

**Inspace Partnerships
Regeneration & New Homes Ltd**

**Dee Park Regeneration
Scheme, Tilehurst**

Air Quality Assessment

Project Ref: 22852/001

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August 2009

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Dee Park Regeneration Scheme, Tilehurst
Air Quality Assessment

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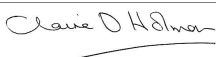
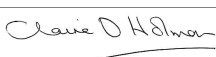
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Dee Park Regeneration Scheme, Tilehurst
Air Quality Assessment

Executive Summary

Peter Brett Associates LLP (PBA) has been commissioned by Inspace Partnerships Regeneration & New Homes Ltd to undertake an air quality assessment of the proposed Dee Park Regeneration Scheme at Tilehurst, Reading.

An assessment was made of the baseline air quality, the potential impact at receptors close to local roads due to emissions from redevelopment traffic and a proposed biomass boiler, and the suitability of the site for residential use. The assessment focused on nitrogen dioxide (NO₂) and particulate matter (PM₁₀) as these are the pollutants of most concern where traffic and biomass burning is the source.

Reading Borough Council (RBC) has declared an Air Quality Management Area (AQMA) for NO₂ that covers a large part of the centre of Reading and all main roads through Reading. Oxford Road is included in the AQMA and is likely to be affected by traffic from the proposed redevelopment. Baseline modelled and monitored data show that exceedence of the annual NO₂ objective is likely close to the Oxford Road/Grovelands Road junction.

There is predicted to be no change in air quality at receptors close to the Oxford Road/Grovelands Road junction due to the proposed redevelopment. Away from the junction, the proposed redevelopment is predicted to increase annual mean NO₂ concentrations by a maximum of 1µg/m³; however the annual objective is achieved by a wide margin. As annual mean concentrations are predicted to be below 60µg/m³, the 1-hour objective will be achieved.

The objectives for PM₁₀ are predicted to be achieved by a wide margin, and there is no impact on PM₁₀ concentrations due to the proposed redevelopment.

The annual objectives for NO₂ and PM₁₀ are achieved across the application site; therefore there are no constraints on residential development at the site with regard to air quality.

This executive summary contains an overview of the key findings and conclusions. However no reliance should be placed on any part of the executive summary until the whole of the report has been read.

Dee Park Regeneration Scheme, Tilehurst
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1 Introduction

1.1 Proposed Development

- 1.1.1 Peter Brett Associates LLP (PBA) has been commissioned by Inspace Partnerships Regeneration & New Homes Limited to undertake an air quality assessment for the proposed Dee Road Regeneration Scheme, Tilehurst in Reading.
- 1.1.2 The redevelopment is bounded by Dee Road and Grovelands Road to the East, Oxford Road to the north and Norcot Avenue to the west and includes the construction of 703 houses and flats, a school, community centre, retail units and a 60 unit sheltered block to incorporate a biomass boiler. The site location is shown on **Figure 1**.

1.2 Scope of Assessment

- 1.2.1 This assessment provides baseline data on air quality in the vicinity of the application site, and establishes the suitability of the site for residential use. It then assesses the potential air quality impact from the operation of the proposed redevelopment due to changes in traffic and the proposed biomass boiler.
- 1.2.2 The main potential impacts on air quality due to the proposed redevelopment are:
- The suitability of the site for residential use
 - The impact of the proposed redevelopment on air quality due to increased traffic and the operation of a biomass boiler
- 1.2.3 The potential impact on local air quality has been assessed in terms of nitrogen dioxide (NO₂) and particulate matter (PM₁₀, i.e. particles less than 10 microns) concentrations, as these are the main pollutants of concern associated with traffic and energy plant.

2 Legislation & Policy

2.1 Local Air Quality Management

- 2.1.1 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM). This requires Local Authorities to regularly and systematically review and assess air quality within their boundaries against a series of objectives, and appraise development and transport plans against these assessments.
- 2.1.2 The Air Quality Strategy (2007) establishes the policy for ambient air quality for the UK. Its primary objective is to ensure that everyone can enjoy a level of ambient air quality in public places that poses no significant risk to health or quality of life, and to protect the environment. The Strategy sets out the national air quality objectives (NAQOs). Those included in LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002.
- 2.1.3 The air quality objectives for the protection of human health apply to outdoor locations where people are regularly present, and where they might reasonably be expected to be exposed over the relevant averaging times (which vary from 15 minutes to a year). The air quality objectives do not apply to occupational, indoor or in vehicle exposure.
- 2.1.4 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.
- 2.1.5 Over 230 local authorities have declared AQMAs. Reading Borough Council (RBC) has declared an AQMA for NO₂ that covers a large part of the centre of Reading and all main roads through Reading, including Oxford Road as shown in **Figure 1**.
- 2.1.6 RBC's Air Quality Action Plan (2009) sets out a number of measures it intends to pursue in order to improve air quality in the borough, including:
- Progress with core infrastructure projects detailed in the Local Transport Plan 2006-2011
 - Use of the planning system to ensure development does not worsen air quality
 - RBC and business fleet emissions reductions
 - Encouraging the use of sustainable modes of transport, including the use of Travel Plans, and promoting awareness of air quality issues
 - Improving air quality monitoring and accessibility to the data

2.2 Air Quality Objectives

- 2.2.1 The NAQOs for NO₂ and PM₁₀, set out in the Air Quality (England) Regulations 2000 are shown in **Table 2.1**.
- 2.2.2 The Air Quality Strategy includes a new exposure reduction target of 25µg/m³ for smaller particles known as PM_{2.5} to be achieved by 2020. PM_{2.5} is a subset of PM₁₀; therefore if concentrations of PM₁₀ are less than 25µg/m³, then the exposure reduction target for PM_{2.5} is achieved. This pollutant has not been included in this assessment because it is not included in LAQM.

Table 2.1: NO₂ and PM₁₀ Objectives included in the Air Quality (England) Regulations 2000

Pollutant	Objective	Date to be achieved by and maintained thereafter
Nitrogen dioxide (NO ₂)	200µg/m ³ measured as a 1 hour mean, not to be exceeded more than 18 times a year	31 December 2005
	40µg/m ³ measured as an annual mean	
Particulate matter (PM ₁₀)	50µg/m ³ measured as a 24 hour mean, not to be exceeded more than 35 times a year	31 December 2004
	40µg/m ³ measured as an annual mean	

2.3 Air Quality Limit Values

- 2.3.1 The Air Quality Standards Regulations 2007 implement the European Union's 1996 Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC) and its 'daughter' directives (1999/30/EC, 2000/69/EC, 2002/3/EC and 2004/107/EC). It includes limit values for NO₂ and PM₁₀. These are essentially the same as the NAQO values but the compliance date for NO₂ is 2010 instead of 2005. The onus is on central not local government for ensuring that the limit values are met. These are mandatory whereas there is no legal obligation to meet the NAQOs. Therefore, the limit values carry more weight than the NAQOs.
- 2.3.2 A new Directive on ambient air quality and cleaner air for Europe (2008/50/EC) came into force in June 2008. This does not change the existing limit values but allows flexibility where compliance is difficult. The deadline for complying with the PM₁₀ limit values can be postponed for three years after the Directive's entry into force (i.e. to June 2011), or by a maximum of five years from the compliance date for NO₂ (i.e. to January 2015), provided action measures are proposed.
- 2.3.3 Given the widespread exceedence of these objectives, the Government has applied to the European Commission for exemption from the obligation to apply the 24-hour mean limit value for PM₁₀ in 8 zones/agglomerations. However, the Reading/Wokingham Urban Area is not one of these areas. It is anticipated that the UK Government will also apply to the European Commission for exemption from the obligation to apply the annual mean limit value for NO₂ in many areas.

2.4 Planning Policy

- 2.4.1 Planning Policy Statement 23: Planning and Pollution Control (PPS23) sets out the Government's current policies on air quality and planning. It advises that any consideration of air quality and potential impacts arising from development, possibly leading to impacts on health, is capable of being a material planning consideration. It requires existing and likely future air quality in an area be considered when a local planning authority considers a planning application, and that AQMA action plans are taken into account.
- 2.4.2 Appendix 1G of Annex 1 of PPS 23 advises that not all planning applications for development within or adjacent to AQMAs should be refused:
- "It is not the case that all planning applications for development within or adjacent to AQMAs should be refused if the developments result in a deterioration of local air quality. Such an approach could sterilise development, particularly where authorities have designated their entire areas as AQMAs."*
- 2.4.3 The South East Plan (2009) contains Policy NRM9: Air Quality:
- "Strategies, plans, programmes and planning proposals should contribute to sustaining the current downward trend in air pollution in the region. This will include seeking improvements in air quality so that there is a significant reduction in the number of days of medium and high*

air pollution by 2026. Local development documents and development control can help to achieve improvements in local air quality through:

- i. ensuring consistency with Air Quality Management Plans*
- ii. reducing the environmental impacts of transport, congestion management, and support the use of cleaner transport fuels*
- iii. mitigating the impact of development and reduce exposure to poor air quality through design, particularly for residential development in areas which already, or are likely to, exceed national air quality objectives*
- iv. encouraging the use of best practice during construction activities to reduce the levels of dust and other pollutants*
- v. assessing the potential impacts of new development and increased traffic levels on internationally designated nature conservation sites, and adopt avoidance and mitigation measures to address these impacts."*

- 2.4.4 RBC's adopted Core Strategy (2008) contains Policy CS34: Pollution and Water Resources which states that:

"Development will only be permitted where it would not be damaging to the environment through air,... 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."

2.5 Air Quality Planning Guidance

- 2.5.1 Guidance for local authority air quality and planning officers on how to consider air quality within the development control process was issued by Environmental Protection UK (formerly the National Society for Clean Air and Environmental Protection (NSCA)) in November 2006. Although this has no statutory standing it is widely used by local authorities.

3 Methodology

3.1 Introduction

- 3.1.1 This air quality assessment provides baseline data on air quality around the area of the proposed redevelopment and investigates the impact that the redevelopment will have during its operational phase. It focuses on those pollutants of most concern locally in the context of the proposed redevelopment, i.e. NO₂ and PM₁₀.
- 3.1.2 The other pollutants in the National Air Quality Strategy have not been included because the Air Quality Review and Assessments (AQR&As) undertaken by RBC show that the NAQOs will be achieved.

3.2 Consultation

- 3.2.1 Sam Bryan, an Air Quality Officer at RBC, was consulted over the approach to this assessment and agreed that the methodology was appropriate¹.

3.3 Baseline Air Quality

- 3.3.1 Current air quality around the site has been assessed by drawing on the following measured and modelled data.
- 3.3.2 RBC's LAQM review and assessments provide information regarding historical air quality in Reading.
- 3.3.3 The continuous monitor located on Oxford Road and the AURN New Town monitor provide roadside and background NO₂ and PM₁₀ data respectively (locations shown on **Figure 1**). Data from the Oxford Road monitor was also used for model verification.
- 3.3.4 RBC operate an extensive diffusion tube monitoring network, and the data from roadside monitors on Oxford Road and Liebenrood Road and background monitors in Prospect Park, Forbury Gardens and Christchurch Meadows is presented (locations shown on **Figure 1**).
- 3.3.5 Modelled data for 1km x 1km grids obtained from the UK Air Quality Archive (www.airquality.co.uk) and referred to in the Government's most recent Technical Guidance (LAQM.TG(09)) have been used to determine the background air quality in the area.
- 3.3.6 Annual mean concentrations of NO₂ and PM₁₀ in 2009 have been modelled at receptors likely to be affected by local air pollution using the ADMS-Roads dispersion model (see **Section 3.4**).

3.4 Operational Impact

Traffic

- 3.4.1 The impact from the change in traffic generated by the proposed redevelopment has been assessed by modelling concentrations of NO₂ and PM₁₀ at the façade of receptors on the local road network. The receptors are described below and are shown in **Figure 2** (the number in brackets is the receptor number on the figure):
- 745 Oxford Road (R1)
 - 773 Oxford Road (R2)
 - 852 Oxford Road (R3)
 - 26 Wigmore Lane (R4)

¹ Email on the 9th July 2009

- 760 Oxford Road (R5)
 - 2-10 Abbotsbury Ct (R6)
 - 744 Oxford Road (R7)
 - 691 Oxford Road (R8)
 - 687 Oxford Road (R9)
 - 720 Oxford Road (R10)
 - 2 Grovelands Road (R11)
 - 1 Grovelands Road (R12)
 - 138 Grovelands Road (R13)
 - 2 Water Road (R14)
 - Trevor House (R15)
 - 28 Tweed Ct (R16)
 - 148 Dee Road (R17)
 - 18 Gairn Close (R18)
 - 100 Dee Road (R19)
 - 295 Norcott Road (R20)
 - 39/40 Mowbray Drive (R21)
 - 403 Norcott Road (R22)
- 3.4.2 The receptors were chosen, in general, to represent those locations most likely to be affected by emissions due to the proposed redevelopment.
- 3.4.3 Most receptors were modelled at a height of 1.5m; however where the ground level receptor façade is a shop (R1, R2, R3 and R8), a height of 4.5m was modelled to represent first floor residential use.
- 3.4.4 Concentrations were estimated for the following years and scenarios:
- 2009 - Baseline conditions
 - 2013 - Assumed opening year, without and with redevelopment
- 3.4.5 A contour plot of annual mean NO₂ and PM₁₀ concentrations was produced for the 2013 with redevelopment scenario across the application site to assess the suitability of the site for residential use.
- 3.4.6 The ADMS-Roads dispersion model (version 2.3) was used to estimate concentrations of nitrogen oxides (NO_x) and PM₁₀. This model has been widely used in the UK for this type of assessment.
- 3.4.7 Hourly sequential meteorological data for three years (2006, 2007 and 2008) from Heathrow Airport were used to estimate ambient concentrations, and the results averaged to provide 'typical' concentrations for each assessment year. This is the most appropriate meteorological station where the necessary parameters are recorded.
- 3.4.8 Annual average daily traffic (AADT) and the percentage of heavy-duty vehicles (HDVs), defined as vehicles over 3.5 tonnes on roads close to the proposed redevelopment were provided by Pinnacle Transportation. Traffic was assumed to travel at the speed limit on each road link.
- 3.4.9 The traffic data used in the model are shown in [Table 3.1](#).

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Table 3.1: Traffic data

Link	AADT			%HDV		Speed (km/h)
	2009	2013		Without	With	
		Without	With			
Dee Road	11217	12036	12544	2	2	48
Tay Road	1730	1851	2359	6	5	48
Spey Road	2202	2361	3160	6	5	48
Grovelands Road	8010	8595	8789	1	1	48
Water Road	10515	11283	11598	2	2	48
Oxford Road	29417	31564	31673	3	3	48
Norcot Road	10794	11582	11812	1	1	48
Links Drive	1198	1288	1699	4	3	48
Wigmore Lane	17694	18986	19107	3	3	48

- 3.4.10 Motor vehicle emissions were estimated using the Emissions Factor Toolkit (EFT) v2e issued on behalf of Defra (2003). It was assumed that all emissions from existing traffic were from hot engines, and that emissions from 50% of the redevelopment traffic was from cold engines i.e. 50% of the redevelopment traffic will be leaving the site and have a cold engine.
- 3.4.11 The modelled results were verified against 2008 data from RBC's continuous monitor located on Oxford Road using the methodology recommended in the Government's Technical Guidance LAQM.TG(09). Details of the model verification calculations are shown in **Table 3.2**. The verification factors used for NO_x and PM₁₀ were 3.7 and 15.3 respectively.

Table 3.2: Model verification calculations

Pollutant	Background Concentration	Monitored Concentration (total)	Monitored Concentration (road)	Modelled Concentration (road)	Adjustment factor
NO _x	25.0	82.6	57.6	15.4	3.7
PM ₁₀	18.5	26.5	8.1	0.5	15.3

- 3.4.12 Predicted NO_x concentrations were converted to NO₂ using the NO_x to NO₂ conversion spreadsheet (v1.1) available from the UK Air Quality Archive.
- 3.4.13 ADMS-Roads estimates the concentration arising from emissions on the local roads. It is necessary to add an estimate of the background concentration to obtain the total concentration for comparison against the air quality objectives.
- 3.4.14 Data from the pollutant concentration maps available from the UK Air Quality Archive were used to determine the background concentrations. The primary A-road contributions for within each grid were removed from the background concentrations as emissions from this source were explicitly modelled. As only a small number of the minor roads in each grid were modelled, the minor road contributions were not removed. The background concentrations are shown in **Table 3.3**.

Table 3.3: Background pollutant concentrations from the UK Air Quality Archive (µg/m³)

Grid	2009						2013					
	NO _x		NO ₂		PM ₁₀		NO _x		NO ₂		PM ₁₀	
	Un.	Ad.	Un.	Ad.	Un.	Ad.	Un.	Ad.	Un.	Ad.	Un.	Ad.
468500,174500	24.7	23.9	18.9	18.4	18.4	18.3	21.7	21.1	17.0	16.5	17.9	17.8
468500,173500	25.4	25.3	19.3	19.3	18.2	18.2	22.1	22.0	17.2	17.2	17.8	17.8
469500,173500	29.5	28.7	21.8	21.3	18.9	18.8	25.8	25.2	19.6	19.2	18.3	18.3

Notes: (a) Un. = unadjusted concentration, Ad. = adjusted concentration (i.e. primary A-road contribution removed)

Biomass Boiler

- 3.4.15 Concentrations of NO₂ and PM₁₀ due to emissions from the proposed biomass boiler were predicted at the same receptors as used for the traffic impacts using the ADMS 4 dispersion model (version 4.1). The contribution from the biomass boiler was also added to the contour plots.
- 3.4.16 The proposed biomass boiler is a Binder model RRK 130-250 and is exempt from the provisions of Section 20 of the Clean Air Act 1993 (prohibition of smoke emissions in smoke control area)².
- 3.4.17 The parameters used in the model were obtained from test data available from Binder³, and information provided by Inspace Partnerships Regeneration & New Homes Ltd. The parameters are shown in **Table 3.4**.

Table 3.4: Parameters input to the ADMS 4 model

Parameter	Binder RRK 130-250
Power output	250kW
Exhaust exit temperature (°C)	170
Exhaust gas velocity (m/s)	6.3
Stack height (m)	14
Stack diameter (m)	0.25
NO _x emission rate (g/s)	0.0178
PM ₁₀ emission rate (g/s)	0.0039
Operational hours (h/day)	24

- 3.4.18 The biomass boiler was assumed to operate 365 days/year. In reality the biomass boiler is likely to operate for longer hours in the winter and shorter hours in the summer, however specific information is not available.
- 3.4.19 The location of the exhaust stack is shown in **Figure 2**.
- 3.4.20 The building where the biomass boiler is located will affect the dispersion of emissions from the stacks. Wind blowing around buildings distorts the air flow and creates zones of turbulence. Increased turbulence causes greater plume mixing. The rise and trajectory of the plume may be depressed by the flow distortion, leading to higher ground level concentrations closer to the stack than those obtained if the building was not there. The ADMS model incorporates algorithms to account for these building downwash effects. Building 6A in **Figure 2** was included in the model, and the modelled building dimensions are shown in **Table 3.5**. Due to model limitations, the building was assumed to be rectangular.

Table 3.5: Building dimensions included in the model

Building (shown on Figure 2)	Length (m)	Width (m)	Height (m)	Angle from north (°)
Building 6A	49	46	12	37

- 3.4.21 As a conservative assumption, all particles emitted were assumed to be PM₁₀ and all NO_x emissions were assumed to be NO₂.

² Statutory Instrument 2009/449

³ Test Report A-1211-1/18c-06, NUA-Umweltanalytik GmbH (Department of Air Pollution Control), 2006

3.5 Assessment Criteria

- 3.5.1 In this assessment the predicted concentrations of NO₂ and PM₁₀ have been assessed against the NAQOs (see [Table 2.1](#)) and the EU limit values (see [Section 2.3](#)).
- 3.5.2 The annual mean concentrations predicted for NO₂ were used to screen whether the short-term objective would be breached. Long term monitoring at sites where road transport is the predominant emission source shows that it is unlikely that the short-term objective will be exceeded if the annual mean concentration is below 60µg/m³.
- 3.5.3 The 24-hour objective for PM₁₀ is more stringent than the annual objective; therefore an assessment has been made against both PM₁₀ objectives set in the Regulations.
- 3.5.4 Given the inherent uncertainties in air quality modelling it has been assumed that there may be an exceedence of the NAQO value if the predicted annual mean concentration is greater than 90% of it.

4 Baseline Air Quality

4.1 Dust

- 4.1.1 Dust deposition is not typically monitored on a routine basis and there is no data available for the application site.

4.2 Nitrogen Dioxide (NO₂)

- 4.2.1 RBC's LAQM review and assessment reports support the declaration of the AQMA for exceedence of the annual mean NO₂ objective, and confirm that no further exceedence of the annual NO₂ objective is expected outside the AQMA.
- 4.2.2 Annual mean background NO₂ concentrations at the AURN New Town urban background monitor ranged from 21µg/m³ to 25µg/m³ between 2004 and 2008. NO₂ concentrations at this monitor have shown an overall decreasing trend of 0.6µg/m³/year between 2004 and 2008.
- 4.2.3 The annual mean NO₂ concentration at the Oxford Road roadside continuous monitor was 35µg/m³ in 2008, and the annual objective was achieved.
- 4.2.4 **Table 4.1** shows the results of the diffusion tube monitoring on Oxford Road, Liebenrood Road and at background locations in Reading.

Table 4.1: Annual mean NO₂ concentrations measured using diffusion tubes

Diffusion tube (number shows location on Figure 1)	Reading Council's site reference	Site type ^(a)	Annual mean NO ₂ concentrations (µg/m ³)		
			2006	2007	2008
744 Oxford Road (D1)	RD059	r	-	57	57
689 Oxford Road (D2)	RD034	r	43	47	50
252 Oxford Road (D3)	RD063	r	-	41	45
165 Oxford Road (D4)	RD035	r	48	52	60
62 Liebenrood Road (D5)	RD057	r	-	27	28
Prospect Park (D6)	RD058	b	-	20	21
Forbury Gardens (D7)	RD061	b	-	34	33
Christchurch Meadows (D8)	RD062	b	-	26	-

Note:

(a) r = roadside (between 1m from the kerb and the back of the pavement of a busy road), b = background (distanced from sources and broadly representative of background conditions)

- 4.2.5 Annual mean concentrations of NO₂ along Oxford Road are high and have exceeded the annual objective value of 40µg/m³ at all the monitored locations. Concentrations along Liebenrood Road are lower and the annual objective has been achieved.
- 4.2.6 Background concentrations ranged from 20µg/m³ to 34µg/m³ between 2006 and 2008.
- 4.2.7 The background NO₂ concentration predicted across most of the application site from the UK Air Quality Archive (grid 468500,173500) is 19µg/m³ in 2009. This is slightly less than the range of background concentrations measured at the Prospect Park (approximately 1km south-east of the application site) in 2007-2008.
- 4.2.8 **Table 4.2** shows the predicted annual mean NO₂ concentrations in 2009.

Table 4.2: Modelled NO₂ concentrations in 2009

Receptor (number on Figure 2)	Predicted annual mean NO ₂ concentrations (µg/m ³)
745 Oxford Road (4.5m) (R1)	26
773 Oxford Road (4.5m) (R2)	29
852 Oxford Road (4.5m) (R3)	31
26 Wigmore Lane (R4)	29
760 Oxford Road (R5)	43
2-10 Abbotsbury Ct (R6)	43
744 Oxford Road (R7)	45
691 Oxford Road (4.5m) (R8)	32
687 Oxford Road (R9)	42
720 Oxford Road (R10)	43
2 Grovelands Road (R11)	30
1 Grovelands Road (R12)	30
138 Grovelands Road (R13)	23
2 Water Road (R14)	27
Trevor House (R15)	23
28 Tweed Ct (R16)	26
148 Dee Road (R17)	27
18 Gairn Close (R18)	27
100 Dee Road (R19)	26
295 Norcott Road (R20)	24
39/40 Mowbray Drive (R21)	27
403 Norcott Road (R22)	25

- 4.2.9 Annual mean NO₂ concentrations are predicted to exceed the annual NO₂ objective at receptors close to the Oxford Road/Grovelands Road junction, where modelled concentrations range from 32µg/m³ to 45µg/m³ (R5-R10). Away from this junction the annual NO₂ objective is predicted to be achieved.
- 4.2.10 The modelled receptors are set back from the road at building façades where there is relevant exposure. Therefore modelled concentrations around the Oxford Road/Grovelands Road junction are lower than those measured using diffusion tubes, which are likely to be located on street furniture close to the kerb.
- 4.2.11 As annual mean concentrations are below 60µg/m³, the 1-hour objective is likely to be achieved.

4.3 Particulate Matter (PM₁₀)

- 4.3.1 RBC's most recent LAQM review and assessments do not identify any areas where the PM₁₀ objectives are exceeded.
- 4.3.2 Annual mean background PM₁₀ concentrations at the AURN New Town monitor ranged from 19µg/m³ to 24µg/m³ between 2004 and 2007 (data capture was only 10% in 2008). Background PM₁₀ concentrations at this monitor have shown an overall increasing trend of 1.7µg/m³/year between 2004 and 2007.
- 4.3.3 24-hour average PM₁₀ concentrations were greater than 50µg/m³ on a maximum of 19 days in 2007; therefore the 24-hour PM₁₀ objective has been achieved.
- 4.3.4 The annual mean PM₁₀ concentration at the Oxford Road continuous monitor was 27µg/m³ in 2008, and the annual objective was achieved. 24-hour average PM₁₀ concentrations were greater than 50µg/m³ on a maximum of 19 days in 2008; therefore the 24-hour PM₁₀ objective was also achieved.

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4.3.5 The background PM₁₀ concentration predicted across most of the application site from the UK Air Quality Archive (grid 468500,173500) is 18µg/m³ in 2009.

4.3.6 **Table 4.3** shows the predicted annual mean PM₁₀ concentrations and the number of days when the 24-hour concentration is likely to exceed 50µg/m³ in 2009.

Table 4.3: Modelled PM₁₀ concentrations in 2009

Receptor (number on Figure 2)	Predicted annual mean PM ₁₀ concentrations (µg/m ³)	Predicted number of days when PM ₁₀ >50µg/m ³
745 Oxford Road (4.5m) (R1)	21	4
773 Oxford Road (4.5m) (R2)	22	6
852 Oxford Road (4.5m) (R3)	22	7
26 Wigmore Lane (R4)	22	6
760 Oxford Road (R5)	27	18
2-10 Abbotsbury Ct (R6)	27	18
744 Oxford Road (R7)	28	21
691 Oxford Road (4.5m) (R8)	22	7
687 Oxford Road (R9)	27	17
720 Oxford Road (R10)	27	17
2 Grovelands Road (R11)	22	6
1 Grovelands Road (R12)	22	6
138 Grovelands Road (R13)	19	3
2 Water Road (R14)	21	4
Trevor House (R15)	19	3
28 Tweed Ct (R16)	21	4
148 Dee Road (R17)	21	5
18 Gairn Close (R18)	21	4
100 Dee Road (R19)	20	4
295 Norcott Road (R20)	20	3
39/40 Mowbray Drive (R21)	21	5
403 Norcott Road (R22)	20	4

4.3.7 Both the annual and 24-hour PM₁₀ objectives are predicted to be achieved at all modelled receptors in 2009.

5 Operational Impact

- 5.1.1 **Table 5.1** shows the predicted annual mean NO₂ concentrations without and with the proposed redevelopment in 2013.

Table 5.1: Modelled NO₂ concentrations in 2013 without and with redevelopment

Receptor (number on Figure 2)	Predicted annual mean NO ₂ concentrations (µg/m ³)	
	Without	With
745 Oxford Road (4.5m) (R1)	23	24
773 Oxford Road (4.5m) (R2)	26	26
852 Oxford Road (4.5m) (R3)	28	28
26 Wigmore Lane (R4)	26	26
760 Oxford Road (R5)	39	39
2-10 Abbotsbury Ct (R6)	39	39
744 Oxford Road (R7)	41	41
691 Oxford Road (4.5m) (R8)	29	29
687 Oxford Road (R9)	38	38
720 Oxford Road (R10)	39	39
2 Grovelands Road (R11)	27	27
1 Grovelands Road (R12)	27	27
138 Grovelands Road (R13)	21	21
2 Water Road (R14)	24	24
Trevor House (R15)	21	21
28 Tweed Ct (R16)	24	24
148 Dee Road (R17)	24	25
18 Gairn Close (R18)	24	24
100 Dee Road (R19)	23	23
295 Norcott Road (R20)	22	22
39/40 Mowbray Drive (R21)	25	25
403 Norcott Road (R22)	22	22

- 5.1.2 Air quality is predicted to improve at the existing receptors from 2009 to 2013 as a result of the implementation of pollution control measures, such as the introduction of cleaner vehicles.
- 5.1.3 There remains a risk that the annual mean NO₂ objective/EU limit value will be exceeded close to the Oxford Road/Grovelands Road junction, and the annual objective is exceeded at 744 Oxford Road (R7). However, no increase in annual mean NO₂ concentrations is predicted at the junction as a result of the proposed redevelopment.
- 5.1.4 Away from the junction there is a maximum increase in annual mean NO₂ concentrations of 1µg/m³ due to the proposed redevelopment; however the annual objective is achieved by a wide margin.
- 5.1.5 **Figure 3** shows that the annual NO₂ objective will be achieved across the application site with the proposed redevelopment in 2013.
- 5.1.6 As annual mean NO₂ concentrations are predicted to remain below 60µg/m³, the 24-hour objective/EU limit value will be achieved.
- 5.1.7 **Table 5.2** shows the predicted annual mean PM₁₀ concentrations and the number of days when PM₁₀ is predicted to be greater than 50µg/m³ without and with the proposed redevelopment in 2013.

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Table 5.2: Modelled PM₁₀ concentrations in 2013 without and with redevelopment

Receptor (number on Figure 2)	Predicted annual mean PM ₁₀ concentrations (µg/m ³)		Predicted number of days when PM ₁₀ >50µg/m ³	
	Without	With	Without	With
745 Oxford Road (4.5m) (R1)	20	20	3	3
773 Oxford Road (4.5m) (R2)	21	21	4	4
852 Oxford Road (4.5m) (R3)	21	21	5	5
26 Wigmore Lane (R4)	21	21	5	5
760 Oxford Road (R5)	25	25	13	13
2-10 Abbotsbury Ct (R6)	25	25	13	13
744 Oxford Road (R7)	26	26	15	15
691 Oxford Road (4.5m) (R8)	21	21	5	5
687 Oxford Road (R9)	25	25	12	12
720 Oxford Road (R10)	25	25	12	12
2 Grovelands Road (R11)	21	21	4	4
1 Grovelands Road (R12)	21	21	4	4
138 Grovelands Road (R13)	19	19	2	2
2 Water Road (R14)	20	20	3	3
Trevor House (R15)	19	19	2	2
28 Tweed Ct (R16)	20	20	3	3
148 Dee Road (R17)	20	20	3	4
18 Gairn Close (R18)	20	20	3	3
100 Dee Road (R19)	20	20	3	3
295 Norcott Road (R20)	19	19	2	3
39/40 Mowbray Drive (R21)	20	20	4	4
403 Norcott Road (R22)	20	20	3	3

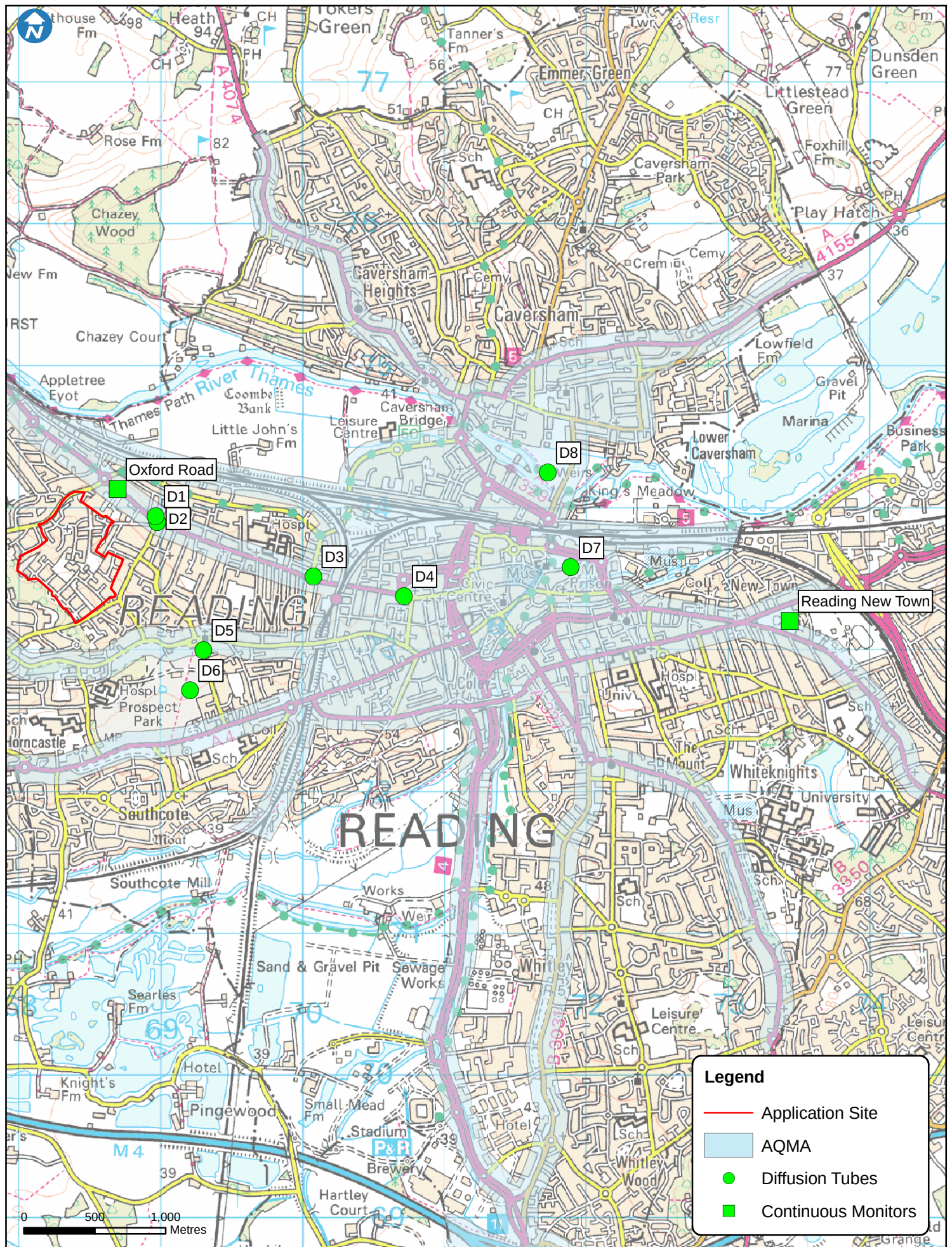
- 5.1.8 The PM₁₀ objectives/EU limit values are achieved by a wide margin. There is no increase in PM₁₀ concentrations at the existing receptors as a result of the operation of the proposed redevelopment.
- 5.1.9 **Figure 4** shows that the annual PM₁₀ objective will be achieved across the application site with the proposed redevelopment in 2013.
- 5.1.10 As the annual objectives for NO₂ and PM₁₀ are predicted to be achieved across the application site by a wide margin, there are no constraints to residential development at the site.

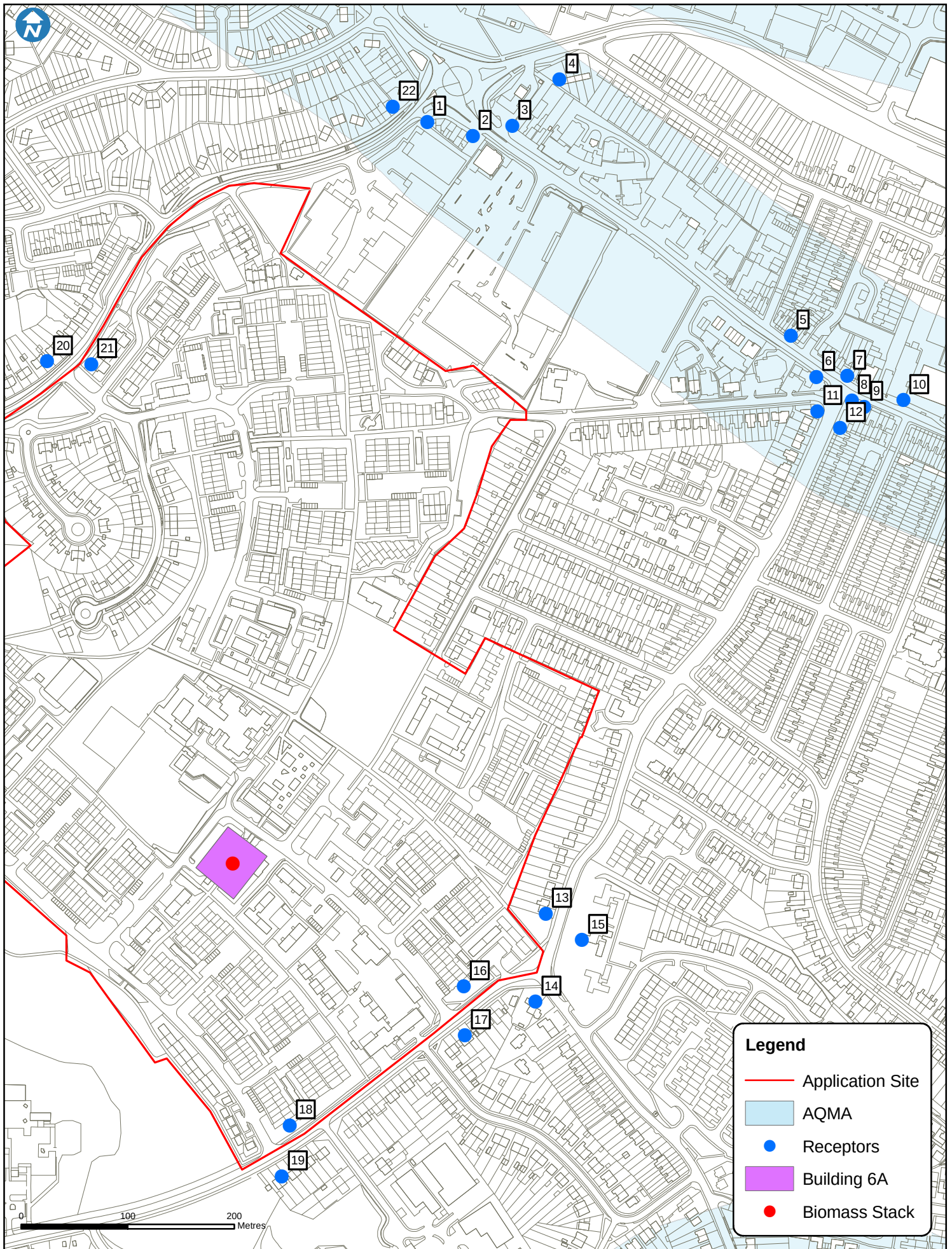
6 Mitigation

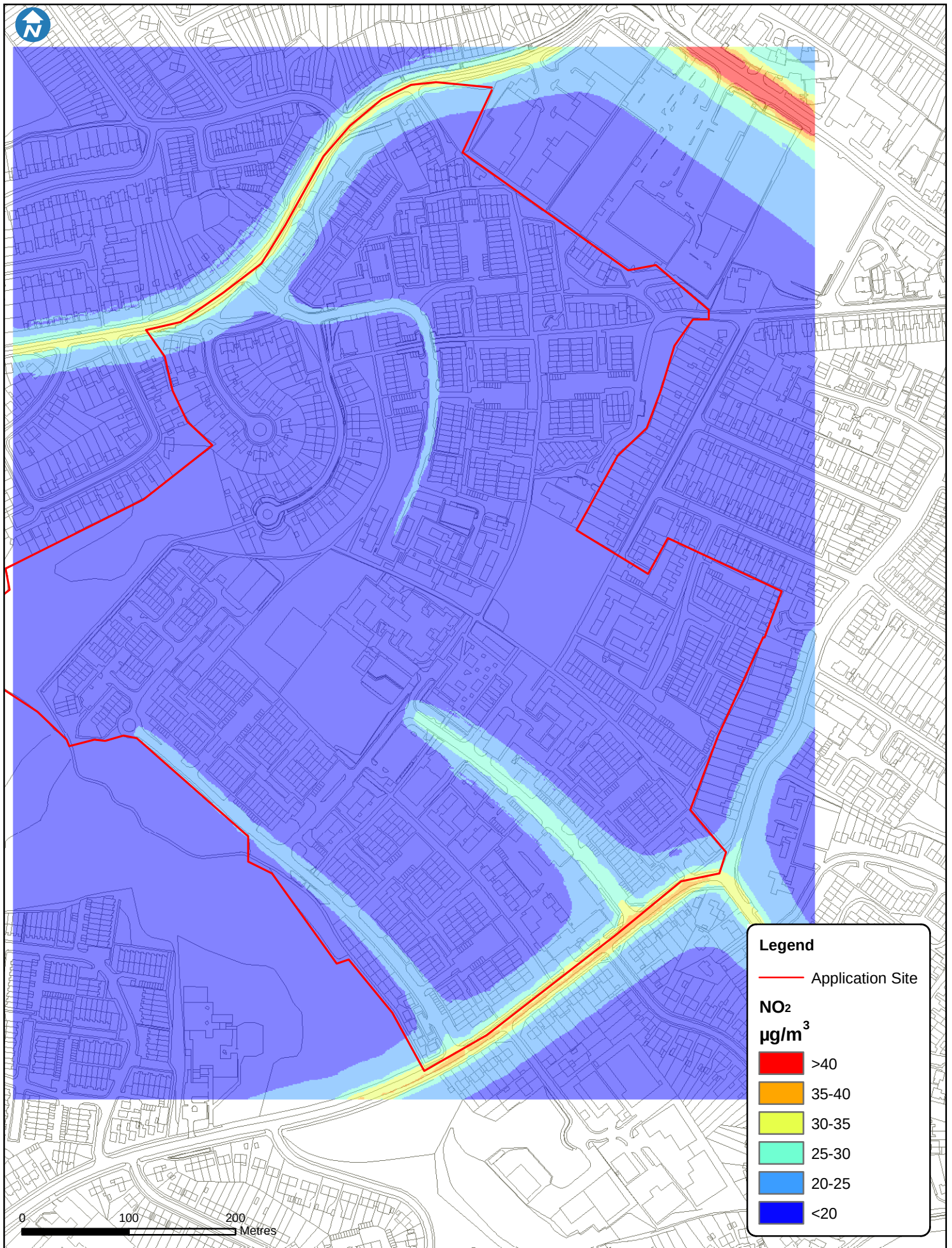
- 6.1.1 As no impact is predicted due to the operation of the proposed redevelopment, there will be no need for mitigation.

7 Conclusion

- 7.1.1 RBC have declared an AQMA for exceedence of the annual NO₂ objective covering a large part of the centre of Reading and the main traffic routes into Reading. The NAQOs for PM₁₀ are likely to be achieved across Reading.
- 7.1.2 Baseline modelling and RBC's diffusion tube data show that the annual objective for NO₂ is likely to be exceeded close to the Oxford Road/Grovelands Road junction in 2009 and 2013; however there is no air quality impact at the Oxford Road/Grovelands Road junction due to the proposed redevelopment.
- 7.1.3 Away from the junction, the maximum increase in annual mean NO₂ concentrations due to the proposed redevelopment is 1µg/m³; however the annual objective is achieved by a wide margin.
- 7.1.4 There is no impact on PM₁₀ concentrations due to the proposed redevelopment, and the NAQOs for PM₁₀ are achieved by a wide margin.
- 7.1.5 The annual objectives for NO₂ and PM₁₀ are achieved across the application site; therefore there are no constraints on residential development at the site due to air quality.

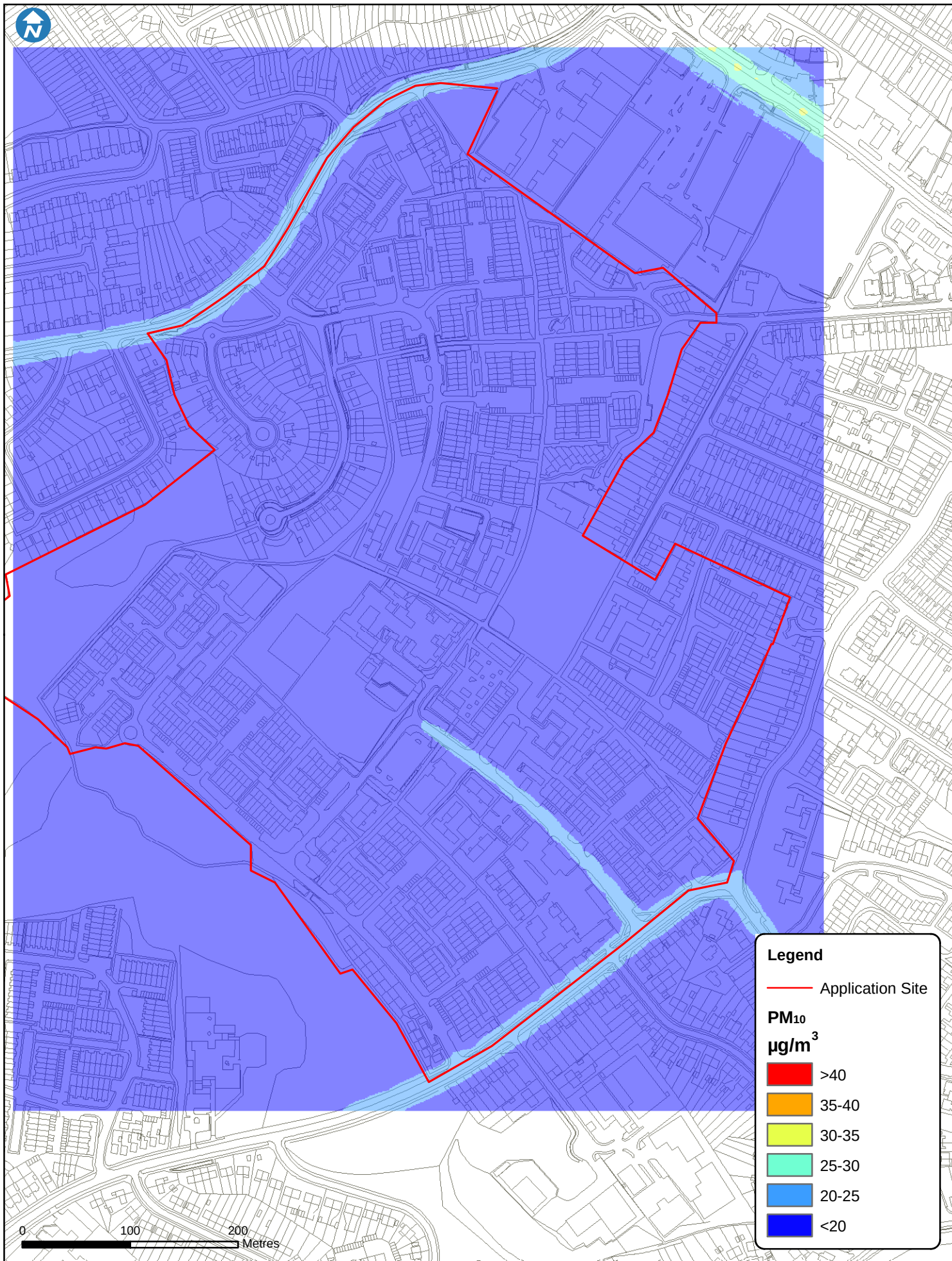






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Contours of Annual Mean NO₂ Concentrations Across the Application Site



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Contours of Annual Mean PM₁₀ Concentrations Across the Application Site