AIR QUALITY ASSESSMENT
COVENTRY STADIUM, BRANDON

REC REFERENCE: AQ103803R3

REPORT PREPARED FOR: FRAMPTONS

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National Consultancy, Locally Delivered

A CONCEPT LIFE SCIENCES COMPANY

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EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd have been commissioned by Framptons to undertake an Air Quality Assessment in support of a planning application for a proposed residential development at Coventry Stadium, Brandon.

The proposals comprise the development of approximately 137 residential properties with associated car parking and the infrastructure.

The site is located adjacent to A428, a potential source of road vehicle exhaust emissions, as such there is the potential to introduce future site users into areas of poor air quality. Additionally, the development may affect sensitive locations as a result of construction phase dust emissions and road traffic exhaust emissions. As such, an Air Quality Assessment was therefore required in support of the proposals in order to determine baseline conditions, assess site suitability for proposed end use and provide consideration of potential impacts associated with the development.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of demolition, earthworks, construction, and track-out 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 at the site and to predict air quality impacts as a result of road vehicle exhaust emissions associated with traffic generated by the development. Results were subsequently verified using monitoring results obtained from RBC.

The results indicated that pollutant levels across the site, where residential units are proposed, 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. Additionally, the assessment concluded that impacts on pollutant levels as a result of operational phase pollutant emissions were predicted to be **not significant** at all sensitive locations within the vicinity of the site. The use of robust assumptions, where necessary, was considered to provide sufficient results confidence for an assessment of this nature.

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

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APPENDICES

1. INTRODUCTION

1.1 Background

Resource and Environmental Consultants Ltd (REC) was commissioned by Frampton to undertake an Air Quality Assessment in support of a planning application for a proposed residential development at Coventry Stadium, Brandon.

The site is located adjacent to A428 Road at Coventry Stadium, Brandon at approximate National Grid Reference (NGR): 440710, 277310. Reference should be made to Figure 1 for a location plan.

1.2 Site Location and Context

The proposals comprise the development of the site to provide circa 137 residential units and the associated infrastructure.

The proposed development is located adjacent to A428, approximately 6km west of the Rugby Borough Council (RBC) Air Quality Management Area (AQMA) and approximately 2km east of the Coventry City Council (CCC) AQMA; both of which have been declared due to exceedances of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO_2). As such, there is potential that the proposals could cause adverse impacts to existing pollution levels at nearby sensitive receptors within the AQMAs. An Air Quality Assessment was therefore required to determine baseline conditions, consider location suitability for the proposed end-use and provide consideration of potential effects as a result of the proposals. 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 nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

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

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

2.2 UK Legislation

The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose 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 2007[1]. The AQS sets out AQOs that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of 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 (µg/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 (2010) 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 Framework[3] (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

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

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

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

2.5.2 National Planning Practice Guidance

The National Planning Practice Guidance[4] (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. Why should planning be concerned about air quality?
2. What is the role of Local Plans with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to a planning decision?
6. Where to start if bringing forward a proposal where air quality could be a concern?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?
9. How do considerations about air quality fit into the development management process?

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

2.6 Rugby Borough Council – Core Strategy

The RBC Local Development Framework consists of a series of documents, of which the Core Strategy[5] is the most significant. The Core Strategy was formally adopted in June 2011, and sets out the vision, objectives and core policies for spatial planning within the district until to 2026.

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

"Policy CS11 - Transport and New Development
[…]
Where development proposals fall within the designated Air Quality Management Area, the transport assessment should set out how detrimental impacts on air quality will be mitigated.

RBC's Supplementary Planning Document (adopted in March 2012) states that

"The Council seeks to ensure that new development does not result in a significant increase in the production of air pollutants that will hinder the achievement of its objectives set out in its Air Quality Strategy."[6]

[4] http://planningguidance.planningportal.gov.uk/.
[5] Rugby Borough Council – Local Development Framework |Final version Core Strategy June 2011
[6] Rugby Borough Council LDF – Planning Obligations, Supplementary Planning Document March 2012

Rugby Borough Council - Local Planning Policy

The Rugby Borough Council (RBC) Local Plan is currently under consultation, however the publication draft and supporting documents was released in September 2016 and provides the current basis for the determination of planning applications within the RBC area of administration.

A review of the RBC draft Local Plan[7] indicated the following policy in relation to air quality is relevant to this assessment:

> "Policy HS5: Traffic Generation and Air Quality
>
> Any development that results in significant negative impacts on health and wellbeing of people in the area as a result of pollution, noise or vibration caused by traffic generation will not be permitted unless effective mitigation can be achieved.
>
> Any development that results in significant negative impacts on air quality within identified Air Quality Management Areas or on the health and wellbeing of people in the area as a result of pollution should be supported by an air quality assessment, and, where necessary, a mitigation plan to demonstrate practical and effective measures to be taken to avoid the adverse impacts.
>
> All measures required in the Policy should take full account of the cumulative impact off all development proposed in this Local Plan (and any other known development) on traffic generation and air quality. "

Reference has been made to the above policies during the undertaking of this Air Quality Assessment by assessing pollutant concentrations across the proposed site, and by determining the impact of traffic associated with the development may have on the local road network.

[7] Rugby Borough Council Local Plan - 2011 - 2031, Publication Draft, September 2016

3 METHODOLOGY

The proposed development has the potential to cause air quality impacts during the construction and operational phases 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'[8].

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

- Demolition
- Earthworks;
- Construction; and
- Track-out

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 PM_{10}.

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,

[8] Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2014.

medium or large (Step 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

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

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 3.

Table 3 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	• Total building volume greater than 50,000m^3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities greater than 20m above ground level
	Earthworks	• Total site area greater than 10,000m^2 • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • More than 10 heavy earth moving vehicles active at any one time • Formation of bunds greater than 8m in height • More than 100,000 tonnes of material moved
	Construction	• Total building volume greater than 100,000m^3 • On site concrete batching • Sandblasting
	Trackout	• More than 50 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	Demolition	• Total building volume 20,000m^3 to 50,000m^3 • Potentially dusty construction material • Demolition activities 10m to 20m above ground level
	Earthworks	• Total site area 2,500m^2 to 10,000m^2 • Moderately dusty soil type (e.g. silt) • 5 to 10 heavy earth moving vehicles active at any one time • Formation of bunds 4m to 8m in height • Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	• Total building volume 25,000m^3 to 100,000m^3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching

Magnitude	Activity	Criteria
Medium	Trackout	• 10 to 50 HDV trips per day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50m to 100m
Small	Demolition	• Total building volume under 20,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities less than 10m above ground level • Demolition during wetter months
	Earthworks	• Total site area less than 2,500m^2 • Soil type with large grain size (e.g. sand) • Less than 5 heavy earth moving vehicles active at any one time • Formation of bunds less than 4m in height • Total material moved less than 20,000 tonnes • Earthworks during wetter months
	Construction	• Total building volume less than 25,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	• Less than 10 HDV trips per day • Surface material with low potential for dust release • Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the development 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 PM_{10} e.g. residential properties, hospitals, schools and residential care homes	• Internationally or nationally designated site e.g. Special Area of Conservation

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
Medium	• Users would expect to enjoy a reasonable level of amenity • Aesthetics or value of their property could be diminished by soiling • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	• Nationally designated site e.g. Sites of Special Scientific Interest
Low	• Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, 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

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
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

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
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 demolition activities.

Table 8 Dust Risk Category from Demolition

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

Table 9 outlines the risk category from earthworks and construction activities.

Table 9 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 10 outlines the risk category from trackout.

Table 10 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'. This has been described as **negligible** within this report to provide continuity between assessment terminologies.

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 IAQM[8] guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix III.

3.2 Operational Phase Assessment

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO_2 and PM_{10}, associated with vehicles travelling to and from the site, as well as expose future site-users to elevated pollutant levels. Potential impacts have been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2015 Verification;
- Opening year do-minimum (DM) (predicted traffic flows in 2019 should the proposals not proceed); and
- Opening year do-something (DS) (predicted traffic flows in 2019 should the proposals be completed).

It should be noted that air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2015 were utilised within the dispersion model. The use of 2019 traffic data and 2015 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Reference should be made to Appendix II for assessment input data.

Receptors potentially sensitive to changes in NO_2 and PM_{10} concentrations were identified within 200m of the affected highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)[9] on the likely limits of pollutant dispersion from road sources. LAQM (TG16)[2] provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;
- Hospitals; and
- Care homes.

The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 11. These are based upon the guidance provided within the Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance 'Land-Use Planning and Development Control: Planning for Air Quality'[10].

Table 11 Operational Traffic Exhaust Emissions - Significance of Impact

Long Term Average Concentration	% Change in Concentration Relative to AQO			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

The criteria shown in Table 11 is adapted from the EPUK and IAQM guidance 'Land-Use Planning and Development Control: Planning for Air Quality'[10] with sensitivity descriptors included to allow comparisons of various air quality impacts. It should be noted that changes of 0%, i.e. less than 0.5%, will be described as negligible in accordance with the EPUK and IAQM guidance.

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 11, the EPUK and IAQM[10] document states that this framework is to be used as a starting point to make a judgement on significance of effect but other influences might need to be accounted for. Whilst impacts might be determined as 'slight', 'moderate' or 'substantial' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances. The following factors may provide some assistance in determining the overall significance of a development:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;

[9] Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.
[10] Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and Institute of Air Quality Management, 2017.

- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease; and
- The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3.

These factors were considered and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that 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.

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 a Review and Assessment of air quality within their area of administration. This process concluded that annual mean concentrations of NO_2 are above the AQO within the area. As such, AQMAs has been declared, which is described as:

> **Rugby AQMA** - The area covers the whole urban area of Rugby bounded by the southern boundary with Daventry District Council, A5, M6, minor roads to the west of Long Lawford, A45 and M45.

The proposed site is located approximately 6km west of the Rugby AQMA. Due to distance to the proposed site and the AQMA potential impacts within this area have not been considered further in this assessment.

CCC has also undertaken a Review and Assessment of air quality within their area of administration. This process concluded that annual mean concentrations of NO_2 are above the AQO within the area. As such, AQMAs has been declared, which is described as

> **Coventry AQMA** - "An area encompassing all land within the administrative boundaries of the city of Coventry

The proposed site is located approximately 2km east of the Coventry AQMA. As such, there is the potential for the development to cause adverse impacts to air quality within this area. This area has therefore been considered within this report.

Both RBC and CCC 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

Monitoring of pollutant concentrations is undertaken by RBC using continuous and periodic methods throughout their area of administration. The closest continuous monitor to the proposed development is OSR1 (Parkfield Road), located at NGR: 449029,276315. This is approximately 8.5km north-east of the development boundary at a roadside location. Due to distance to the proposed site, Automatic analyser has not been considered for this assessment.

RBC also utilises passive diffusion tubes to monitor NO_2 concentrations throughout the council. The closest diffusion tubes located in the vicinity of the proposed development have been identified and monitoring results from recent years are summarised in Table 12.

Table 12 Diffusion Tube Monitoring Results

Site ID	Site Name	Type	NGR (m)		Annual Mean NO_2 Concentration ($\mu g/m^3$)		
			X	Y	2013	2014	2015
S14	Binley Woods, Village Hall	Urban Background	439450	277523	18.3	17.9	19.00
S45	Bretford- electricity pole near 3 Avon Cottages	Roadside	442963	277071	26.9	28.3	27.7

As indicated in Table 12 the annual mean AQO for NO_2 was not exceeded at any of the identified monitoring locations during the recent years. Reference should be made to Figure 2 for a graphical representation of the 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: 440500, 277500. Data for this location was downloaded from the DEFRA website[11] for the purpose of this assessment and is summarised in Table 13 for the year for which most recent monitoring data is available (2015) and the predicted development opening year (2019).

Table 13 Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration ($\mu g/m^3$)	
	2015	2019
NO_x	20.70	16.88
NO_2	14.65	12.20
PM_{10}	15.34	14.84

As shown in Table 13, background concentrations of NO_2 did not exceed the relevant AQOs. Comparison with the 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 dust and road vehicle exhaust emission impacts in the following Sections.

4.4.1 Construction Phase Sensitive Receptors

Receptors sensitive to potential dust impacts during earthworks and construction were identified from

[11] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.

a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 14.

Table 14 Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Residential Receptors	Approximate Number of Ecological Receptors
Less than 20	1 - 10	0
20 - 50	10-100	0
50 - 100	10-100	-
100 - 350	More than 100	-

Reference should be made to Figure 3 for a graphical representation of demolition, earthworks and construction dust buffer zones.

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 construction traffic would access the site from A428 Rugby Road to ensure the maximum potential trackout distance was considered.

Table 15 Trackout Dust Sensitive Receptors

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

Reference should be made to Figure 4 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 within a residential and agricultural area. As such, historical dust generation may have occurred as a result of windblown emissions from commuting and farm activities

Guidance	Comment
The likelihood of concurrent dust generating activity on nearby sites	A review of the surrounding areas indicated that there is an approved application (Ref R16/1724 Date of approval date 05.05.2017) of erection of 3 dwellings and associated parking in the area adjoined to the eastern boundary of the proposed site. If the construction phases of the developments overlap, concurrent dust activity is likely to occur.
Pre-existing screening between the source and the receptors	There is vegetation present along the entire boundary of the site and a significant amount of vegetation exist on the north-western side of boundary. If retained, this could provide a natural protective screen to receptors in these directions
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-west of the development, as shown in Figure 5. As such, properties to the north-east would be most affected by dust emissions. However, currently there is a significantly large area of vegetation on the north and north-western side of the development and it can act as a natural screen if retained.
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			
	Demolition	Earthworks	Construction	Track-out
Dust Soiling	Medium	Medium	Medium	High
Human Health	Low	Low	Low	Low

4.4.2 Operational Phase Sensitive Receptors

Receptors sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 18. All sensitive receptors were modelled at a height of 1.5m to represent ground floor level.

Table 18 Road Vehicle Exhaust Emission Sensitive Receptors

Receptor		NGR (m)	
		X	Y
R1	4 Rugby Road	440547.4	277119.9
R2	The Poplars, Rugby Road	440737.3	277043.4
R3	Headington House, Rugby Road	440535.4	277198.8
R4	Binley Woods Primary School.	440255.7	277171.8
R5	254 Rugby Road	440371.5	277230.6
R6	246 Rugby Road	440245.2	277308.0
R7	222 Rugby Road	440090.9	277355.4
R8	182 Rugby Road	439898.9	277462.4
R9	291 Rugby Road	439770.1	277456.3
R10	249 Rugby Road	439655.8	277530.4
R11	283 Rugby Road	439559.8	277503.7
R12	The Hollies, Rugby Road	440776.4	276809.9
R13	4 Oakdale Road	439103.7	277583.2
R14	76A Brandon Road	437989.6	278128.8
R15	65 Brandon Road	437964.4	278196.4
R16	34 Brandon Road	437813.3	278303.5
R17	542 Binley Road	437616.5	278411.7

Receptor		NGR (m)	
		X	Y
R18	5 Sevilla Close	438496.2	278746.6
R19	16 Dowley Croft	438560.8	278545.8
R20	21 Kings Park Drive	438789.2	278072.8
R21	109 Rugby Road	438998.5	277648.9
R22	4 Avondale Road	441043.4	276409.2
R23	4 Bretford Bridge Road	442973.1	277156.5

The sensitive receptors identified in Table 18 represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposed development that have not been individually identified above. Reference should be made to Figure 6 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

5 ASSESSMENT

There is the potential for air quality impacts as a result of the construction and operation 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

Demolition

Demolition will involve the removal of the existing stadium and its associated buildings will involve the removal of potentially dusty construction material like concrete. As such, the magnitude of potential dust emissions from demolition activities is **medium**, in accordance with the criteria outlined in Table 3.

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

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

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 greater than 10,000m^2. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is

therefore **large**.

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **medium**. In accordance with the criteria outlined in
Table 9 outlines the risk category from earthworks and construction activities.

Table 9, the development is considered to be a **medium** risk site for dust soiling as a result of earthworks activities.

Table 17 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in
Table 9 outlines the risk category from earthworks and construction activities.

Table 9, the development is considered to be a **low** risk site for human health as a result of earthwork activities.

Construction

Due to the size of the development site the total building volume is likely to be greater than 100,000m^2. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **large**.

Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **medium**. In accordance with the criteria outlined in
Table 9 outlines the risk category from earthworks and construction activities.

Table 9, the development is considered to be a **medium** risk site for dust soiling as a result of construction activities.

Table 17 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in
Table 9 outlines the risk category from earthworks and construction activities.

Table 9, the development is considered to be a **low** risk site for human health 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 has been estimated that the unpaved road length is likely to be more than 100m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from track out is therefore **large**.

Table 17 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **high** risk site for dust soiling as a result of trackout activities.

Table 17 indicates the sensitivity of the area to human health is **low**. In accordance within the criteria outlined in Table 10, the development is considered to be a **low** risk site for human health as a result of track out activities.

Summary of the Risk of Dust Effects

A summary of the risk from each dust generating activity is provided in Table 19.

Table 19 Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Track out
Dust Soiling	Medium	Medium	Medium	High
Human Health	Low	Low	Low	Low

As indicated in Table 19, the potential risk of dust soiling is **medium** from demolition, earthworks, construction and **high** from track out activities, while the potential risk of human health impacts is **low** from all of the above 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[8] guidance 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 20. The mitigation measures outlined in Table 20 can be reviewed prior to the commencement of construction works incorporated into a wider Construction Environmental Management Plan (CEMP), if necessary.

Table 20 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

Issue	Control Measure
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 actives 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
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

Issue	Control Measure
Demolition	• Soft strip inside buildings before demolition • Ensure effective water suppression is used during demolition operations, as proposed within the DMP and CLP • Avoid explosive blasting. The Demolition Method Statement states that demolition will be performed by hand until the structure is reduced down to a safe height allowing for mechanical demolition to take place • Bag and remove any biological debris before demolition
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 20 are implemented, the residual effect from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[8].

5.2 Operational Phase Assessment

Additional vehicle movements associated with the operation of the proposed development will generate exhaust emissions, such as NO_2 and PM_{10}, on the local and regional road networks. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

The assessment considered the following scenarios:

- 2015 Verification;

- 2019 DM; and
- 2019 DS.

The DM (i.e. without development) scenario is representative of anticipated traffic data for 2019. The DS (i.e. with development) scenarios are representative of anticipated traffic data for 2019 with the addition of predicted variations in traffic flow patterns as a result of the proposals.

For the purpose of this assessment traffic data was supplied for 2019, the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2015 were utilised within the dispersion model. The use of 2019 traffic data and 2015 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Reference should be made to Appendix II for full assessment input details.

5.2.1 Nitrogen Dioxide

Predicted Concentrations at the Development Site

Annual mean NO_2 concentrations were predicted across the development for the DM and DS scenarios, as shown in Figure 7 and Figure 8. Concentrations were predicted to be below the AQO across the developable areas of the site with and without the proposals in place, with levels ranging from 16.07µg/m^3 to 47.49µg/m^3 in the DS scenario. However, it should be noted that exceedances of the AQO where isolated to non-sensitive locations along the local road network, more critically there were no predicted exceedance at sensitive locations across the site.

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 site users from elevated NO_2 concentrations.

Predicted Concentrations at Sensitive Receptors

Annual mean NO_2 concentrations were predicted for the 2019 DM and DS scenarios and are summarised in Table 21. Exceedances are highlighted in **bold**.

Table 21 Predicted Annual Mean NO_2 Concentrations

Sensitive Receptor		Predicted Annual Mean NO_2 Concentration (µg/m^3)		
		DM	DS	Change
R1	4 Rugby Road	19.06	19.23	0.17
R2	The Poplars, Rugby Road	22.52	22.84	0.32
R3	Headington House, Rugby Road	26.62	27.03	0.41
R4	Binley Woods Primary School	16.48	16.54	0.06

Sensitive Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R5	254 Rugby Road	19.49	19.66	0.17
R6	246 Rugby Road	21.54	21.78	0.24
R7	222 Rugby Road	21.15	21.38	0.23
R8	182 Rugby Road	24.89	25.24	0.35
R9	291 Rugby Road	21.98	22.22	0.24
R10	249 Rugby Road	24.76	25.09	0.33
R11	283 Rugby Road	21.89	22.12	0.23
R12	The Hollies, Rugby Road	21.1	21.34	0.24
R13	04 Oakdale Road	23.55	23.77	0.22
R14	76A Brandon Road	27.13	27.24	0.11
R15	65 Brandon Road	33.91	34.07	0.16
R16	34 Brandon Road	27.2	27.31	0.11
R17	542 Binley Road	24.63	24.72	0.09
R18	5 Sevilla Close	23.42	23.45	0.03
R19	16 Dowley Croft	21.39	21.42	0.03
R20	21 Kings Park Drive	29.25	29.31	0.06
R21	109 Rugby Road	29.48	29.81	0.33
R22	4 Avondale Road	21.8	22.05	0.25
R23	4 Bretford Bridge Road	33.05	33.67	0.62

As indicated in Table 21, annual mean NO_2 concentrations there were no exceedance with the relevant AQO at any receptor locations in both the DM and DS scenarios.

Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 22.

Table 22 Predicted NO_2 Impacts

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Significance of Impact
R1	4 Rugby Road	0.43	75% or Less	Negligible
R2	The Poplars, Rugby Road	0.80	75% or Less	Negligible
R3	Headington House, Rugby Road	1.03	75% or Less	Negligible
R4	Binley Woods Primary School	0.15	75% or Less	Negligible
R5	254 Rugby Road	0.43	75% or Less	Negligible
R6	246 Rugby Road	0.60	75% or Less	Negligible
R7	222 Rugby Road	0.58	75% or Less	Negligible
R8	182 Rugby Road	0.87	75% or Less	Negligible
R9	291 Rugby Road	0.60	75% or Less	Negligible
R10	249 Rugby Road	0.82	75% or Less	Negligible
R11	283 Rugby Road	0.58	75% or Less	Negligible
R12	The Hollies, Rugby Road	0.60	75% or Less	Negligible
R13	04 Oakdale Road	0.55	75% or Less	Negligible
R14	76A Brandon Road	0.27	75% or Less	Negligible
R15	65 Brandon Road	0.40	75% or Less	Negligible
R16	34 Brandon Road	0.27	75% or Less	Negligible
R17	542 Binley Road	0.23	75% or Less	Negligible
R18	5 Sevilla Close	0.07	75% or Less	Negligible
R19	16 Dowley Croft	0.08	75% or Less	Negligible
R20	21 Kings Park Drive	0.15	75% or Less	Negligible
R21	109 Rugby Road	0.82	75% or Less	Negligible
R22	4 Avondale Road	0.63	75% or Less	Negligible
R23	4 Bretford Bridge Road	1.55	75% or Less	Negligible

As indicated in Table 22, the significance of impacts on annual mean NO_2 concentrations as a result of the development was predicted to be **negligible** at all locations.

5.2.2 Particulate Matter

Predicted Concentrations at the Development Site

Annual mean PM_{10} concentrations were predicted across the development for the DM and DS scenarios, as shown in Figure 9 and Figure 10. Concentrations were predicted to be below the AQO across the developable areas of the site both with and without the proposals in place, with levels ranging from 15.80µg/m^3 to 20.27µg/m^3 in the DS scenario.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future site users from elevated PM_{10} concentrations.

Predicted Concentrations at Sensitive Receptors

Annual mean PM_{10} concentrations were predicted for each scenario and are summarised in Table 23.

Table 23 Predicted Annual Mean PM_{10} Concentrations

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration (µg/m^3)		
		DM	DS	Change
R1	4 Rugby Road	15.92	15.95	0.03
R2	The Poplars, Rugby Road	16.38	16.43	0.05
R3	Headington House, Rugby Road	16.95	17.02	0.07
R4	Binley Woods Primary School	15.59	15.60	0.01
R5	254 Rugby Road	15.98	16.00	0.03
R6	246 Rugby Road	16.27	16.31	0.04
R7	222 Rugby Road	16.22	16.26	0.04
R8	182 Rugby Road	16.75	16.81	0.06
R9	291 Rugby Road	16.34	16.38	0.04
R10	249 Rugby Road	16.74	16.80	0.06
R11	283 Rugby Road	16.34	16.37	0.03
R12	The Hollies, Rugby Roa	16.22	16.26	0.04
R13	4 Oakdale Road	16.58	16.61	0.03
R14	76A Brandon Road	17.16	17.18	0.02
R15	65 Brandon Road	18.30	18.33	0.03

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R16	34 Brandon Road	17.21	17.23	0.02
R17	542 Binley Road	16.81	16.83	0.02
R18	5 Sevilla Close	16.86	16.87	0.01
R19	16 Dowley Croft	16.45	16.46	0.01
R20	21 Kings Park Drive	17.75	17.77	0.02
R21	109 Rugby Road	17.43	17.49	0.06
R22	4 Avondale Road	16.32	16.36	0.04
R23	4 Bretford Bridge Road	17.99	18.11	0.12

As indicated in Table 23, annual mean PM_{10} concentrations were below the relevant AQO at all sensitive receptor locations for both scenarios considered.

Predicted impacts on annual mean PM_{10} concentrations are summarised in Table 24.

Table 24 Predicted PM_{10} Impacts

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Significance of Impact
R1	4 Rugby Road	0.06	75% or Less	Negligible
R2	The Poplars, Rugby Road	0.13	75% or Less	Negligible
R3	Headington House, Rugby Road	0.18	75% or Less	Negligible
R4	Binley Woods Primary School	0.02	75% or Less	Negligible
R5	254 Rugby Road	0.07	75% or Less	Negligible
R6	246 Rugby Road	0.10	75% or Less	Negligible
R7	222 Rugby Road	0.09	75% or Less	Negligible
R8	182 Rugby Road	0.15	75% or Less	Negligible
R9	291 Rugby Road	0.10	75% or Less	Negligible
R10	249 Rugby Road	0.14	75% or Less	Negligible
R11	283 Rugby Road	0.10	75% or Less	Negligible

Sensitive Receptor		% Change in Concentration Relative to AQO	Long Term Average Concentration	Significance of Impact
R12	The Hollies, Rugby Road	0.10	75% or Less	Negligible
R13	4 Oakdale Road	0.09	75% or Less	Negligible
R14	76A Brandon Road	0.05	75% or Less	Negligible
R15	65 Brandon Road	0.08	75% or Less	Negligible
R16	34 Brandon Road	0.05	75% or Less	Negligible
R17	542 Binley Road	0.04	75% or Less	Negligible
R18	5 Sevilla Close	0.02	75% or Less	Negligible
R19	16 Dowley Croft	0.01	75% or Less	Negligible
R20	21 Kings Park Drive	0.03	75% or Less	Negligible
R21	109 Rugby Road	0.15	75% or Less	Negligible
R22	4 Avondale Road	0.11	75% or Less	Negligible
R23	4 Bretford Bridge Road	0.29	75% or Less	Negligible

As indicated in Table 24, impacts on annual mean PM_{10} concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all receptor locations.

5.2.3 Impact Significance

The overall significance of operational phase road traffic emission impacts was determined as **not significant**. This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 3. Further justification is provided in Table 25.

Table 25 Overall Road Traffic Exhaust Emission Impact Significance

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	Impacts on NO_2 and PM_{10} concentrations were predicted to be negligible at all sensitive receptors. These represent worst-case locations and therefore it is unlikely that any other receptors would be significantly affected by the proposed development
Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant	The proposed development will not result in any new exposure to pollutant concentrations above the AQOs across the proposed development

Guidance	Comment
The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors	The change in concentration relative to the AQO was predicted to range from 0.07% to 1.55% for NO_2. Therefore, resultant impacts were predicted to be negligible at all sensitive receptors considered. The change in concentrations relative to the AQO was predicted to range from 0.01% to 0.29% for PM_{10}. Resulting in negligible impacts at all sensitive receptors considered
Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease	There were no exceedances of the annual mean AQO for NO_2 at any sensitive location within the modelling extents. There were no exceedances of the annual mean AQO for PM_{10} at any location within the modelling extents
The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3	There were exceedances of the annual mean AQO for NO_2 within the assessment extents however these were confined to across the local road network. There were no exceedances of the annual mean AQO for PM_{10} at any location within the modelling extents

6 CONCLUSION

REC Ltd was commissioned by Framptons to undertake an Air Quality Assessment for a planning application for a proposed residential development at Coventry Stadium, Brandon.

The proposals comprise the development of the 137 residential dwellings along with associated infrastructure.

The proposed development is located adjacent to A428 Road, a significant source of road transport emissions and between two AQMA declared by RBC and CCC. An Air Quality Assessment was therefore required to quantify baseline conditions, consider the suitability of the site 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 to predict air quality impacts as a result of road vehicle exhaust emissions associated with traffic generated by the development. Results were subsequently verified using monitoring results obtained from RBC.

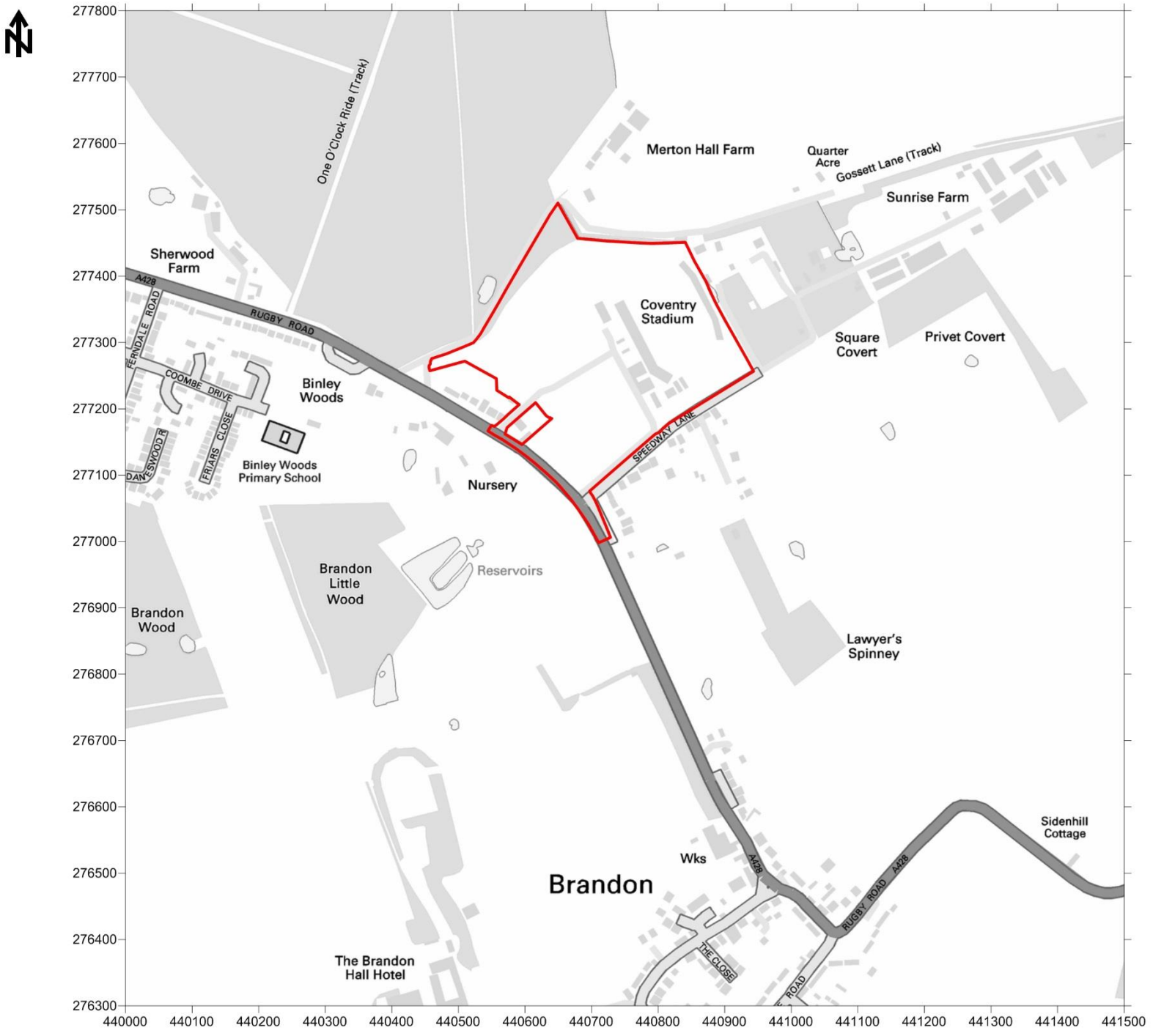
The dispersion modelling results indicated that pollutant levels across the developable areas of the site were below the relevant AQOs with exceedances only occurring on the local road network. The location is therefore considered suitable for the proposed end-use without the inclusion of mitigation methods to protect future users from poor air quality. Predicted impacts on NO_2 and PM_{10} concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at all sensitive receptor locations within the vicinity of the site. The overall significance of potential impacts was determined to be **not significant**, in accordance with the EPUK and IAQM guidance.

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
CCC	Coventry City Council
CERC	Cambridge Environmental Research Consultants
CEMP	Construction Environmental Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do Minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DS	Do Something
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	Rugby Borough Council
REC	Resource and Environmental Consultants
TEMPRO	Trip End Model Presentation Program
z_0	Roughness Length

APPENDIX I FIGURES



Legend

Site Boundary

Title

Figure 1

Site Location

Project

Air Quality Assessment
Coventry Stadium, Brandon

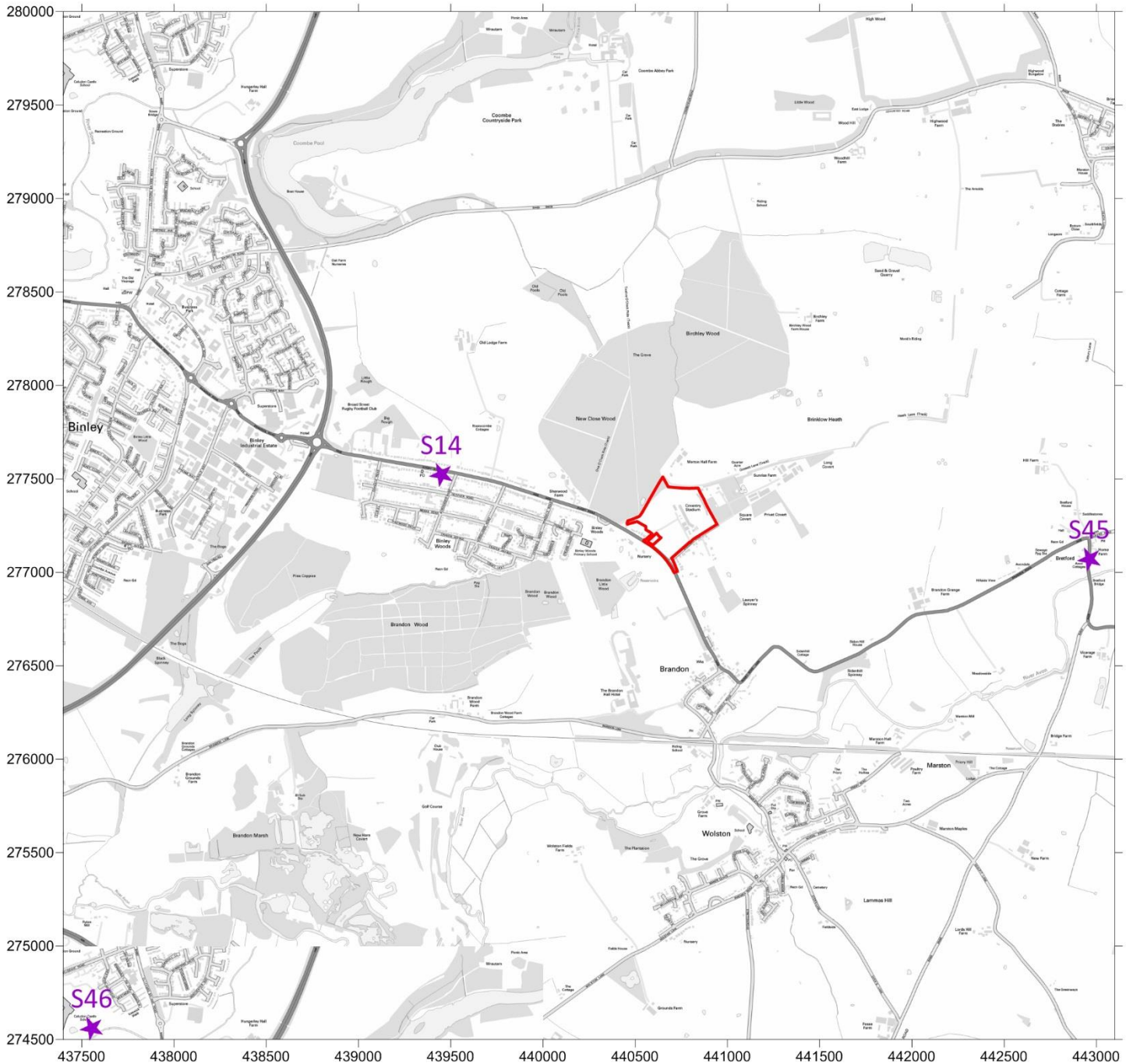
Project Number

AQ103803r3

Client

Framptons

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



Legend

Site Boundary

Diffusion Tube Monitoring Locations

Title

Figure 2

Diffusion Tube Monitoring Locations

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

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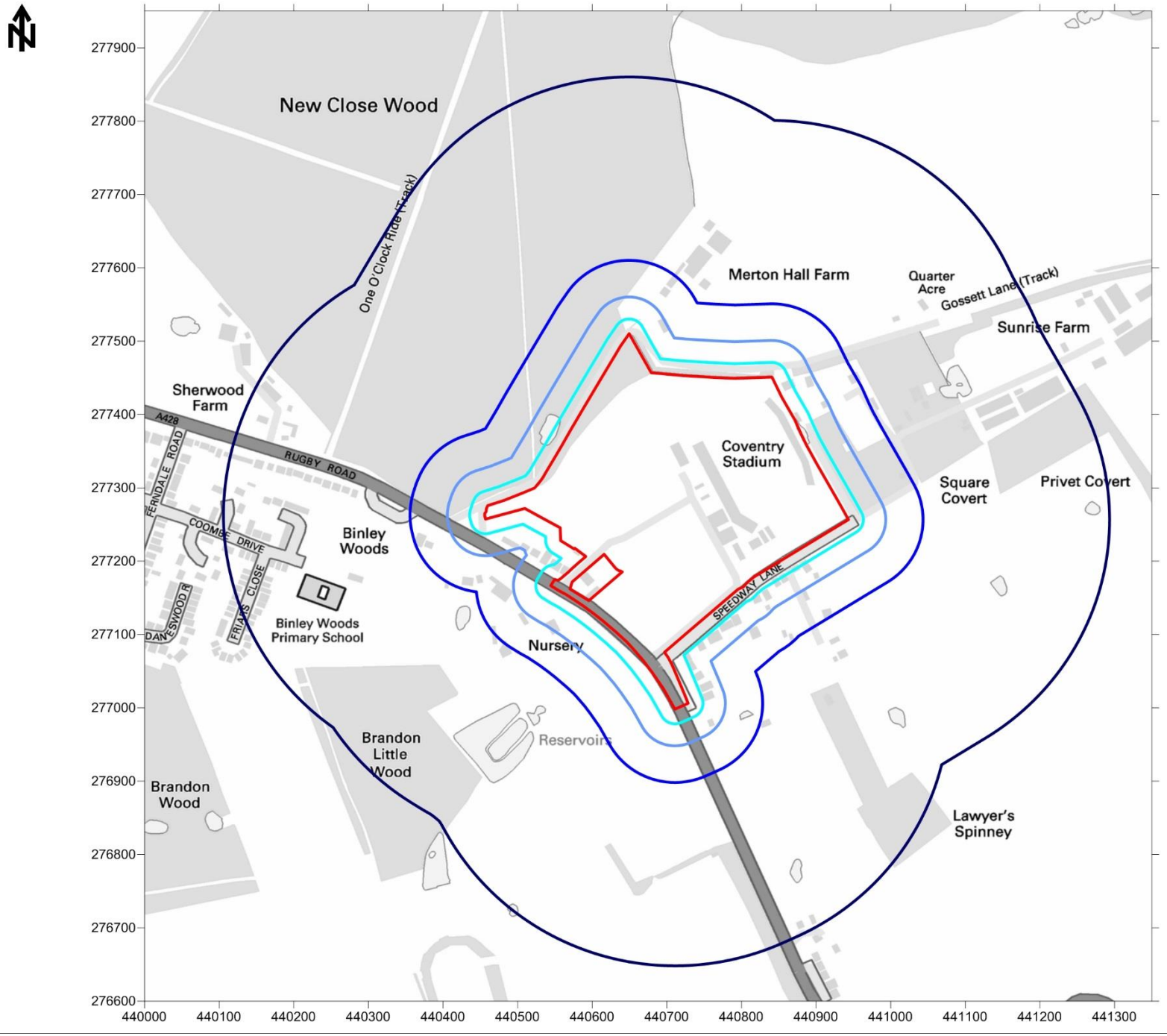

Legend

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

Title

Figure 3

Demolition, Earthworks and Construction Dust Buffer Zones

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

Framptons

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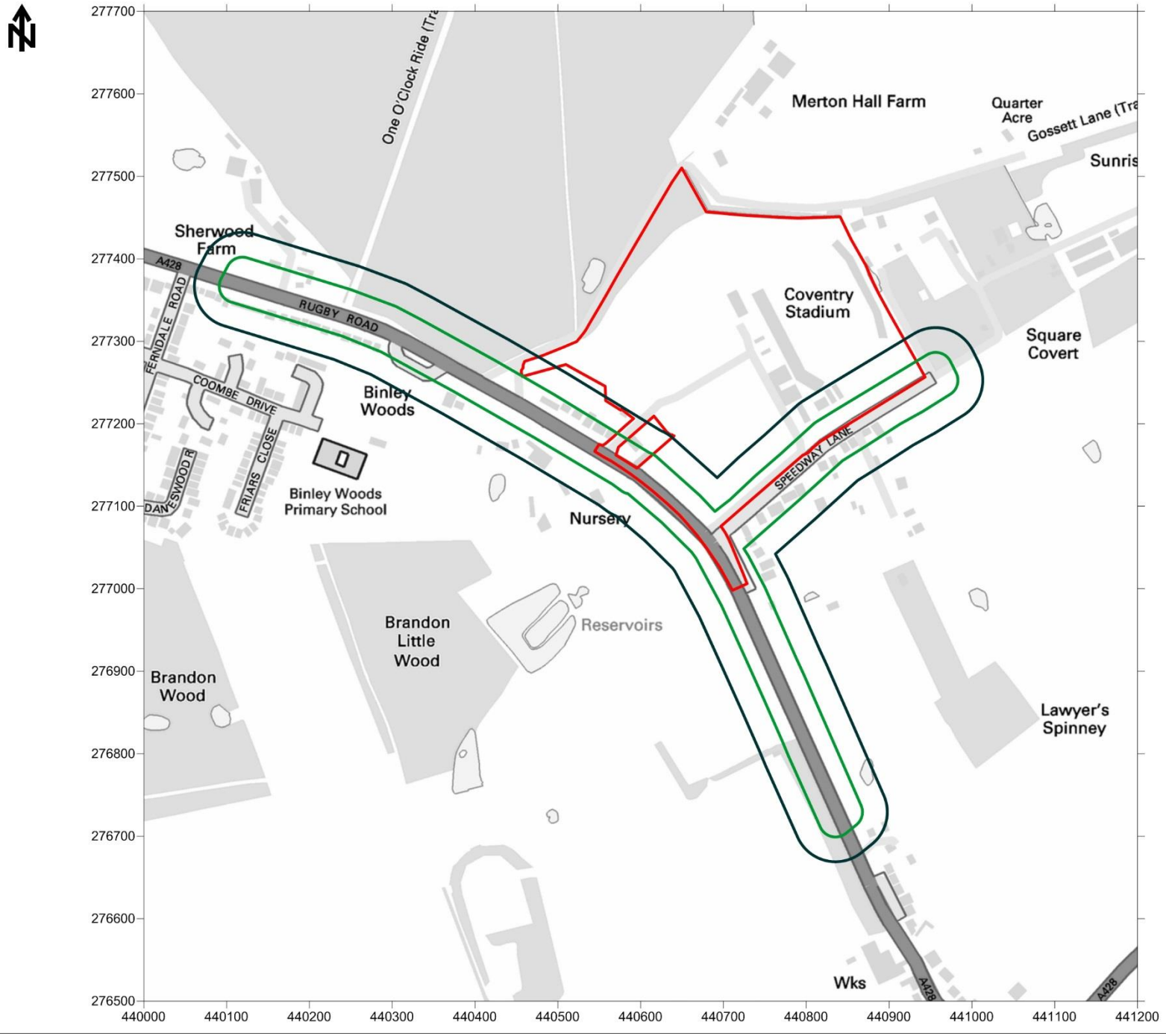


Legend

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

Title

Figure 4

Trackout Dust Buffer Zones

Project

Air Quality Assessment
Coventry Stadium, Brandon

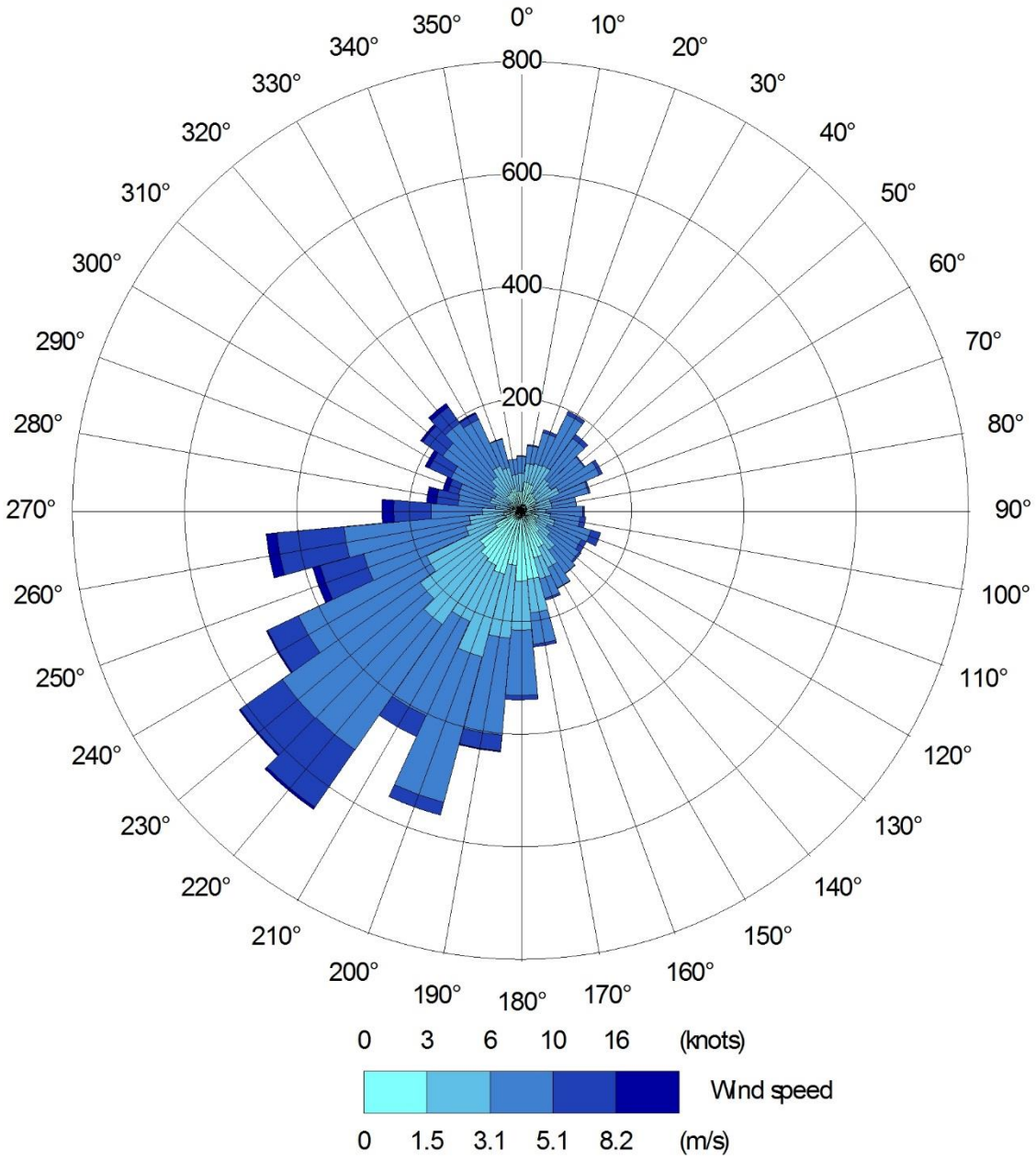
Project Number

AQ103803r3

Client

Framptons

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



Legend

Title

Figure 5

Wind Rose2015
Church Lawford Meteorological Station

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

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REC
Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE
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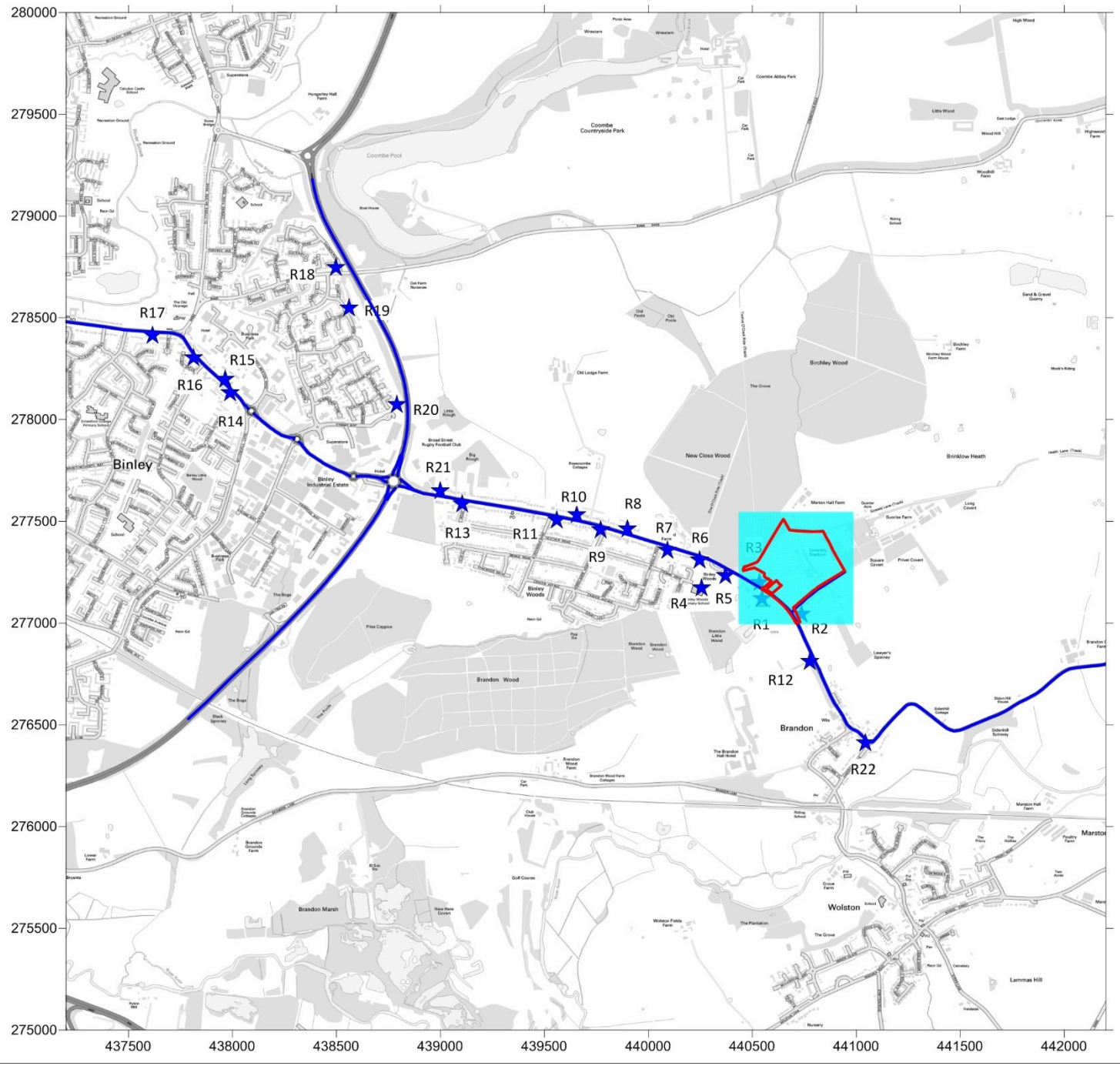

Legend

- Site Boundary
- Modelled Road Link
- Cartesian Grid
- Sensitive Receptor Locations

Title

Figure 6

ADMS Inputs

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

Framptons

REC

Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE

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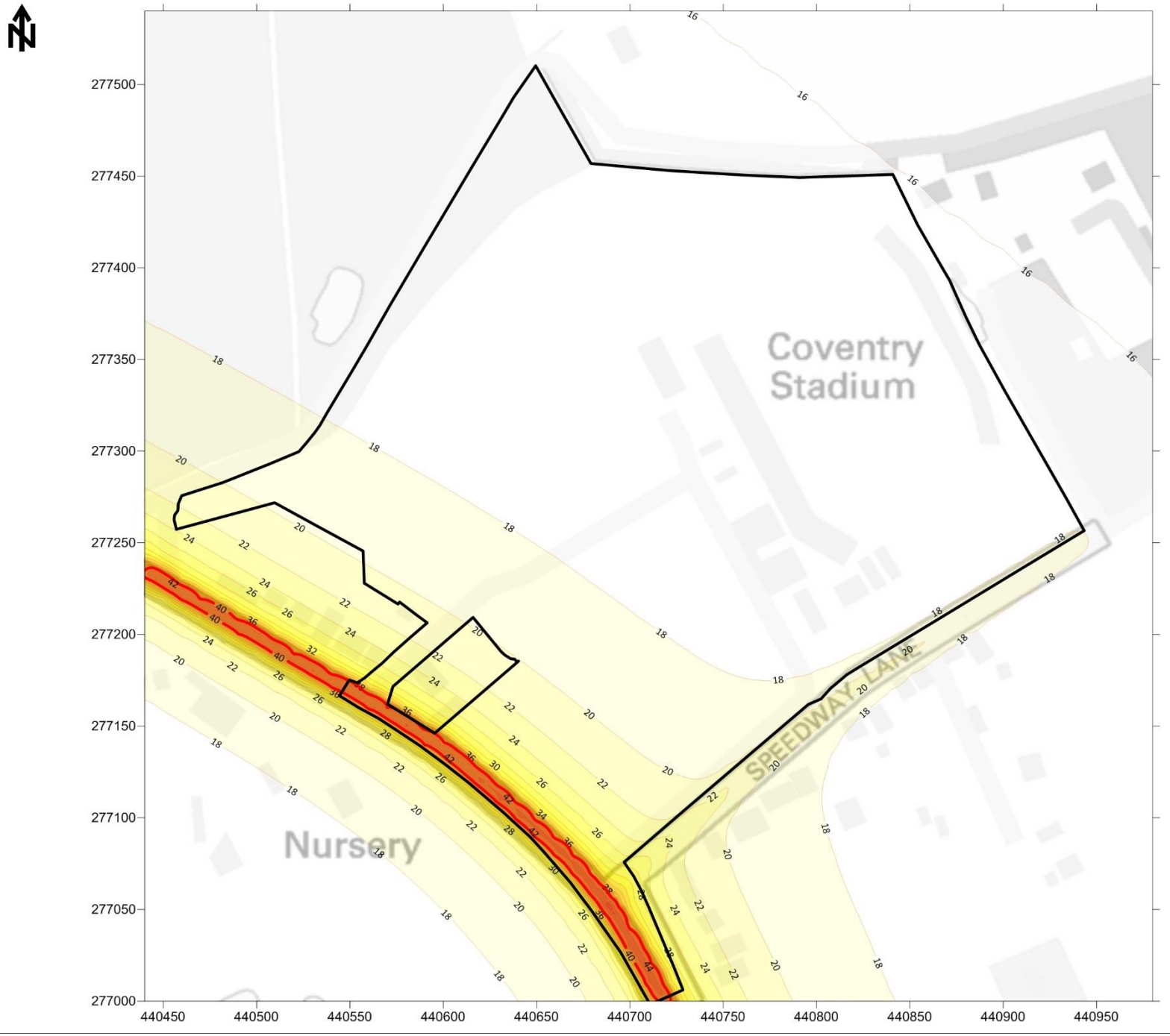

Legend

Site Boundary

50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
20
18
16

Predicted Annual Mean NO_2 Concentration (µg/m³)

Title

Figure 7

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2019 DM

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

Framptons

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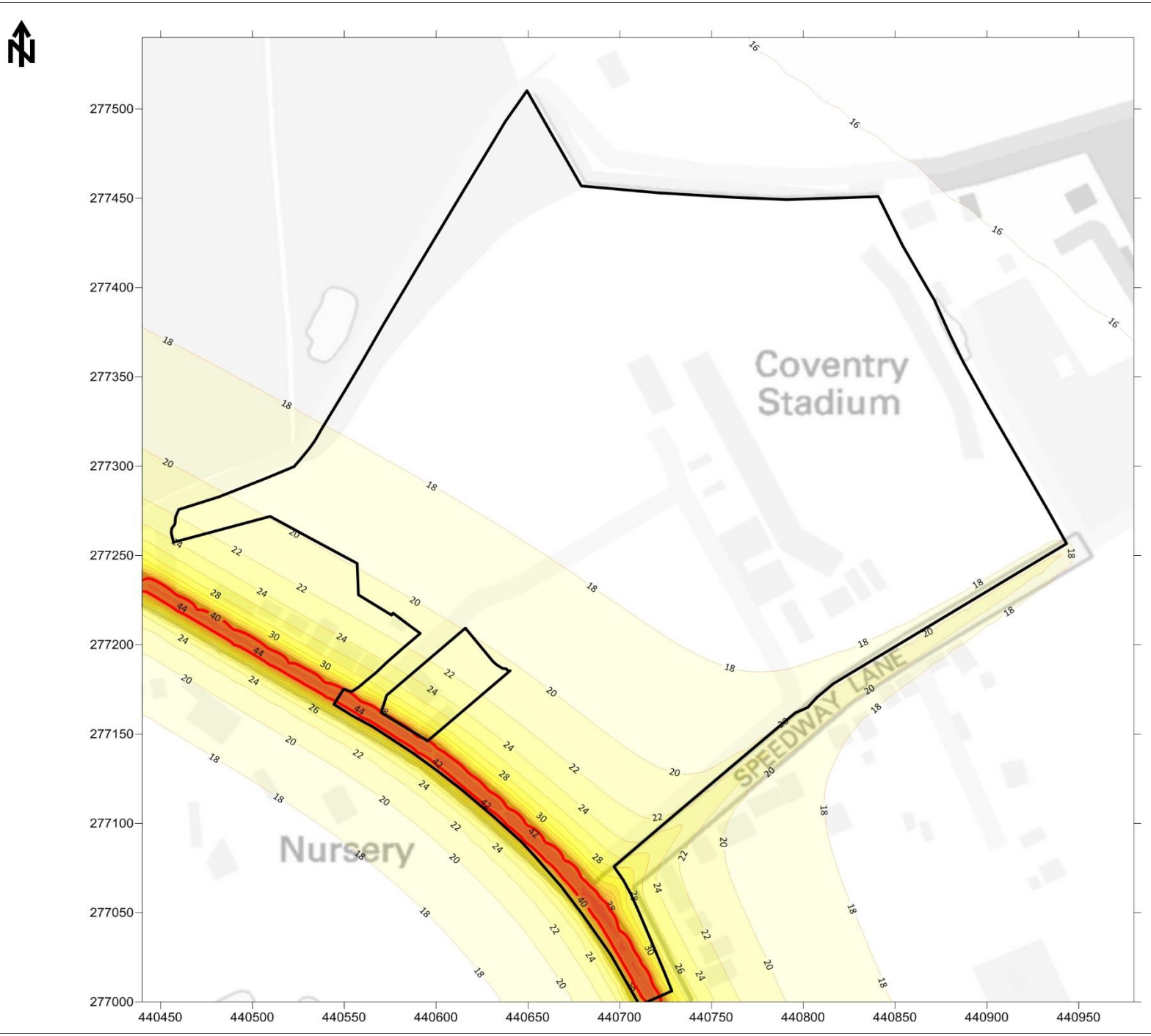

Legend

Site Boundary

Predicted Annual Mean NO_2 Concentration (µg/m³)

50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
20
18
16

Title

Figure 8

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2019 DS

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

Framptons

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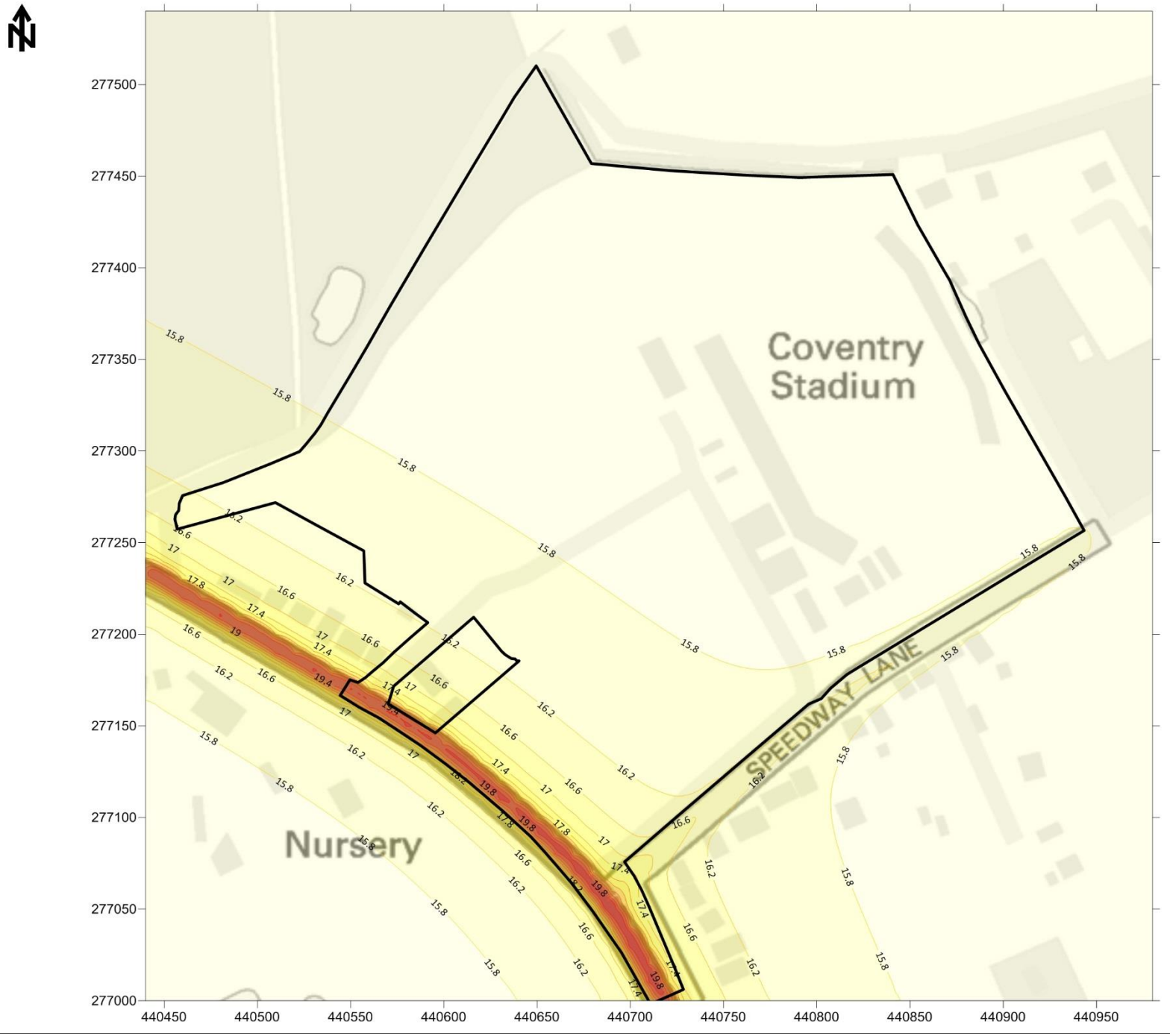

Legend

Site Boundary

Predicted Annual Mean PM_{10} Concentration (µg/m³)

19.8
19.4
19
18.6
18.2
17.8
17.4
17
16.6
16.2
15.8
15.4
15

Title

Figure 9

Predicted Annual Mean PM_{10} Concentrations (µg/m³) 2019 DM

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

Framptons

REC
Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE
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www.recltd.co.uk

Legend

Site Boundary

Predicted Annual Mean PM_{10} Concentration (µg/m³)

19.8
19.4
19
18.6
18.2
17.8
17.4
17
16.6
16.2
15.8
15.4
15

Title

Figure 10

Predicted Annual Mean PM_{10} Concentrations (µg/m³) 2019 DS

Project

Air Quality Assessment
Coventry Stadium, Brandon

Project Number

AQ103803r3

Client

Framptons

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APPENDIX II ASSESSMENT INPUT DATA

ASSESSMENT INPUTS

The proposed development has the potential to impact air quality at existing sensitive receptor locations. Dispersion modelling using ADMS Roads was therefore undertaken to predict NO_2 and PM_{10} concentrations at sensitive locations both with and without the development in order to consider potential changes as a result of the proposals.

The dispersion 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 inputs are described in the following subsections.

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.

Assessment Area

Ambient concentrations were predicted over the area NGR: 440440, 277000 to 440980, 277540. One Cartesian grid at a height of 1.5m was used within the model to represent concentrations at ground floor level to produce data suitable for contour plotting using the Surfer software package.

Reference should be made to Figure 6 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment, including development flows, was provided by David Tucker Associates, the Transport Consultants for the project.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2017 traffic flow year to 2015, which was used to represent the baseline year. Whereas, assumption was made for Speedway Lane traffic data using DFT website

Road widths were estimated from aerial photography and UK highway design standards. Reference should be made to Figure 6 for a graphical representation of the road link locations. A summary of the

traffic data used in the verification scenarios is provided in Table AII.1.

Table AII.1 2015 Traffic Data

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
1	Slowdown 1 East of A228 towards site	4.2	5366	2.57	15
2	Slowdown 2 East of A228 towards site	9.5	5366	2.57	12
3	A228 East Road	6.5	10731	2.57	20
4	A228 Road Slowdown near Site	6.5	10731	2.57	18
5	Speedway Lane	6.5	1073	2.57	20
6	A228 Left of the site	6.5	10731	2.57	25
7	A228 Slowdown Rugby Road	6.5	10731	2.57	20
8	A228 Brandon Road	6.5	10731	2.57	25
9	A228 near Queens Road	5.6	10731	2.57	20
10	A228 S of DT	5.6	10731	2.57	25
11	Slowdown 1 West of A228	9.5	8239	2.77	15
12	Slowdown 2 West of A228	11.8	8239	2.77	18
13	West A228 Road	15.5	16478	2.77	25
14	A228 Slowdown Roundabout B	14.5	16478	2.77	18
15	A228 Between RA B-C	11.5	16478	2.77	20
16	A228 Slowdown Before RA-C	15.5	16478	2.77	15
17	A228 Slowdown After RA-C	13.0	16478	2.77	18
18	A228 Between RA C-D	8.5	16478	2.77	22
19	Slowdown Before A228 Roundabout D	9.5	16478	2.77	15
20	Slowdown After A228 Roundabout D	14.0	16478	2.77	18
21	A228 towards Binley	9.5	16478	2.77	25
22	Slowdown Roundabout A46 North of A228	10.5	20606	4.31	18
23	Slowdown Roundabout A46 North of A228	9.5	20606	4.31	15
24	A46 North	18.0	41212	4.31	50

Road Link		Road Width (m)	24-hour AADT Flow	HDV Prop. (%)	Mean Vehicle Speed (km/h)
25	Slowdown1 Roundabout A46 South of A228	8.5	20239	6.28	18
26	Slowdown 2 Roundabout A46 South of A228	14.5	20239	6.28	20
27	A46 South	18.0	40477	6.28	50
RA-A	Roundabout A46/ A228	14.5	52600	6.28	18
RA-B	A228 West Roundabout 1	14.5	16478	2.77	10
RA-C	A228 Roundabout 2	11.5	16478	2.77	12
RA- D	A228 Roundabout 3	15.5	16478	2.77	10

The road width and mean vehicle speed shown in Table AII.1 remained the same for 2019. A summary of the 2019 traffic data is shown in Table AII.2.

Table AII.2 2019 Traffic Data

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
1	Slowdown 1 East of A228 towards site	5614	2.54	5901	2.42
2	Slowdown 2 East of A228 towards site	5614	2.54	5901	2.42
3	A228 East Road	11229	2.54	11802	2.42
4	A228 Road Slowdown near Site	11229	2.54	11802	2.42
5	Speedway Lane	1123	2.54	1401	2.42
6	A228 Left of the site	11229	2.54	11802	2.42
7	A228 Slowdown Rugby Road	11229	2.54	11802	2.42
8	A228 Brandon Road	11229	2.54	11802	2.42
9	A228 near Queens Road	11229	2.54	11802	2.42
10	A228 S of DT	11229	2.54	11802	2.42
11	Slowdown 1 West of A228	8541	2.77	8652	2.73
12	Slowdown 2 West of A228	8541	2.77	8652	2.73

Road Link		DM		DS	
		24-hour AADT Flow	HDV Prop. (%)	24-hour AADT Flow	HDV Prop. (%)
13	West A228 Road	17083	2.77	17304	2.73
14	A228 Slowdown Roundabout B	17083	2.77	17304	2.73
15	A228 Between RA B-C	17083	2.77	17304	2.73
16	A228 Slowdown Before RA-C	17083	2.77	17304	2.73
17	A228 Slowdown After RA-C	17083	2.77	17304	2.73
18	A228 Between RA C-D	17083	2.77	17304	2.73
19	Slowdown Before A228 Roundabout D	17083	2.77	17304	2.73
20	Slowdown After A228 Roundabout D	17083	2.77	17304	2.73
21	A228 towards Binley	17083	2.77	17304	2.73
22	Slowdown Roundabout A46 North of A228	21314	4.3	21388	4.29
23	Slowdown Roundabout A46 North of A228	21314	4.3	21388	4.29
24	A46 North	42628	4.3	42776	4.29
25	Slowdown1 Roundabout A46 South of A228	20939	6.27	21040	6.24
26	Slowdown 2 Roundabout A46 South of A228	20939	6.27	21040	6.24
27	A46 South	41877	6.27	42080	6.24
RA-A	Roundabout A46/ A228	53150	6.27	53375	6.24
RA-B	A228 West Roundabout 1	17083	2.77	17304	2.73
RA-C	A228 Roundabout 2	17083	2.77	17304	2.73
RA- D	A228 Roundabout 3	17083	2.77	17304	2.73

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 7.0) released in 2016, which incorporates updated COPERT4v11 vehicle emissions factors for NO_x and vehicle fleet information.

There is current uncertainty over NO_2 concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2015 emission factors have been utilised for the prediction of pollution levels for all 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 Church Lawford meteorological station over the period 1st January 2015 to 31st December 2015 (inclusive). Church Lawford meteorological station is located at approximate NGR 445720, 273540, which is approximately 6.1km south-east 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 for a wind rose of utilised meteorological data.

Roughness Length

A roughness length (z_0) of 0.5m 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 'parkland, open suburbia'.

A z_0 of 0.2m was utilised to represent the morphology of the meteorological station location and is suggested as being suitable for 'agricultural areas (min)'

Monin-Obukhov Length

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

Background Concentrations

An annual mean NO_2 concentration of 14.65µg/m^3 and PM_{10} concentration of 15.34µg/m^3, as predicted by DEFRA, was used in the dispersion modelling assessment to represent annual mean pollutant levels in the vicinity of the site.

Similarly to emission factors, background concentrations for 2015 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposals.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO_2 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 2015, using traffic data, meteorological data and monitoring results from this year.

RBC undertakes monitoring of NO_2 concentrations at two monitoring locations within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO_2 result for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LAQM (TG16)[2].

The monitored annual mean NO_2 concentration and calculated road NO_x concentration are summarised in Table AII.3.

Table AII.3 2015 Monitoring Results

Monitoring Location	Monitored NO_2 Concentration ($\mu g/m^3$)	Calculated Road NO_x Concentration ($\mu g/m^3$)
S14 Binley Woods, Village Hall	19.0	8.36
S45 Bretford electricity pole near 3 Avon Cottages	27.7	26.19

The dispersion model was run with the traffic input data previously detailed for 2015 to predict the NO_x concentration at the monitoring location. The results are shown in Table AII.4.

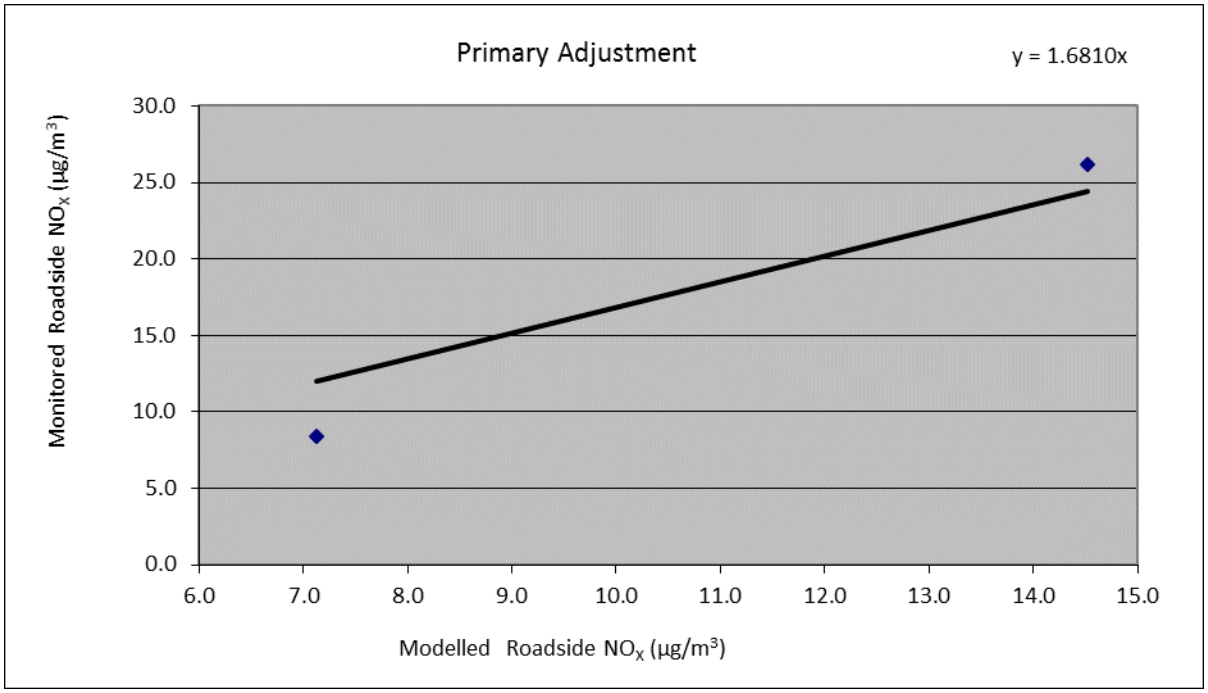
Table AII.4 Verification Results

RBC ID	Monitoring Location	Modelled Road NO_x Concentration ($\mu g/m^3$)
S14	Binley Woods, Village Hall	7.13
S45	Bretford electricity pole near 3 Avon Cottages	14.52

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trend line based on the linear progression through zero was calculated. This indicated a verification factor of **1.6810** was required to be applied to all modelling results, as shown in Graph 1.

As PM_{10} monitoring is not undertaken within the assessment extents, the same verification factor was also utilised to adjust model predictions of this pollutant in accordance with the guidance provided within LAQM (TG16)[2].

Graph 1 Verification



APPENDIX III ASSESSOR'S CURRICULUM VITAE

CONAL KEARNEY

Principal Air Quality Consultant

BEng(Hons), MSc, MIAQM, MIEnvSc

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 Wale – 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