



AIR QUALITY ASSESSMENT 300 KING'S ROAD, READING

REC REFERENCE: AQ105140R1

REPORT PREPARED FOR: TITAN PROPERTY DEVELOPMENTS LTD

DATE: MARCH 2018



National Consultancy, Locally Delivered

A CONCEPT LIFE SCIENCES COMPANY





Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	-	-	-	
Date	27/03/2018			
Prepared by	Victoria Thomson			
Signature				
Position	Graduate Air Quality Consultant			
Checked by	Josh Davis			
Signature				
Position	Air Quality Consultant			
Verified by	Conal Kearney			
Signature				
Position	Principal Air Quality Consultant			
Project number	AQ105140r1			

A C O N C E P T L I F E S C I E N C E S C O M P A N Y





EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd was commissioned by Titan Property Ltd to undertake an Air Quality Assessment in support of the proposed residential development at 300 King's Road, Reading.

The proposal comprises the development of 14 residential apartments, with 8 parking spaces, alongside associated infrastructure and landscaping.

The site is located within an area identified by the Reading Borough Council as experiencing elevated pollutant concentrations. Subsequently there are concerns that the proposals have the potential to introduce future site users into an area of elevated pollutant concentrations, as well as to cause potential air quality impacts at nearby sensitive locations during the construction and operational phases. An Air Quality Assessment was therefore required to determine baseline conditions at the site and assess its suitability for the proposed end use in accordance with the requirements of the National Planning Policy Framework.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Dispersion modelling was undertaken in order to quantify pollutant concentrations across the proposed site and assess potential exposure of future users. The results indicated that pollutant levels across the site were below the relevant air quality standards and, as such, the location is considered suitable for the proposed end-use without the inclusion of mitigation methods. The use of robust assumptions, where necessary, was considered to provide sufficient results confidence for an assessment of this nature.

Potential impacts during the operational phase of the development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken to determine the potential for trips generated by the development to affect local air quality. This indicated that operational road vehicle emission impacts were not anticipated to be significant.

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





TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Background	1
1.2 Site Location and Context	1
1.3 Limitations	1
2. LEGISLATION AND POLICY	2
2.1 European Legislation	2
2.2 UK Legislation	2
2.3 Local Air Quality Management	4
2.4 Dust	4
2.5 National Planning Policy	4
2.5.1 National Planning Policy Framework	4
2.5.2 National Planning Practice Guidance	5
2.6 Local Planning Policy	5
3. METHODOLOGY	7
3.1 Construction Phase Assessment	7
3.1.1 Step 1	7
3.1.2 Step 2	7
3.1.3 Step 3	12
3.1.4 Step 4	12
3.2 Operational Phase Assessment	13
3.2.1 Future Exposure	13
3.2.2 Road Traffic Exhaust Emission Impacts	13
4. BASELINE	15
4.1 Local Air Quality Management	15
4.2 Air Quality Monitoring	15
4.3 Background Pollutant Concentrations	17
4.4 Sensitive Receptors	17
5. ASSESSMENT	20
5.1 Construction Phase Assessment	20
5.1.1 Step 1	20
5.1.2 Step 2	20
5.1.3 Step 3	22
5.1.4 Step 4	24
5.2 Operational Phase Assessment	24
5.2.1 Future Exposure	24
5.2.2 Road Traffic Exhaust Emissions	25
6. CONCLUSION	26
7. ABBREVIATIONS	27





APPENDIX

Appendix I	Figures
Appendix II	Assessment Inputs
Appendix III	Assessor's Curriculum Vitae





1. INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd was commissioned by Titan Property Developments Ltd to undertake an Air Quality Assessment in support of a proposed residential development at 300 King's Road, Reading.

1.2 Site Location and Context

The site is located at 300 King's Road, Reading, at approximate National Grid Reference (NGR): 472760, 173210. Reference should be made to Figure 1 within Appendix I for a location plan.

The proposal comprises the development of 14 residential apartments with 8 parking spaces, alongside associated infrastructure and landscaping.

The site is located in an Air Quality Management Area (AQMA) declared by Reading Borough Council (RBC) for exceedances of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO₂). Subsequently, there is potential for the development to expose future users to poor air quality. Additionally, the proposals may have the potential to cause impacts at sensitive receptors within the AQMA during the construction and operational phases. As such, an Air Quality Assessment is required in order to determine baseline conditions at the site, assess site suitability for the proposed end-use. This is detailed in the following report.

1.3 Limitations

This report has been produced in accordance with REC's standard terms of engagement. REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.





2. LEGISLATION AND POLICY

2.1 European Legislation

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 objectives for particulate matter with an aerodynamic diameter of less than 2.5µm (PM_{2.5}). The consolidated Directives include:

- ▶ Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient Air Quality Limit Values (AQLVs) for NO₂, oxides of nitrogen (NO_x), sulphur dioxide, lead and 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 (Amendment) Regulations (2016) came into force on 31st December 2016. These Regulations amend the Air Quality Standards Regulations 2010 and transpose the 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 6 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 exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for compliance vary slightly.

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

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





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 more than 18 times a year
PM ₁₀	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year

Table 2 summarises the advice provided in DEFRA guidance LAQM (TG16)² on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objectives Should Apply At	Objectives 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-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

² Local Air Quality Management Technical Guidance 2016 LAQM (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 administration under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves considering present and likely future air quality against the AQOs. If it is predicted that levels at sensitive locations where members of the public are regularly present for the relevant averaging period 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 (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 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) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

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

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

2.5 National Planning Policy

2.5.1 National Planning Policy Framework

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 this assessment:

"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

³ National Planning Policy Framework, Department for Communities and Local Government, 2012.





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.

2.5.2 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 relevant air quality sections are highlighted below:

Paragraph 001 states that: "Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values" and "It is important that the potential impact of new development on air quality is taken into account, where the national assessment indicates that relevant limits have been exceeded or are near the limit". The role of Local Authorities under LAQM are stated and that Air Quality Action Plans should "identify measures that will be introduced in pursuit of the objectives"

Paragraph 005 states that "Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation"

Paragraph 007 states that "Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality". In terms of mitigation, it states that "Mitigation options where necessary will be location specific, will depend on the proposed development and should be proportionate to the likely impact".

Paragraph 009 shows a flow chart highlighting how the assessment of air quality impacts should fit into the development management process. It makes it clear that air quality impact risks, AQLVs and AQOs should be considered in the decision-making process.

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

2.6 Local Planning Policy

Reading Borough Council's (RBC) Local Development Framework (LDF) consists of a portfolio of documents of which the Core Strategy⁵, which was adopted with alterations in January 2015, is the principal overarching part. The Core Strategy sets out the strategic policy framework for the city until 2020.

A review of the Core Strategy indicated the following policy in relation to air quality that is relevant to this assessment:

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

⁵ Core Strategy, Reading Borough Local Development Framework, Reading Borough Council, 2015.





"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.

[...]."

Reference has been made to this policy during the undertaking of this Air Quality Assessment by assessing pollutant concentrations across the proposed development.





3. METHODOLOGY

The proposed development has the potential to cause air quality impacts during the construction phase in addition to exposing future site users to elevated pollution levels. These issues have been assessed in accordance with the following methodology.

3.1 Construction Phase Assessment

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'⁶.

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

- ▶ 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.

3.1.1 Step 1

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

3.1.2 Step 2

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

- ▶ The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and

⁶ Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2016.





- ▶ 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 emissions through the construction phase. The relevant criteria are summarised in Table 3.

Table 3 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Earthworks	• Total site area greater than 10,000m² • 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 100,000m³ • 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	Earthworks	• Total site area 2,500m² to 10,000m² • Moderately dusty soil type (e.g. silt) • 5 to 10 heavy earth moving vehicles active at any one time • Formation of bunds 4m to 8m in height • Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	• Total building volume 25,000m³ to 100,000m³ • 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





Magnitude	Activity	Criteria
Small	Earthworks	• Total site area less than 2,500m² • 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 25,000m³ • 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 site for construction, earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table 4.

Table 4 Examples of Factors Defining Sensitivity of an Area

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





Sensitivity	Examples	
	Human Receptors	Ecological Receptors
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, playing fields, farmland, footpaths, short term car park 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 during the construction phase:

- ▶ 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 the 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 in the undertaking of this assessment.

The sensitivity of the area to dust soiling effects on people and property is shown in Table 5.

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

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

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





Table 6 Sensitivity of the Area to Human Health Impacts

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

Table 7 outlines the sensitivity of the area to ecological impacts.





Table 7 Sensitivity of the Area to Ecological Impacts

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

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

Table 8 outlines the risk category from earthworks and construction activities.

Table 8 Dust Risk Category from Earthworks and Construction

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

Table 9 outlines the risk category from trackout.

Table 9 Dust Risk Category from Trackout

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

3.1.3 Step 3

Step 3 requires the identification of site specific mitigation measures within the IAQM guidance 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.

3.1.4 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'.

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM⁶ guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix III.

3.2 Operational Phase Assessment

3.2.1 Future Exposure

The proposed development includes sensitive land use, in close proximity to an arterial highway network. As such, the proposals have the potential to introduce new receptors into an area of existing poor air quality. Detailed dispersion modelling was therefore undertaken to quantify NO₂ and PM₁₀ concentrations across the site and determine suitability for the proposed use. Reference should be made to Appendix II for details of the assessment inputs.

3.2.2 Road Traffic Exhaust Emission Impacts

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO₂ and PM₁₀, associated with vehicles travelling to and from the site. A screening assessment was therefore undertaken using the criteria contained within the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) 'Land-Use Planning & Development Control: Planning for Air Quality (2017)'⁷ guidance documents to determine the potential for trips generated by the development to affect local air quality.

The EPUK and IAQM guidance⁷ document states the following criteria to help establish when an air quality assessment is likely to be considered necessary:

- ▶ Proposals that will cause a change in Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 elsewhere;
- ▶ Proposals that will cause a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 elsewhere;
- ▶ Proposals that would realign roads within an AQMA by more than 5m;
- ▶ Proposals that will introduce new junctions or remove existing junctions near relevant receptors;
- ▶ Proposals that will introduce or change a bus station or change flows of buses by more than 25 AADT within an AQMA or more than 100 AADT elsewhere;
- ▶ Proposals which will include an underground car park with extraction system which will be within 20m of a relevant receptor and have more than 100 movements per day;
- ▶ Proposals which include either a centralised plant using biofuel, a combustion plant with single or thermal input >300KWh or a standby emergency generator associated with a centralised energy centre; and,
- ▶ Proposals which include combustion processes of any size.

Should these criteria not be met, then the EPUK and IAQM guidance⁷ documents consider air quality

⁷ Land-Use Planning & Development Control: Planning for Air Quality, EPUK and IAQM, January 2017.





impacts associated with a scheme to be **negligible** and no further assessment is required.

Should screening of the traffic data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the predicted change in NO₂ and PM₁₀ 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 EPUK and IAQM guidance⁷.





4. BASELINE

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

4.1 Local Air Quality Management

As required by the Environment Act (1995), RBC, has undertaken Review and Assessment of air quality within their area of administration. This process has indicated that concentrations of NO₂ are above the AQO within the city. As such, one AQMA has been declared, which is described as:

"Reading AQMA (annual mean NO₂ exceedances) - An area encompassing all the main arterial routes in and out of Reading and central areas."

The proposed development is located within the Reading AQMA. As such there could be potential for the development to introduce future residents to elevated pollutant concentrations. This has been considered within this report.

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

4.2 Air Quality Monitoring

RBC undertakes monitoring of pollutant concentrations using continuous techniques throughout their area of administration. A review of the most recent Air Quality Annual Status Report⁸ indicates that there are currently four automatic analysers within their area of administration. Monitoring results at these locations for NO₂ from recent years are shown in Table 10. Exceedances of the AQO are highlighted in **bold**.

Table 10 NO₂ Automatic Monitoring Results

Site ID	Location	NGR (m)		Type	Annual Mean NO ₂ Concentration (µg/m ³)		
		X	Y		2014	2015	2015
Reading AURN	AURN	473441	173198	Urban Background	27.00	22.00	34.00
RD1	Caversham Road	471153	174429	Roadside	41.00	38.00	39.00
RD3	Oxford Road	468700	174126	Roadside	35.00	31.00	30.00
RD4	London Road	473703	173409	Roadside	-	-	32.00

As indicated in Table 10, the annual mean AQO for NO₂ was exceeded at RD1 in 2014, there are no other exceedances in recent years. Reference should be made to Figure 2 within Appendix I for a graphical representation of the diffusion tube monitoring locations.

⁸ Reading Borough Council, Air Quality Annual Status Report, 2017.





All four sites also monitor PM₁₀ concentrations and recent results are shown in Table 11.

Table 11 Automatic PM₁₀ Monitoring Results

Site ID	Location	NGR (m)		Type	Annual Mean PM ₁₀ Concentration (µg/m ³)		
		X	Y		2014	2015	2016
Reading AURN	AURN	473441	173198	Urban Background	14.00	12.00	13.00
RD1	Caversham Road	471153	174429	Roadside	33.00	28.00	20.00
RD3	Oxford Road	468700	174126	Roadside	20.00	23.00	22.00
RD4	London Road	473703	173409	Roadside	-	-	19.00

As indicated in Table 11 there were no exceedances of the annual mean AQO for PM₁₀ at any location in recent years.

RBC utilise passive diffusion tubes to monitor NO₂ concentrations throughout the city. A review of the most recent monitoring data available indicated that there are four suitable diffusion tubes located in the vicinity of the proposed development. Recent NO₂ monitoring results from this location are shown in Table 12. Exceedances of the AQO are shown in **bold**.

Table 12 Diffusion Tube Monitoring Results

Site Name		Type	NGR (m)		Annual Mean NO ₂ Concentration (µg/m ³)		
			X	Y	2014	2015	2016
DT06	Wycliffe Church	Roadside	473072	173204	-	-	49.00
DT07	162 London Road	Roadside	473490	173326	50.00	48.00	42.00
DT08	419 London Road	Roadside	473729	173432	46.00	43.00	42.00
DT09	276 King's Road	Roadside	472716	173218	37.00	33.00	32.00

As indicated in Table 12, the annual mean AQO for NO₂ was exceeded at three considered diffusion tubes in recent years. Again, this is due to their roadside locations within the Reading AQMA. Reference should be made to Figure 2 within Appendix I for a graphical representation of diffusion tube monitoring locations.





4.3 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: 472500, 173500. Data for this location was downloaded from the DEFRA website⁹ for the purpose of this assessment and is summarised in Table 13 for the verification year (2016) and the predicted development opening year (2020).

Table 13 Background Pollutant Concentrations

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)	
	2016	2020
NO _x	39.23	32.55
NO ₂	25.36	21.84
PM ₁₀	15.32	14.52

As shown in Table 13, background pollutant concentrations do not exceed the relevant AQOs. Comparison with NO₂ monitoring results indicates the impact that vehicle exhaust emissions from the highway network have on pollutant concentrations at roadside locations.

4.4 Sensitive Receptors

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

Receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 14.

Table 14 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
20 - 50	More than 100	0
50 - 100	More than 100	-
100 - 350	More than 100	-

Reference should be made to Figure 3 within Appendix I for a graphical representation of earthworks and construction dust buffer zones.

⁹ <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>.





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 route. These are summarised in Table 15. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. However, it was assumed that construction traffic would access the site along (A329) King's Road.

Table 15 Trackout Dust Sensitive Receptors

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

Reference should be made to Figure 4 within Appendix I for a graphical representation of trackout dust buffer zones.

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

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 16.

Table 16 Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located in a predominantly residential location. There is likely to have been a history of dust generating activities due commuting and regeneration
The likelihood of concurrent dust generating activity on nearby sites	A review of the RBC Planning Portal indicated the following forthcoming large-scale development within 500m of the site • 170512: Change of use of office building from Class B1 (a) (offices) to C3 (dwelling houses) to comprise 78 flats. Prior Notification under Class O, Part 3 of Schedule 2 of the Town and Country Planning (General Permitted Development) Order 2015. Application received March 2017 for Aspen House, 300 King's Road, Reading, RG1 4HP, approximately 10m east of the site As such, there is a risk of concurrent dust generating activities should the above applications gain planning permission and the construction phases overlap





Guidance	Comment
Pre-existing screening between the source and the receptors	There is currently limited vegetation present on the northern and southern boundaries of the site. As such, pre-existing natural protective screening to on-site receptors is limited
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south of the development, as shown in Figure 5 within Appendix I. As such, properties to the north of the site would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no 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 unlikely to 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

Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was considered to be **high**. This was because users would expect to enjoy a reasonable level of amenity, aesthetics or value of their property could be diminished by soiling and people would be expected to be present for extended periods of time e.g. residential properties.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.1.2, is shown in Table 17.

Table 17 Sensitivity of the Surrounding Area

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





5. ASSESSMENT

There is the potential for air quality impacts as a result of the construction of the proposed development in addition to the exposure of future site users to elevated pollution levels. These are assessed in the following Sections.

5.1 Construction Phase Assessment

5.1.1 Step 1

The undertaking of activities such as 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 haul road and highway surfaces.

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

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

5.1.2 Step 2

Earthworks

Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. Information on soil type was not available for the purpose of this assessment. As such, the soil type was considered to be potentially dusty in order to provide a worst-case scenario.

The proposed development site is estimated to cover a total area of less than 2,500m². In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **small**.

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for dust soiling as a result of earthworks activities.

Table 17 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **negligible** risk site for human health impacts as a result of earthwork activities.

Construction

Due to the size of the development the total building volume is likely to be less than 25,000m³. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **small**.





Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for dust soiling as a result of construction activities.

Table 17 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **negligible** risk site for human health impacts as a result of construction activities.

Trackout

Information on the number of HDV trips to be generated during the construction phase of the development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project.

Based on the site area, it is anticipated that the unpaved road length is likely to be less than 50m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **small**.

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for dust soiling as a result of trackout activities.

Table 17 indicates the sensitivity of the area to human health impacts is **medium**. In accordance with the criteria outlined in Table 9, the development is considered to be a **negligible** risk site for human health impacts as a result of trackout activities.

Summary of the Risk of Dust Effects

A summary of the risk from each dust generating activity is provided in Table 18.

Table 18 Summary of Potential Unmitigated Dust Risks

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

As indicated in Table 18, the potential risk of dust soiling is **low** from earthworks, construction and trackout activities. The potential risk of human health impacts is **negligible** for earthworks, construction and trackout activities.

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.





5.1.3 Step 3

The IAQM guidance⁶ provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the development site as summarised in Table 19. The mitigation measures outlined in Table 19 can be reviewed prior to the commencement of construction works incorporated into the existing strategies as applicable.

Table 19 Fugitive Dust 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 • Develop and implement a stakeholder communications plan that includes community engagement • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site Management	• Record all dusty and air quality complaints and make the complaints log available to the LA when asked • Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation • Make complaints log available to LA when asked • Hold regular liaison meetings with other high risk construction sites that are within 500m of the site boundary. Ensuring plans are co-ordinated and dust and particulate matter emission are minimised
Monitoring	• Undertake daily on-site and off-site inspection where receptors are nearby to monitor dust • Carry out regular site inspections to monitor compliance with the DMP • Increase frequency of site inspections when activities with a high potential to produce dust are being carried out
Preparing and Maintaining the Site	• Plan site layout so that machinery and dust causing activities are located away from receptors • Fully enclose site or specific operations where there is a high potential for dust production and the site as active for an extensive period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods • Remove materials that have a potential to produce dust from site as soon as possible • Cover, seed or fence stockpiles to prevent wind whipping Use water as dust suppressant where applicable





Issue	Control Measure
Operating Vehicle/ Machinery and Sustainable Travel	• All vehicles to switch off engines - no idling vehicles • Avoid the use of diesel or petrol powered generators where practicable • Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph in unsurfaced haul roads • Produce a Construction Logistics Plan to manage sustainable deliveries Implement a Travel Plan that supports and encourages sustainable travel
Operations	• Cutting equipment to use water as dust suppressant or suitable local extract ventilation • Ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation • Use enclosed chutes and covered skips • Minimise drop heights • Ensure equipment is readily available on site to clean any spillages
Waste Management	• No bonfires
Earthworks and Construction	• Re-vegetate earthworks and exposed areas • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate • Only remove the cover in small areas during work and not all at once • Avoid scabbling • Ensure sand and other aggregates are stored and not able to dry out, unless it is required for a specific process • Ensure bulk cement and other fine powder materials are delivered and stored to prevent escape
Trackout	• Use water-assisted dust sweeper on the access and local roads • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving sites are covered to prevent escape of materials • Inspect on-site routes for integrity, instigate necessary repairs and record in site log book • Install hard surfaced haul routes which are regularly damped down • Implement a wheel washing system at a suitable location near site exit • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits • Access gates to be located at least 10m from receptors, where possible





5.1.4 Step 4

Assuming the relevant mitigation measures outlined in Table 19 are implemented, the residual effect from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance⁶.

5.2 Operational Phase Assessment

5.2.1 Future Exposure

The proposed development has the potential to expose future users to elevated pollution levels. This was assessed through dispersion modelling, with the results presented in the following Sections. Reference should be made to Appendix II for full assessment input details.

Nitrogen Dioxide

Figure 6 within Appendix I displays the contour plot for the predicted annual mean NO₂ concentrations at 1.5m exposure across the ground floor of the development for the proposed opening year (2020).

Predicted annual mean NO₂ concentrations across the development site are summarised in Table 20.

Table 20 Predicted Annual Mean NO₂ Concentrations at the Development Site

Floor	Predicted 2020 Annual Mean NO ₂ Concentration Range (µg/m ³)
Ground (1.5m)	31.39 – 41.02

As indicated in Table 20, there were predicted exceedances of the AQO at the proposed development site. However, exceedances of the annual mean AQO are only predicted at non-sensitive areas of the proposed site covering sections immediately adjacent to the A329. Annual mean NO₂ concentrations are predicted to be below the relevant AQO at all sensitive locations throughout the development with a maximum of 39.05µg/m³ at the most significantly affected receptor locations. As such, it is considered that annual mean NO₂ levels at the development site should not be viewed as a constraint to development.

It should be noted that NO₂ concentrations above the ground floor were not included within this report as predicted concentrations at ground floor were deemed acceptable. This is because pollutant concentrations are likely to be lower at elevated heights due to increased distance from emission sources, such as the local highway network.

Predictions of 1-hour NO₂ concentrations were also not produced as part of the dispersion modelling assessment. However, as stated in LAQM (TG16)² if annual mean NO₂ concentrations are below 60µg/m³ then it is unlikely that the 1-hour AQO will be exceeded. As such based on the results in Table 20 it is not predicted that concentrations will exceed the 1-hour mean AQO for NO₂ across the development site in the 2020 opening year scenario.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for the proposed end use without the implementation of mitigation techniques to protect future residents from elevated NO₂ concentrations.





Particulate Matter

Figure 7 within Appendix I displays the contour plot for the predicted annual mean PM₁₀ concentrations at 1.5m exposure across the ground floor of the development for the proposed opening year (2020).

Predicted annual mean PM₁₀ concentrations across the development site are summarised in Table 21.

Table 21 Predicted Annual Mean PM₁₀ Concentrations at the Development Site

Floor	Predicted 2020 Annual Mean PM ₁₀ Concentration Range (µg/m ³)
Ground (1.5m)	15.89 – 16.92

Table 21 indicates there were no predicted exceedances of the AQO across the proposed development site. As such, it is considered that annual mean PM₁₀ levels at the development site should not be viewed as a constraint to development.

Similar to NO₂ concentrations, PM₁₀ predictions above ground floor were not included within this report as predicted concentrations at ground floor were deemed acceptable. This is because pollutant concentrations are likely to be lower at elevated heights due to increased distance from emission sources, such as the local highway network.

Based on the dispersion modelling it is considered that PM₁₀ levels at the development should not be viewed as a constraint to development.

5.2.2 Road Traffic Exhaust Emissions

Any additional vehicle movements associated with the proposed development will generate exhaust emissions, such as NO₂ and PM₁₀, on the local and regional road networks.

Based on the information provided by Crosby Transport Planning, the appointed Transport Consultants, the development will generate an average of 34 two-way vehicle movements per day. Therefore, the development will not result in a change of AADT flows of more than 100, produce over 25 HDV movements per day or significantly affect average speeds on the local road network.

Additionally, it is unlikely that the proposed development will generate or increase traffic congestion, give rise to a significant change in AADT or peak traffic flows or increase vehicle speed, significantly alter the traffic composition on local roads or include significant new car parking. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **not significant**, in accordance with the EPUK and IAQM⁷ screening criteria shown in Section 3.2.2.





6. CONCLUSION

REC Ltd was commissioned by Titan Property Development Ltd to undertake an Air Quality Assessment in support of a proposed development at 300 King's Road, Reading.

The proposal comprises the development of 14 residential apartments, with 8 parking spaces, alongside associated infrastructure and landscaping.

The site is located in an AQMA declared by RBC for exceedances of the annual mean AQO NO₂. Subsequently, there is the potential that the proposals could expose future site users to elevated pollution levels. As such, an Air Quality Assessment was required to quantify pollution levels across the site, consider its suitability for the proposed end-use and assess potential impacts as a result of the development.

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

Dispersion modelling was undertaken in order to quantify pollutant concentrations at the site and assess potential exposure of future users. Concentrations of NO₂ and PM₁₀ were predicted across the ground floor and were subsequently verified using local monitoring results obtained from RBC. Exceedances of the annual mean AQO for NO₂ and PM₁₀ were not predicted at any location across the development site.

Potential impacts during the operational phase of the development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. An assessment was therefore undertaken using the EPUK and IAQM⁷ screening criteria to determine the potential for trips generated by the development to affect local air quality. This indicated that impacts are likely to be **not significant** throughout the operational phase.

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





7. ABBREVIATIONS

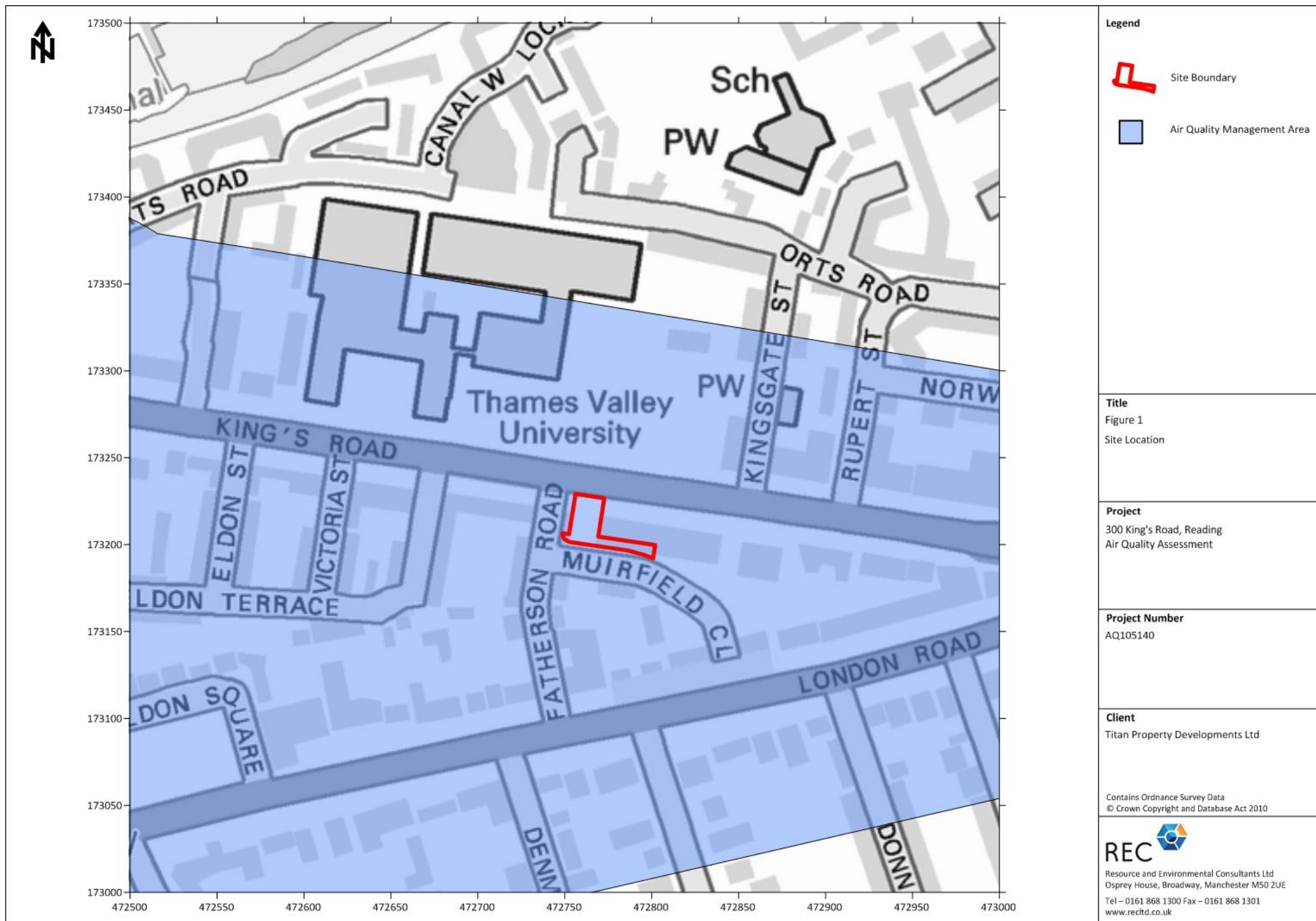
AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQAP	Air Quality Action Plan
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	National Grid Reference
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
RBC	Reading Borough Council
REC	Resource and Environmental Consultants
TEMPRO	Trip End Model Presentation Program
Z ₀	Roughness Length

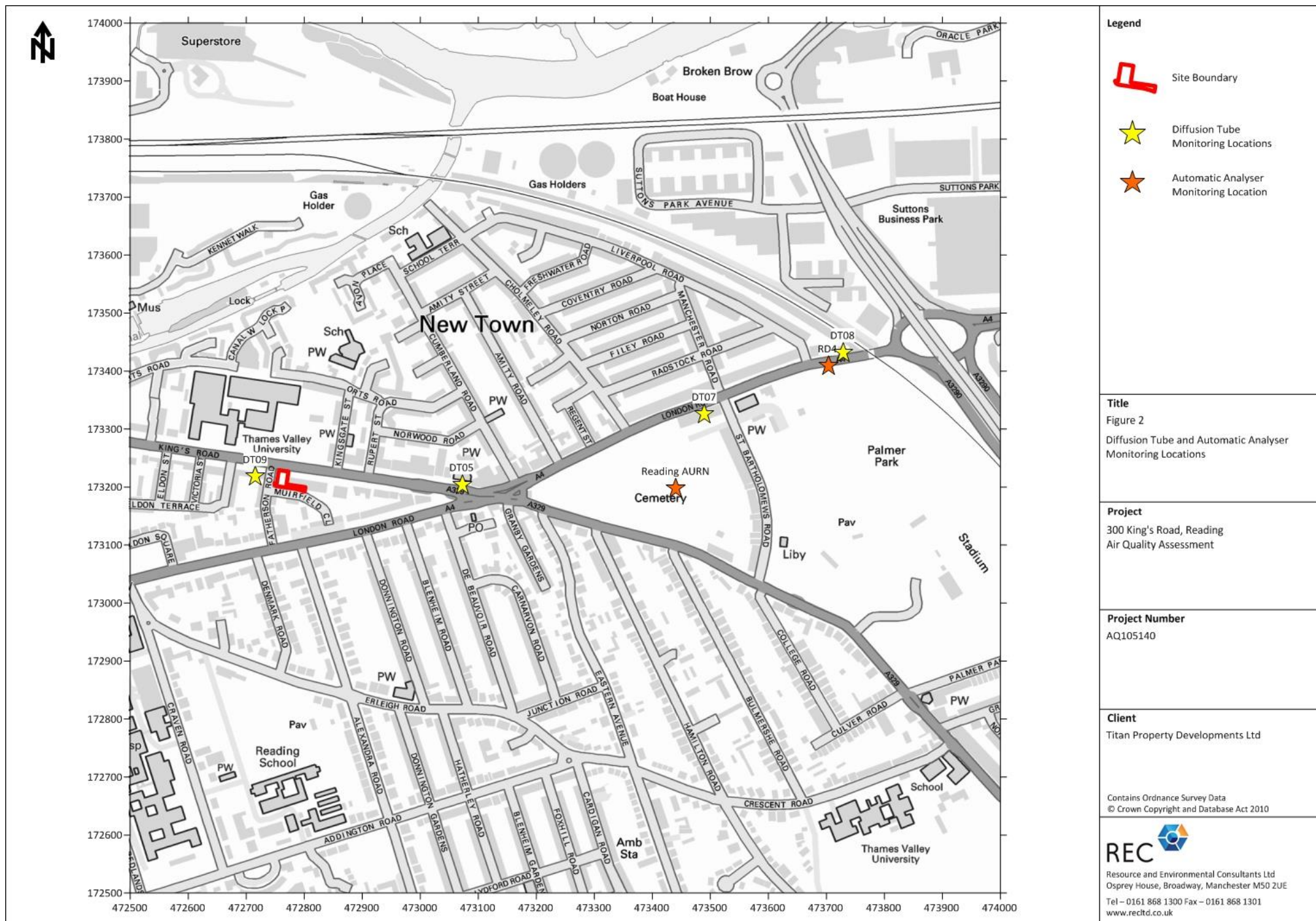


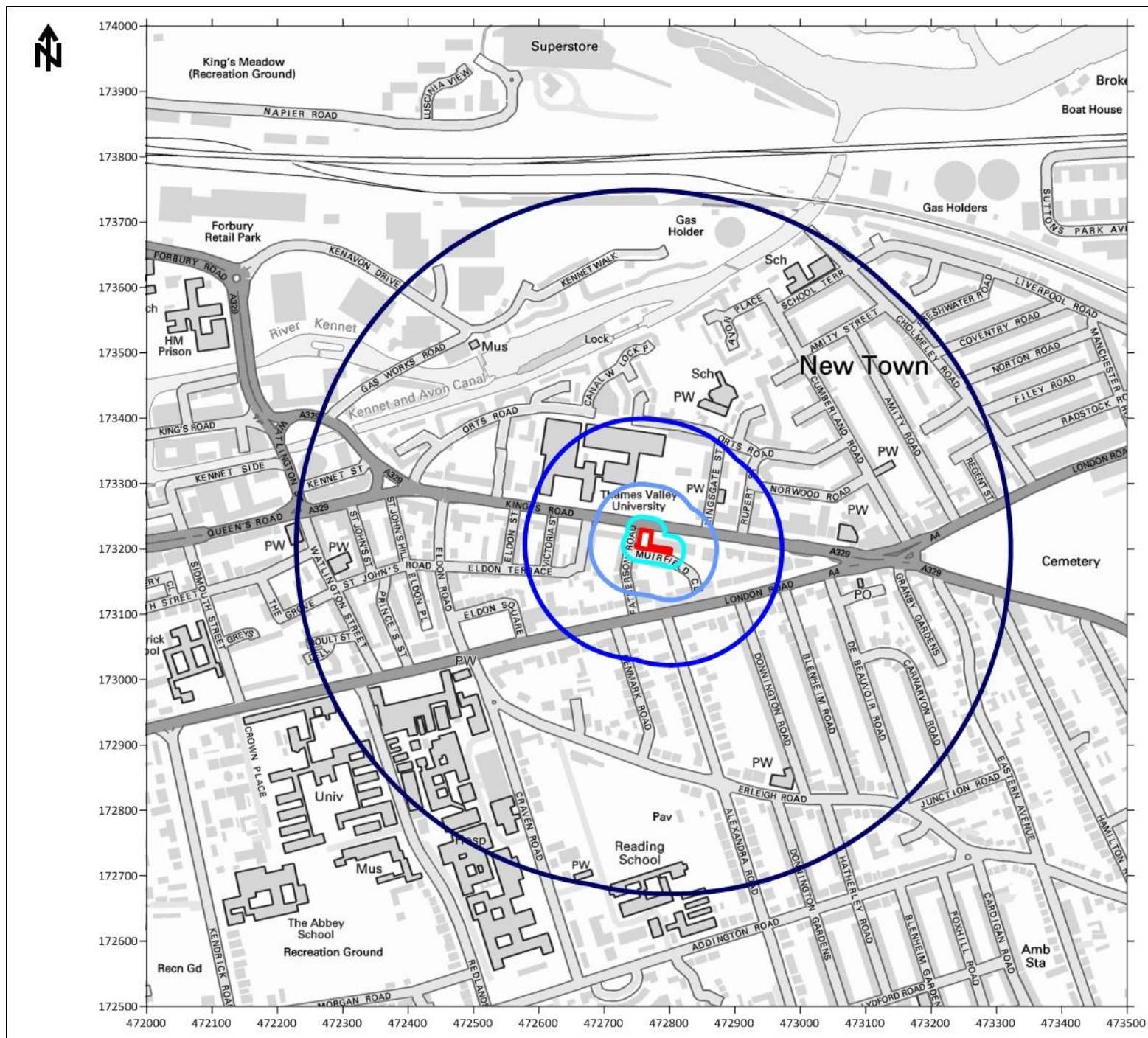


APPENDIX I - FIGURES









Legend

-  Site Boundary
-  20m from Site Boundary
-  50m from Site Boundary
-  100m from Site Boundary
-  350m from Site Boundary

Title

Figure 3
Earthworks and Construction
Dust Buffer Zones

Project

300 King's Road, Reading
Air Quality Assessment

Project Number

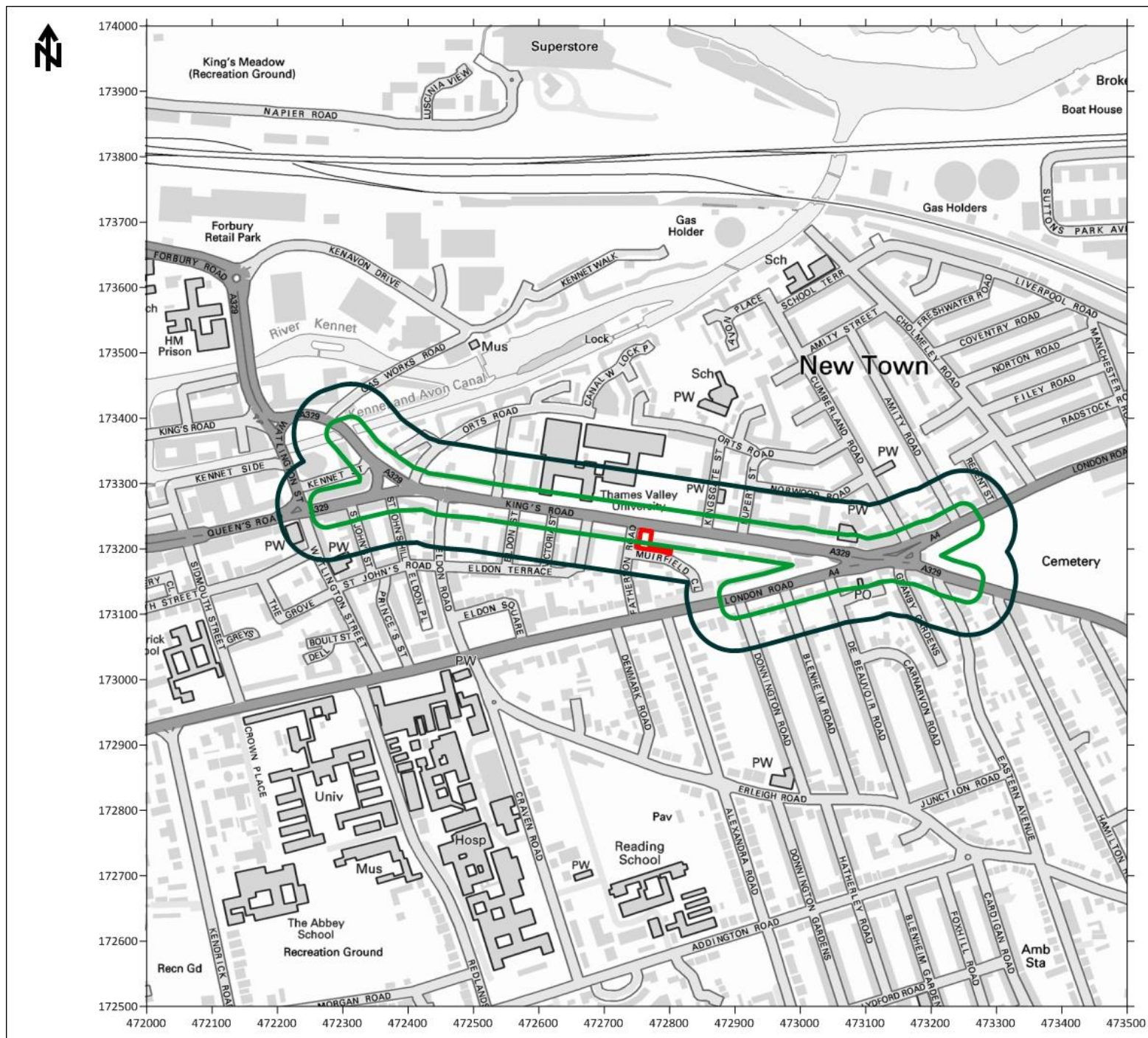
AQ105140

Client

Titan Property Developments Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010

REC 
Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300 Fax – 0161 868 1301
www.rectd.co.uk



Legend

-  Site Boundary
-  20m from Site Access Route
-  50m from Site Access Route

Title

Figure 4
Trackout Dust Buffer Zones

Project

300 King's Road, Reading
Air Quality Assessment

Project Number

AQ105140

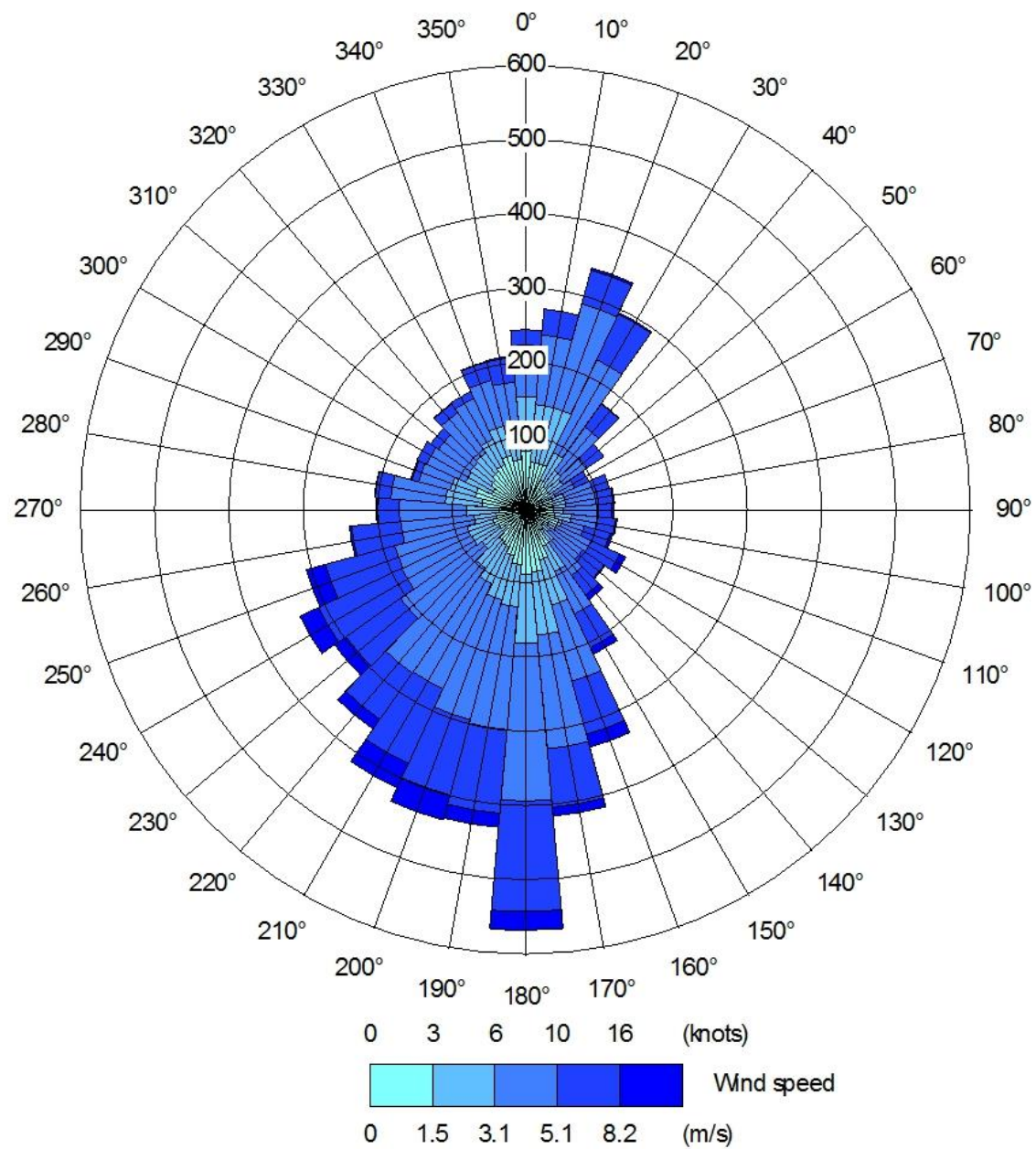
Client

Titan Property Developments Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010



Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300 Fax – 0161 868 1301
www.recd.co.uk



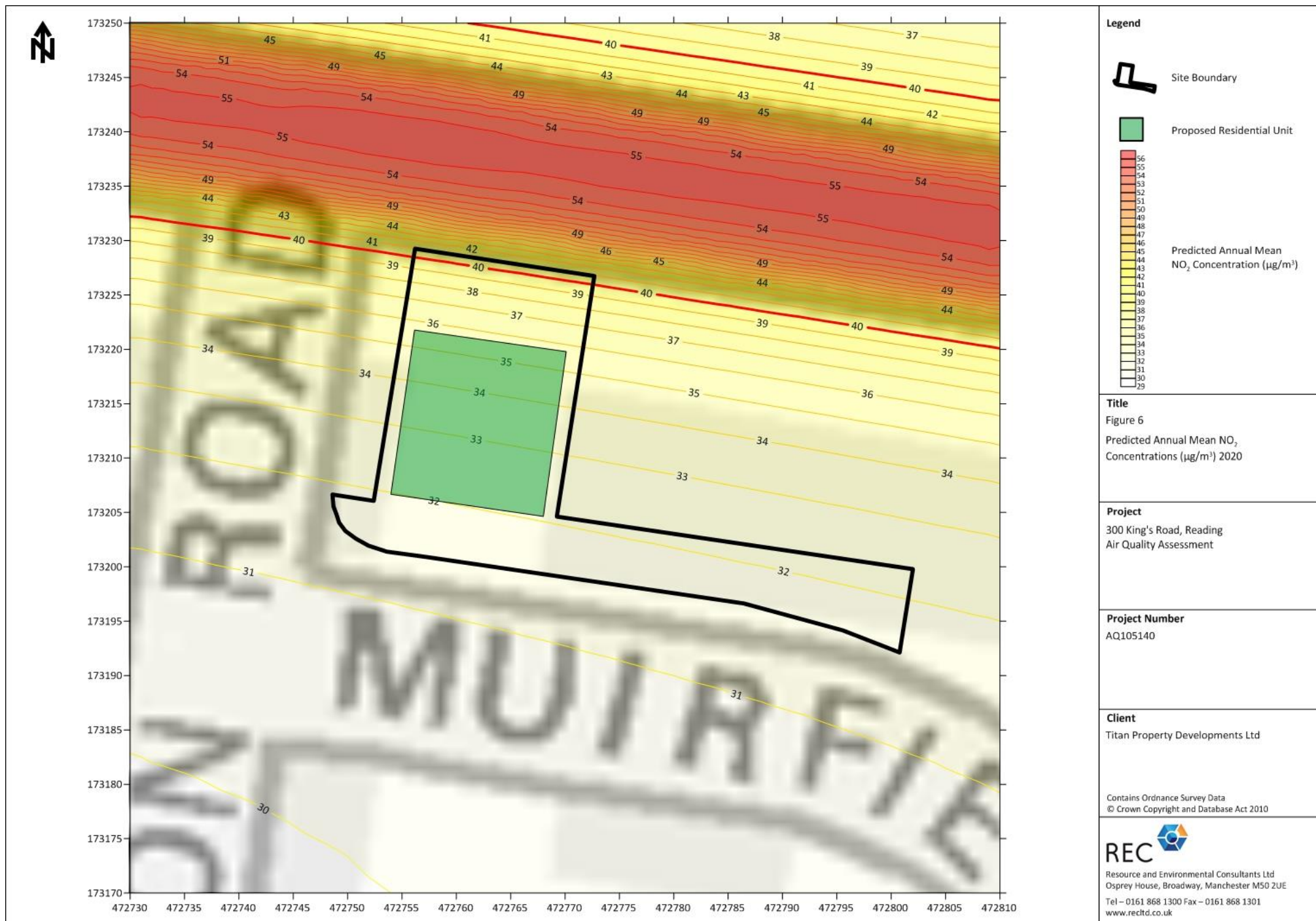
Title
Figure 5
Wind Rose RAF Benson
Meteorological Station 2016

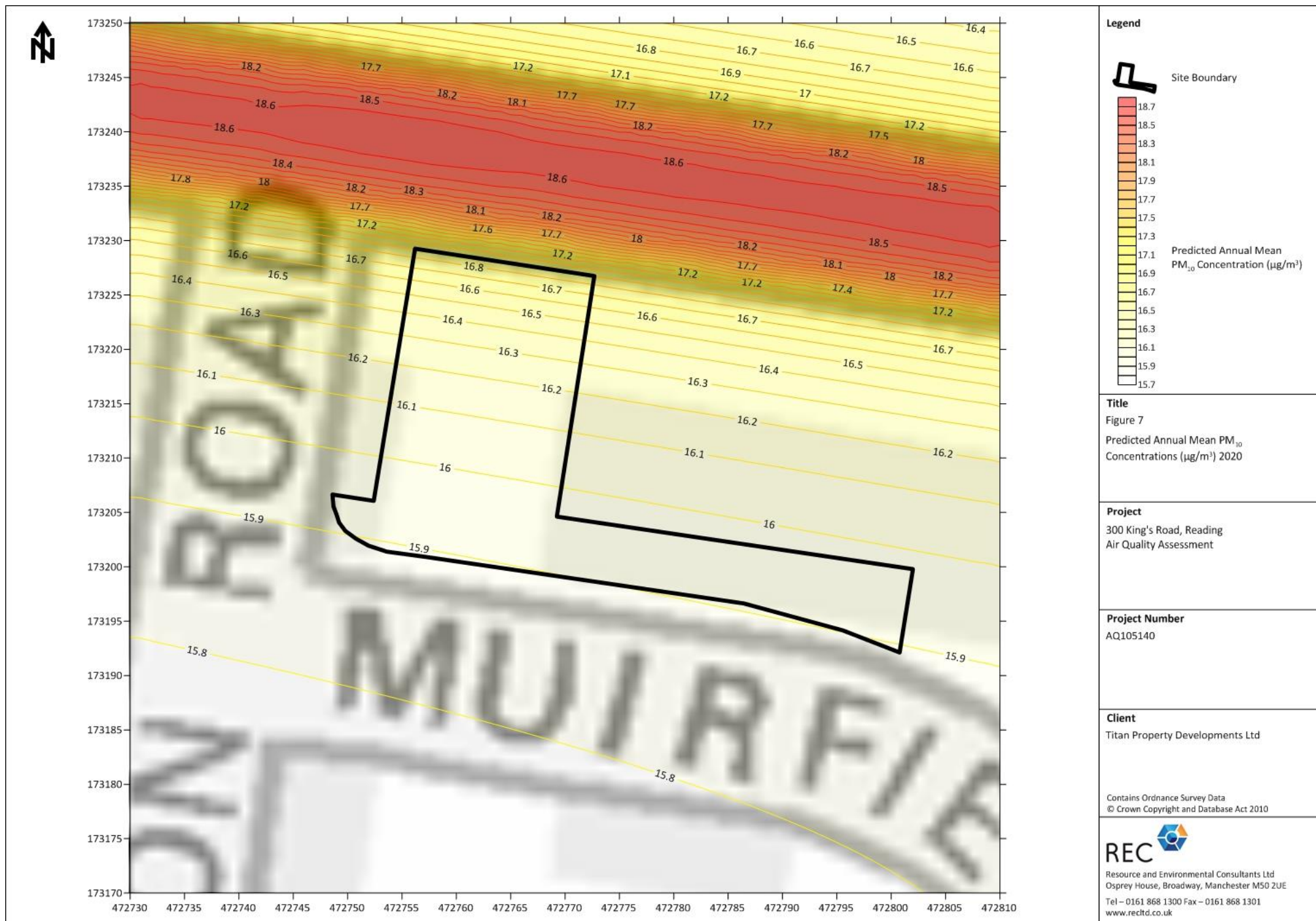
Project
300 King's Road, Reading
Air Quality Assessment

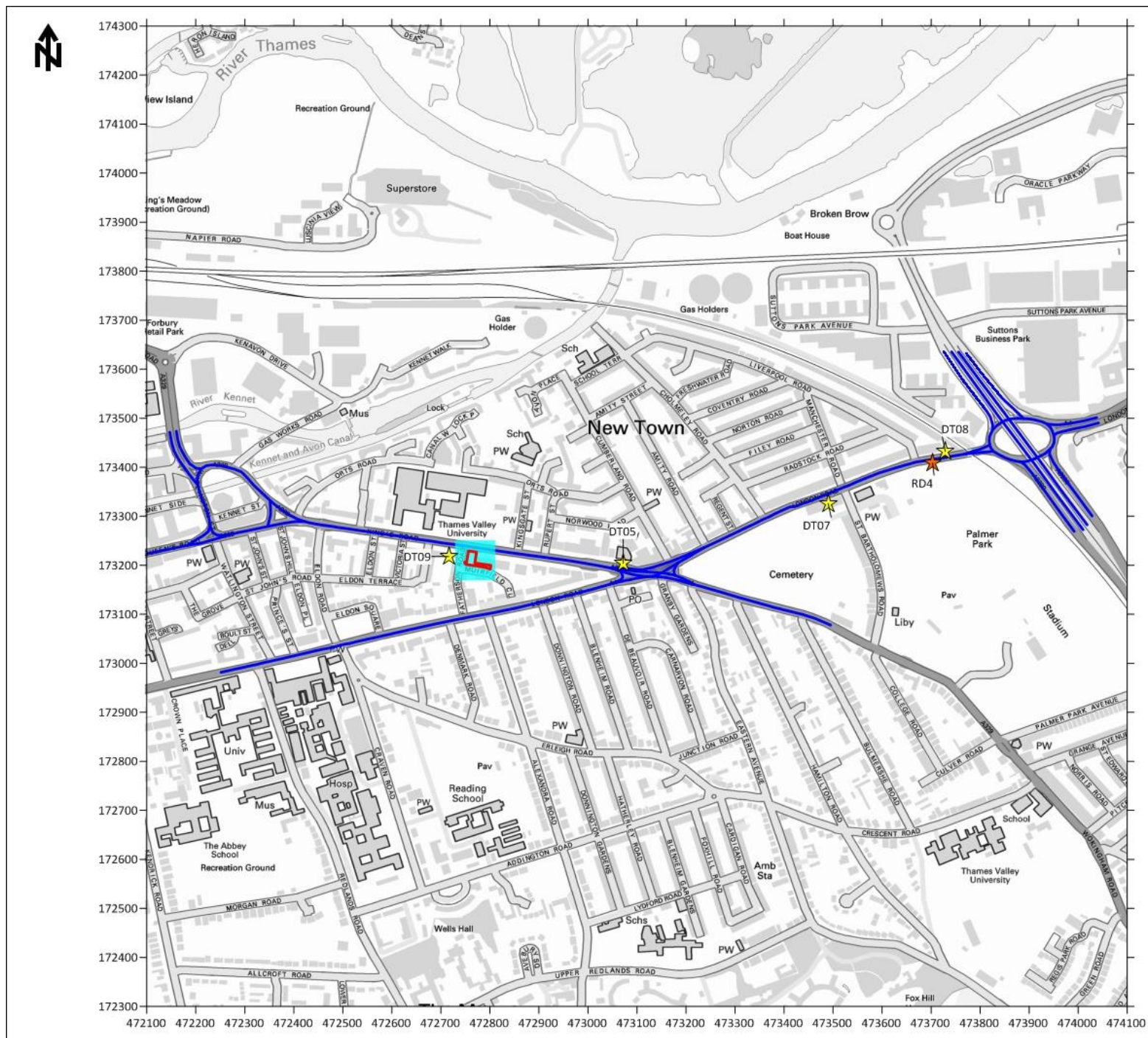
Project Number
AQ105140

Client
Titan Property Developments Ltd

REC
Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300 Fax – 0161 868 1301
www.rectd.co.uk







Legend

-  Site Boundary
-  Modelled Road Link
-  Cartesian Grid
-  Diffusion Tube Monitoring Location
-  Automatic Analyser Location

Title

Figure 8
ADMS-Roads Input

Project

300 King's Road, Reading
Air Quality Assessment

Project Number

AQ105140

Client

Titan Property Developments Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010



Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE
Tel - 0161 868 1300 Fax - 0161 868 1301
www.rectd.co.uk



Air Quality Assessment
300 King's Road, Reading
March 2018
AQ105140r1

APPENDIX II - ASSESSMENT INPUTS





Assessment Inputs

The proposed development has the potential to expose future site users to elevated pollutant levels. In order to assess NO₂ and PM₁₀ concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.0.1.0). 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.

Input Data

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; and
- ▶ Monin-Obukhov length.

Assessment Area

Ambient concentrations were predicted over the proposed development site and surrounding highway network. One Cartesian grid was included in the model over the area NGR: 472730, 173170 to 472810, 173250 at height of 1.5m to represent the ground floor level for 2020 opening year scenario.

Results were subsequently used to produce contour plots within 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 8 within Appendix I for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment, was provided by Crosby Transport Planning, the appointed Transport Consultants for the scheme.





24-hour flows and fleet composition were downloaded from the Department for Transport (DfT) Matrix. The DfT Matrix 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 matrix is referenced in DEFRA guidance LAQM (TG16)² as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

Growth factors provided by the Trip End Model Presentation Program (TEMPO) software package were utilised to allow for conversion from the obtained 2016 traffic flow year to 2020, which was respectively used to represent the development opening year.

Vehicle speeds were estimated based on the free flow potential of each link and local speed limits. Road widths and heights were estimated from aerial photography and UK highway design standards.

A summary of the traffic data used in the verification scenarios is provided in Table All.1.

Table All.1 2016 Traffic Data

Road Link		Road Width (m)	Road Height (m)	Mean Vehicle Speed (km/h)	24-hour AADT Flow	HDV Prop. (%)
L1	King's Road Speed Up at Eldon Road	15.8	0.0	24	20,743	5.5
L2	King's Road	12.4	0.0	40	20,743	5.5
L3	King's Road Slowdown	13.0	0.0	24	20,743	5.5
L4	King's Road onto London Road North of Junction	6.3	0.0	24	10,372	5.5
L5	King's Road onto Wokingham Road	5.8	0.0	24	9,928	1.8
L6	King's Road onto London Road South of Junction	9.7	0.0	24	444	6.5
L7	London Road Slowdown North of Junction	6.8	0.0	24	9,298	4.8
L8	Wokingham Road Slowdown	6.1	0.0	24	5,357	4.4
L9	Bus Lane onto King's Road	3.8	0.0	40	717	100.0
L10	London Road Speed Up South of Junction	5.7	0.0	24	12,331	4.6
L11	London Road onto Wokingham Road	5.2	0.0	24	2,325	4.8
L12	Wokingham Road	8.6	0.0	40	10,714	4.4
L13	London Road North of Junction	8.1	0.0	40	23,245	4.8
L14	London Road Slowdown at Cholmeley Road	8.1	0.0	24	23,245	4.8
L15	London Road	8.4	0.0	40	23,245	4.8
L16	London Road Slowdown at Manchester Road	8.4	0.0	24	23,245	4.8





Road Link		Road Width (m)	Road Height (m)	Mean Vehicle Speed (km/h)	24-hour AADT Flow	HDV Prop. (%)
L17	London Road	8.3	0.0	40	23,245	4.8
L18	London Road South of Junction	8.5	0.0	40	12,774	4.7
L19	London Road Slowdown at Alexandra Road	9.8	0.0	24	12,774	4.7
L20	London Road	8.6	0.0	40	12,774	4.7
L21	London Road Slowdown at Eldon Road	13.5	0.0	24	12,774	4.7
L22	London Road	10.2	0.0	40	12,774	4.7
L23	Watlington Street onto King's Road	11.6	0.0	24	20,743	5.5
L24	King's Road onto Queen's Road Bus Lane	5.4	0.0	24	717	100.0
L25	Watlington Street	9.3	0.0	40	20,943	2.3
L26	Queen's Road Speed Up	3.2	0.0	24	10,029	2.3
L27	Queen's Road Slowdown	10.4	0.0	24	10,029	2.3
L28	Queen's Road	15.9	0.0	40	20,057	2.3
L29	Forbury Road Speed Up	7.9	0.0	24	11,014	2.8
L30	Forbury Road Slowdown	6.5	0.0	24	11,014	2.8
L31	London Road Slowdown at Roundabout	6.2	0.0	24	11,623	4.8
L32	London Road Speed Up at Roundabout	6.4	0.0	24	11,623	4.8
L33	Roundabout	8.1	0.0	24	13,854	2.0
L34	A3290 Southbound Slowdown	7.2	0.0	24	3,032	3.3
L35	A3290 Southbound	7.6	0.0	88	3,032	3.3
L36	Southbound Flyover	7.0	6.0	104	30,322	3.3
L37	A3290 Northbound Slowdown	11.1	0.0	24	3,032	3.3
L38	A3290 Northbound	10.6	0.0	88	3,032	3.3
L39	Northbound Flyover	7.3	6.0	104	30,322	3.3
L40	London Road Eastbound West of Roundabout	7.5	0.0	24	10,022	3.7
L41	London Road Westbound West of Roundabout	8.8	0.0	24	10,022	3.7
L42	Suttons Business Park Southbound	8.8	0.0	88	3,032	3.3
L43	Suttons Business Park Southbound Slowdown at Roundabout	6.9	0.0	24	3,032	3.3





Road Link		Road Width (m)	Road Height (m)	Mean Vehicle Speed (km/h)	24-hour AADT Flow	HDV Prop. (%)
L44	Suttons Business Park Northbound	5.3	0.0	88	3,032	3.3
L45	Suttons Business Park Northbound Speed Up at Roundabout	7.5	0.0	24	3,032	3.3

The road width, height and mean vehicle speed shown in Table AII.1 remained the same for the 2020 scenarios. A summary of the 2020 traffic data is shown in Table AII.2.

Table AII.2 2020 Traffic Data

Road Link		24-hour AADT Flow	HDV Prop. (%)
L1	King's Road Speed Up at Eldon Road	21,759	5.5
L2	King's Road	21,759	5.5
L3	King's Road Slowdown	21,759	5.5
L4	King's Road onto London Road North of Junction	10,880	5.5
L5	King's Road onto Wokingham Road	10,414	1.8
L6	King's Road onto London Road South of Junction	465	6.5
L7	London Road Slowdown North of Junction	9,754	4.8
L8	Wokingham Road Slowdown	5,619	4.4
L9	Bus Lane onto King's Road	752	100.0
L10	London Road Speed Up South of Junction	12,935	4.6
L11	London Road onto Wokingham Road	2,438	4.8
L12	Wokingham Road	11,239	4.4
L13	London Road North of Junction	24,384	4.8
L14	London Road Slowdown at Cholmeley Road	24,384	4.8
L15	London Road	24,384	4.8
L16	London Road Slowdown at Manchester Road	24,384	4.8
L17	London Road	24,384	4.8
L18	London Road South of Junction	13,400	4.7
L19	London Road Slowdown at Alexandra Road	13,400	4.7
L20	London Road	13,400	4.7





Road Link		24-hour AADT Flow	HDV Prop. (%)
L21	London Road Slowdown at Eldon Road	13,400	4.7
L22	London Road	13,400	4.7
L23	Watlington Street onto King's Road	21,759	5.5
L24	King's Road onto Queen's Road Bus Lane	752	100.0
L25	Watlington Street	21,969	2.3
L26	Queen's Road Speed Up	10,520	2.3
L27	Queen's Road Slowdown	10,520	2.3
L28	Queen's Road	21,040	2.3
L29	Forbury Road Speed Up	11,554	2.8
L30	Forbury Road Slowdown	11,554	2.8
L31	London Road Slowdown at Roundabout	12,192	4.8
L32	London Road Speed Up at Roundabout	12,192	4.8
L33	Roundabout	14,533	2.0
L34	A3290 Southbound Slowdown	3,181	3.3
L35	A3290 Southbound	3,181	3.3
L36	Southbound Flyover	31,808	3.3
L37	A3290 Northbound Slowdown	3,181	3.3
L38	A3290 Northbound	3,181	3.3
L39	Northbound Flyover	31,808	3.3
L40	London Road Eastbound West of Roundabout	10,513	3.7
L41	London Road Westbound West of Roundabout	10,513	3.7
L42	Suttons Business Park Southbound	3,181	3.3
L43	Suttons Business Park Southbound Slowdown at Roundabout	3,181	3.3
L44	Suttons Business Park Northbound	3,181	3.3
L45	Suttons Business Park Northbound Speed Up at Roundabout	3,181	3.3





Emission Factors

For the 2016 Verification and 2020 Opening Year scenarios, emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 8.01) released in 2017, which incorporates updated COPERT5v11 vehicle emissions factors for NO_x and vehicle fleet information.

There is current uncertainty over NO₂ concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2016 emission factors have been utilised for the prediction of pollution levels for the 2016 Verification and 2020 Opening Year scenarios in preference to the development opening year in order to provide a robust assessment.

Meteorological Data

Meteorological data used in this assessment was taken from Benson meteorological station over the period 1st January 2016 to 31st December 2016 (inclusive). Benson meteorological station is located at approximate NGR: 462190, 191600, which is approximately 21km north-west of the proposed development.

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, within Appendix I for a wind rose of utilised meteorological data.

Roughness Length

A roughness length (z_0) of 1m was used in this dispersion modelling study. This value of z_0 is considered appropriate for the morphology of the assessment area and is suggested within ADMS-Roads as being suitable for 'cities and woodlands'.

A z_0 of 0.3m was utilised to represent the morphology of the meteorological station location and is suggested 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 in this dispersion modelling study. This value is considered appropriate for the nature of the assessment area and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

A minimum Monin-Obukhov length of 10m was used in this dispersion modelling study. This value is considered appropriate for the nature of the meteorological station location and is suggested within ADMS-Roads as being suitable for 'small towns <50,000'.





Background Concentrations

An annual mean NO₂ concentration of 25.36µg/m³, and a PM₁₀ concentration of 15.32µg/m³ as predicted by DEFRA, was used to represent background levels in the vicinity of the site. In addition, background concentrations for the diffusion tubes were used in the verification process since these were located in different grid squares from the site.

Table All.3 displays the specific background concentrations by DEFRA used for the diffusion tubes in the verification process. This data was used to ensure an accurate and robust model.

Table All.3 Predicted Background Pollutant Concentrations for Diffusion Tubes

Diffusion Tube Grid Square	Diffusion Tubes	Pollutant	Predicted Background Concentration (µg/m ³)
			2016
472500, 173500	DT09	NO _x	39.23
		NO ₂	25.36
		PM ₁₀	15.32
473500, 173500	RD4, DT05,DT07, DT08	NO _x	35.99
		NO ₂	23.68
		PM ₁₀	15.27

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO₂ concentrations using the spreadsheet provided by DEFRA, which is the method detailed within LAQM (TG16)².

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 2016, using traffic data, meteorological data and monitoring results from this year.

RBC undertakes monitoring of NO₂ concentrations at five locations suitable for verification purposes within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO₂ result for use in the verification process. This was undertaken following the methodology contained within IAQM and EPUK guidance LAQM (TG16)².

The dispersion model was run with the traffic input data previously detailed for 2016 to predict the NO_x concentration at the monitoring locations. The results are shown in Table AII.4.

Table AII.4 NO_x Verification Results

RBC ID	Monitoring Location	Modelled Road NO _x Concentration (µg/m ³)	Monitored Road NO _x Concentration (µg/m ³)
RD4	London Road	16.94	20.86
DT05	Wycliffe Church	56.50	27.83
DT07	162 London Road	39.33	17.43
DT08	419 London Road	39.33	16.11
DT09	276 Kings Road	13.52	10.34

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trendline based on the linear progression through zero was calculated, as shown in Graph 1. This indicated that a verification factor of **1.8004** was required to be applied to all NO_x modelling results, showing the model has a slight tendency to underestimate pollutant concentrations.





Graph 1 – Primary Verification Adjustment Factor

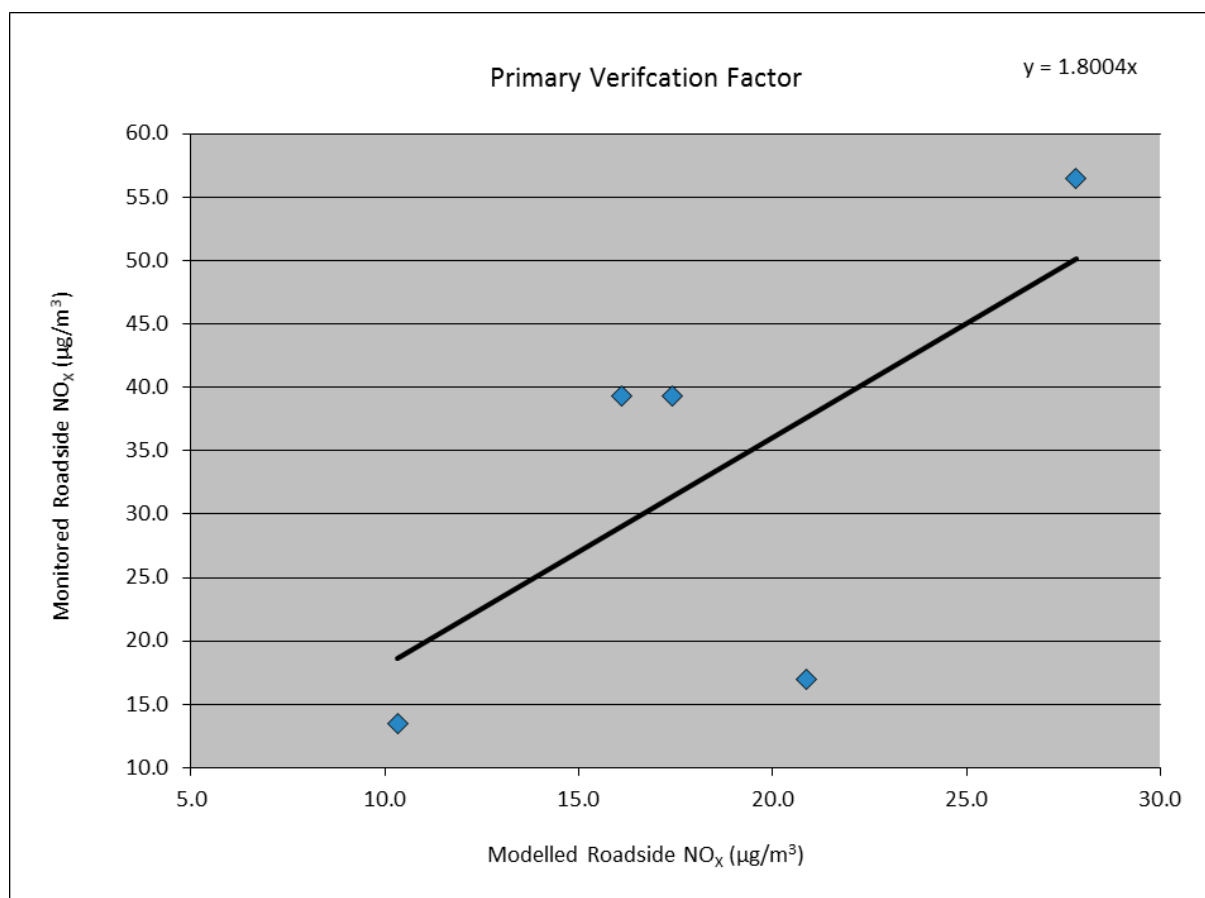


Table AII.5 presents the monitored annual mean NO₂ concentrations and the adjusted modelled total NO₂ concentration based on the above verification factor. Exceedances of the relevant AQO are highlighted in **bold**

Table AII.5 NO₂ Verification Results

RBC ID	Monitoring Location	Monitored NO ₂ Concentration (µg/m ³)	Adjusted Modelled Total NO ₂ Concentration (µg/m ³)	Difference (%)
RD4	London Road	32.00	41.24	-28.88%
DT05	Wycliffe Church	49.00	46.46	5.18%
DT07	162 London Road	42.00	38.57	8.17%
DT08	419 London Road	42.00	37.52	10.67%
DT09	276 Kings Road	32.00	34.39	-7.47%





As PM₁₀ monitoring is not undertaken within the assessment extents, as such the NO₂ adjustment factor of **1.8004** was also utilised to adjust model predictions of this pollutant in accordance with the guidance provided within LAQM (TG16)².

PM10 Verification

RBC undertakes monitoring of annual mean PM₁₀ concentrations at one monitoring location within the assessment extents, it was therefore possible to provide a separate PM₁₀ verification factor. Table AII.6 indicates the monitored and calculated annual mean PM₁₀ concentrations.

Table AII.6 PM₁₀ Monitoring Results

RBC ID	Monitoring Location	Monitored PM ₁₀ Concentration (µg/m ³)	Modelled PM ₁₀ concentration (µg/m ³)	Difference (%)
RD4	London Road	19.00	16.89	1.12

The monitored and modelled roadside concentrations were compared to calculate the associated ratio. This indicated a verification factor of **1.1249** was required to be applied to all PM₁₀ modelling results.





Air Quality Assessment
300 King's Road, Reading
March 2018
AQ105140r1

APPENDIX III - ASSESSOR'S CURRICULUM VITAE





CONAL KEARNEY

Principal Air Quality Consultant

BEng(Hons), MSc, MIAQM, MEnvSc

KEY EXPERIENCE:

Conal is a Principal Consultant with specialist experience in the air quality and odour sector. His key capabilities include:

- ▶ Advanced atmospheric air dispersion modelling of road vehicle and industrial emissions using ADMS-ROADS and AIRVIRO.
- ▶ Preparation of factual and interpretative Air Quality Assessment reports and Air Quality Environmental Statement chapters in the vicinity of proposed schemes and developments in accordance with DEFRA, Environment Agency and Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) methodologies.
- ▶ Management and delivery of project work on key, land development and urban regeneration projects.
- ▶ Assessment of road vehicle exhaust emissions using the Design Manual for Roads and Bridges (DMRB) calculation spreadsheet.
- ▶ Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- ▶ Dust and Odour impact assessments from minerals and waste sites
- ▶ Representing clients at public enquiries and planning hearings.

QUALIFICATIONS:

- ▶ Bachelor of Engineering
- ▶ Master of Science
- ▶ Member of Institute of Air Quality Management
- ▶ Member of the Institute of Environmental Science (IES)

SELECT PROJECTS SUMMARY:

Industrial Developments

Buck Park, Denholme - AQA and dust assessment for proposed mineral extraction and site restoration project.

Messingham Quarry, North Lincolnshire - AQA and dust impacts for proposed new sand extraction site.

Arden Quarry, Derbyshire - AQA for proposed mineral extraction and site restoration

Calder Brick Works, Yorkshire - AQA for proposed site restoration plan

Coopers Moss, St Helens AQA and dust assessment for materials import and site restoration.

Clayton Hall Landfill, Chorley - AQA and odour assessment for proposed landfill extension and mineral extraction.

Highways Developments

Alderley Edge Bypass, Cheshire - AQA for major new road scheme.

South Heywood – EIA for new link road and mixed use joint development

Residential Developments

Beck's Mill, Silsden – AQA and emissions calculation for proposed residential development

Bredbury Curve, Stockport - AQA assessment for proposed residential development in AQMA.

Hollin Lane, Middlewich – AQA for large scale residential development.

Friars School, Southwark, London. School development for mixed use education and residential building in AQMA.

Abbotsford House, Bearsden, Scotland – AQA and dust assessment for residential development

Kelvedon Street, Newport, South Wales – AQA for new housing development

Westcraig, Edinburgh - EIA for residential development

Public Sector

Technical advisor on Manchester Airport Consultative Committee - advise members on environmental technical matters in relation to the airport's operations.

Cheshire County Council - compile AQ chapters for Local Transport Plan

Cheshire East Council - specialist AQ advice on highways, minerals and waste projects

Local Air Quality Management

Broughton Gyratory, Chester - dispersion model for City Centre detailed assessment report

Congleton town centre - dispersion modelling assessment for detailed and further assessment reports.

Disley - dispersion modelling assessment for detailed and further assessments

Holmes Chapel - dispersion modelling assessment for detailed and further assessment reports for road and rail sources.

Crewe - town centre dispersion modelling for detailed and further assessment reports.

Commercial Developments

Granta Park Daycare Centre, Oxfordshire. AQA for new build daycare centre adjacent to major road.

Curzon Cinema, Colchester. Air quality assessment for town centre new build cinema.

Newfoundland Circus, Bristol - AQA for hotel development in city centre

Salesians School, Chertsey - AQA for school extension near M25

