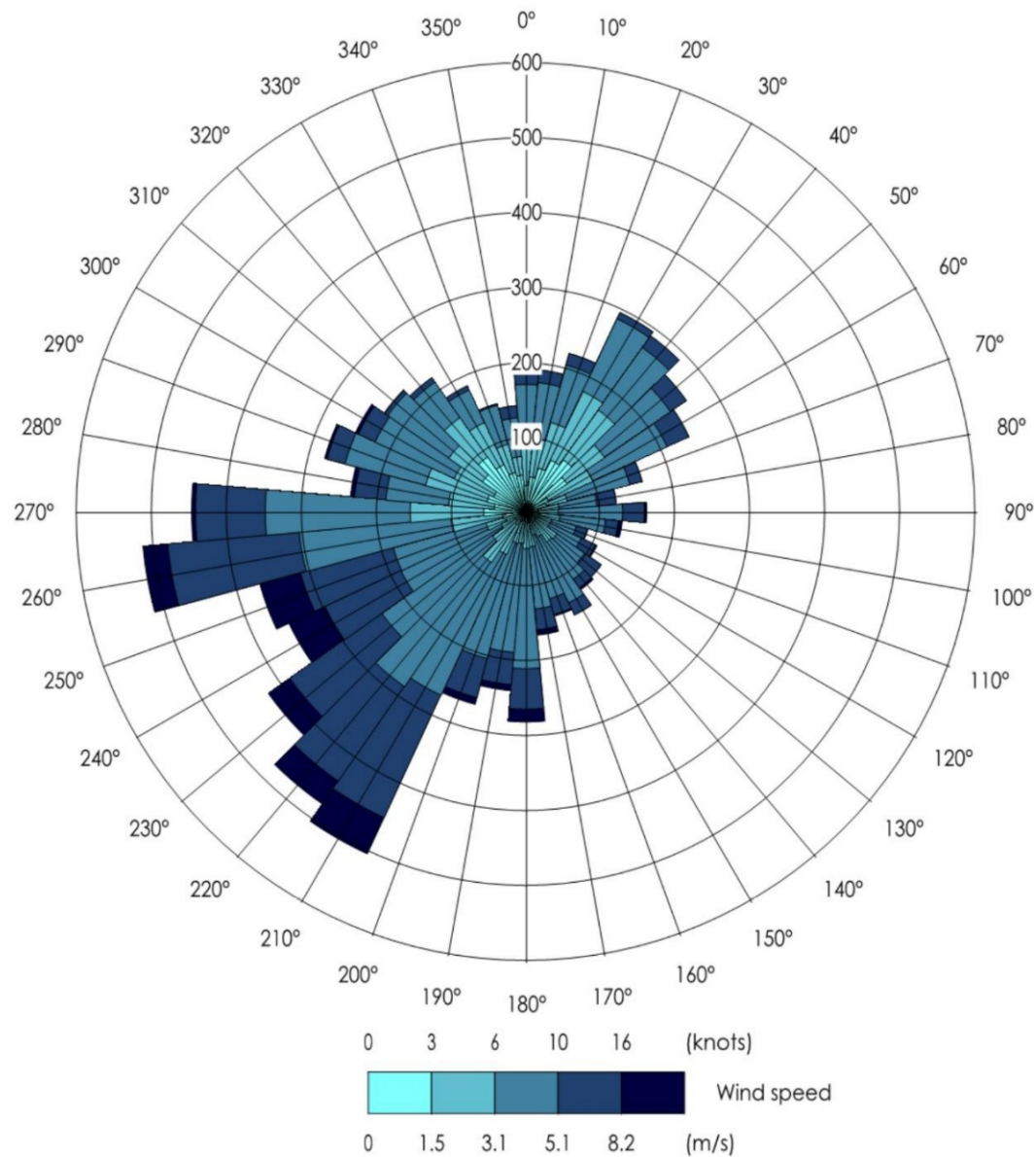
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ADMS- Roads Inputs

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Figure 4



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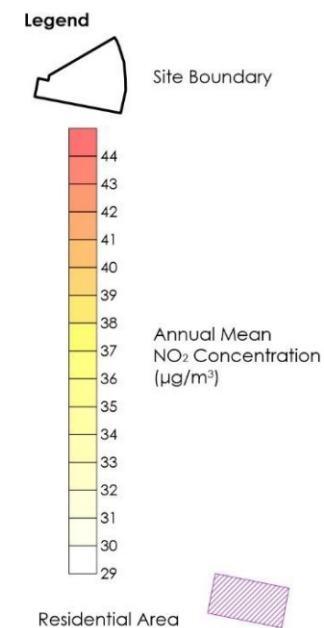
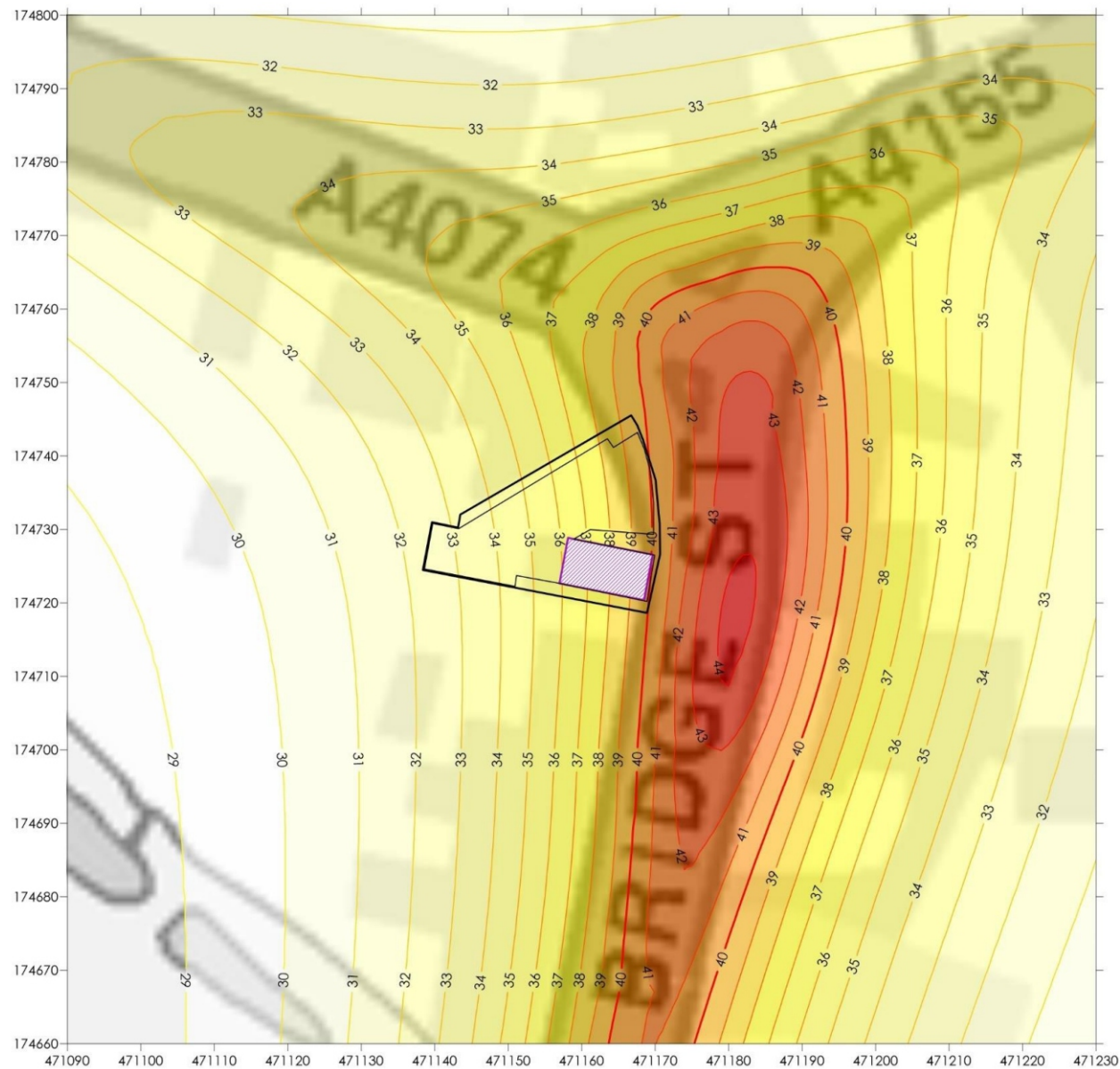
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Wind Rose of 2016 Heathrow
Airport Meteorological Data

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Figure 5



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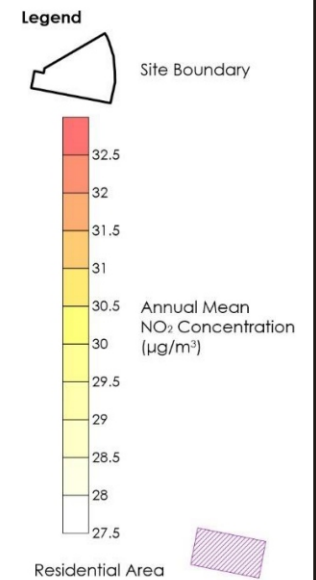
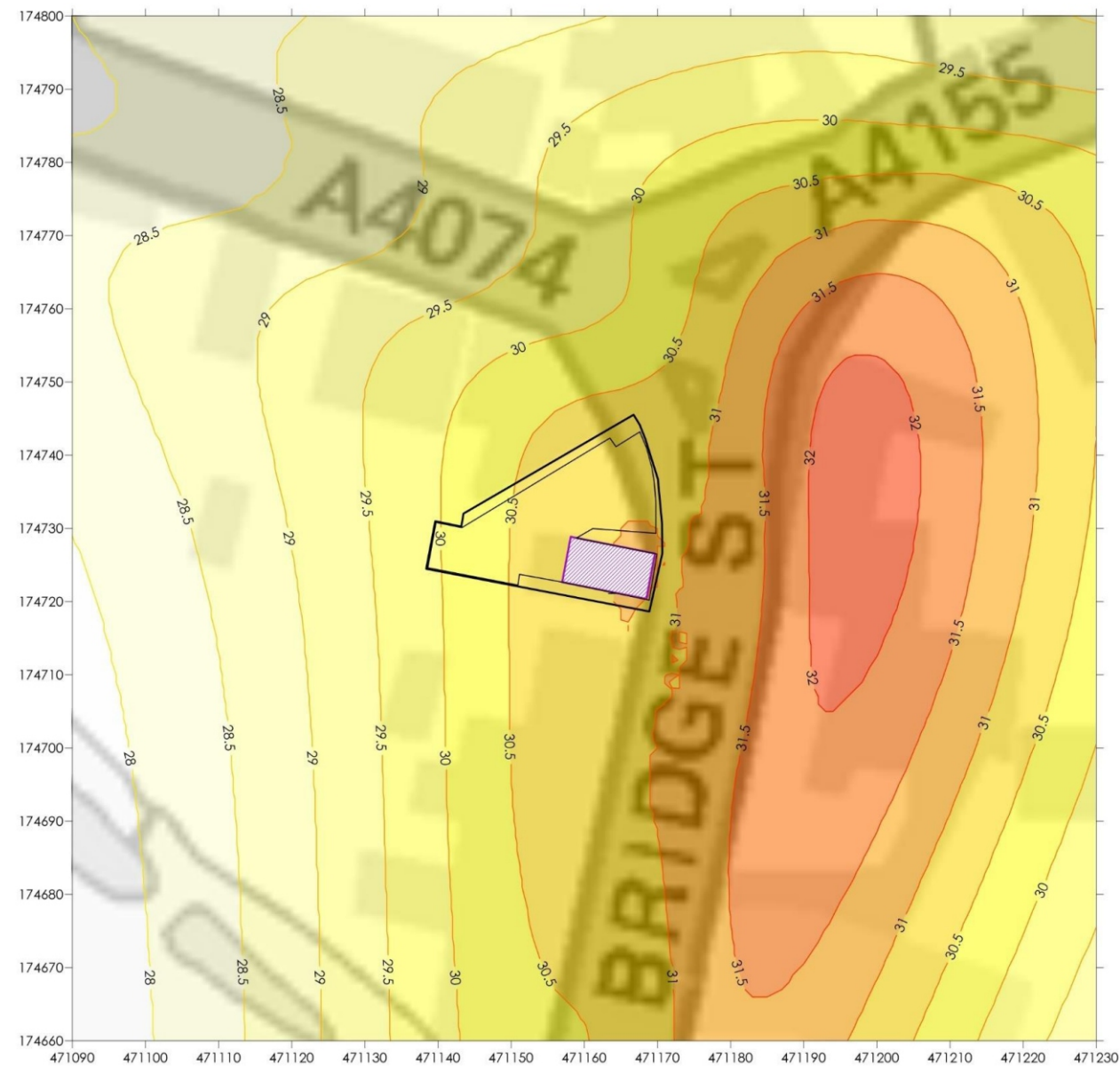
Title:

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

Scale: NTS

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Figure 6



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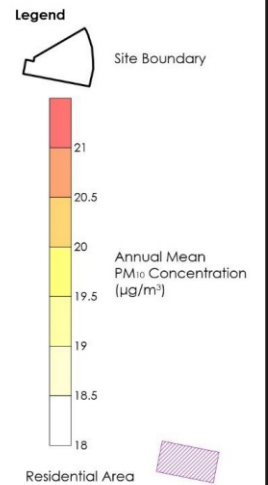
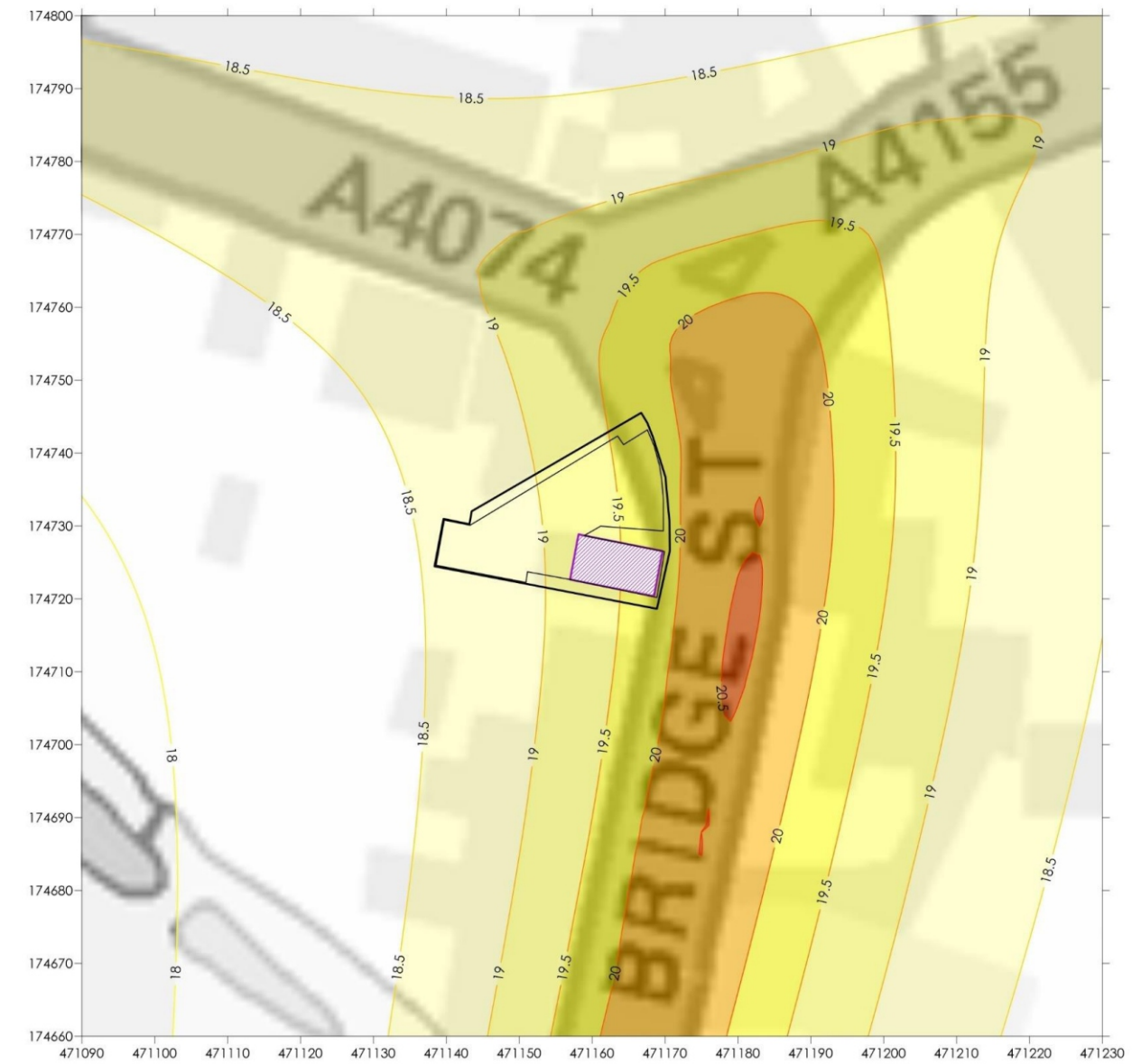
Title:

Predicted Annual Mean NO₂
Concentrations (ug/m³)
Second Floor

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Figure 7



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Predicted Annual Mean NO₂
Concentrations (ug/m³)
Third Floor

Scale: NTS

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Figure 8