

Air Quality Assessment

Land North of Holme House, Oxford Road, Gomersal

Client: Robert Martin

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Executive Summary

Redmore Environmental Ltd was commissioned by Robert Martin to undertake an Air Quality Assessment in support of the allocation of a parcel of land to the north of Holme House, Oxford Road, Gomersal, for residential use through the development plan process.

The site is located in the vicinity of a number of busy roads. These may cause elevated pollution levels due to vehicle exhaust emissions and act as a constraint to residential land use across the parcel of land. As such, an Air Quality Assessment has been undertaken in order to determine baseline conditions at the site, consider its suitability for the proposed end-use and support its allocation within the forthcoming development plan.

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

The results of the dispersion modelling assessment indicated that predicted pollution levels were below the relevant air quality standards across the site. As such, future occupants would not be exposed to poor air quality should the parcel of land be allocated for residential use.

Based on the assessment results, it is concluded that poor air quality is not considered a constraint to allocation of the site for residential land use through the development plan process.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Robert Martin to undertake an Air Quality Assessment in support of the allocation of a parcel of land to the north of Holme House, Oxford Road, Gomersal, for residential use through the development plan process.

1.1.2 Residential development at this location may lead to the exposure of future occupants to elevated pollution levels. As such, an Air Quality Assessment was required in order to determine baseline conditions at the site and consider its suitability for the proposed end-use.

1.2 Site Location and Context

1.2.1 The site is located on land north of Holme House, Oxford Road, Gomersal, at approximate National Grid Reference (NGR): 420388, 427108. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 Kirklees Council (KC) are currently in the process of generating a new statutory development plan for the area, scheduled for adoption in 2017. Review of draft documents produced for the Local Plan reveal that the site north of Holme House is intended for designation as safeguarded land. The proposals aim to achieve approval for this location to be allocated for residential use through during the upcoming local plan period.

1.2.3 The site is located in the vicinity of a number of busy roads, including the M62 and the A651. These may cause elevated pollution levels due to vehicle exhaust emissions and act as a constraint to residential land use across the parcel of land. An Air Quality Assessment was therefore undertaken in order to define baseline conditions, assess any constraints to residential land use at the proposed location and define any mitigation necessary to support the scheme. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 European Directives

2.1.1 European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new Air Quality Limit Values (AQLVs) for particulate matter with an aerodynamic diameter of less than 2.5µm. The consolidated Directives include:

- Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

2.1.2 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

2.2.1 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 5 pollutants.

2.2.2 Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for

Environment, Food and Rural Affairs (DEFRA) and published in July 2007¹. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

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

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum

2.2.4 Table 2 summarises the advice provided in DEFRA guidance LAQM.TG(09)² on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed	Building façades of 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

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

² Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade) or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.3 Local Air Quality Management

2.3.1 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 National Planning Policy

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

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

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

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

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

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

2.5 National Planning Practice Guidance

2.5.1 The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. Why should planning be concerned about air quality?
2. What is the role of Local Plans with regard to air quality?
3. Are air quality concerns relevant to 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?

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

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

2.6 Local Planning Policy

2.6.1 The Unitary Development Plan (UDP)⁵ sets out KC's policies and proposals for the use and development of land and buildings. The UDP was adopted in March 1999, and a direction issued by the Secretary of State for Communities and Local Government in September 2007 led to a review of the plans, where a number of policies were removed.

2.6.2 Review of the UDP policies saved beyond September 2007 revealed the following of relevance to this report:

"Built Environment

BE1

all development should be of good quality design such that it contributes to a built environment which:

[...]

iv. promotes a healthy environment, including space and landscaping about buildings and avoidance of exposure to excessive noise or pollution; [...]"

2.6.3 KC are currently developing a new Local Plan which will form the new statutory plan for the district and will supersede the UDP. Review of the Strategy & Policies⁶ document from the Draft Local Plan revealed the following policies of relevance to this report:

"Policy DLP 48

Healthy, active and safe lifestyles

⁵ Kirklees Unitary Development Plan, Written Statement - Revised with Effect from 28 September 2007, Kirklees Council, 2007.

⁶ Strategies and Policies, Draft Local Plan Kirklees Council, 2015.

The council will, with its partners, create an environment which supports healthy, active and safe communities and reduces inequality. Healthy, active and safe lifestyles will be enabled by:

[...]

g. ensuring that the current air quality in the district is monitored and maintained and, where required, appropriate mitigation measures included as part of new development proposals; [...]"

"Policy DLP51

Protection and improvement of local air quality

Proposals that have the potential to increase local air pollution either individually or cumulatively must be accompanied by evidence to show that the impact of the development has been assessed in accordance with the relevant guidance.

Development which has the potential to cause levels of local air pollution to increase to unsafe levels must incorporate sustainable mitigation measures that reduce this impact to a safe level. If sustainable measures cannot be introduced the development will not be permitted.

Where the development introduces new receptors into Air Quality Management Areas or Areas of Concern or near other areas of relatively poor air quality, for example near roads or junctions, the development must incorporate sustainable measures that protect the new receptors from unacceptable levels of air pollution. Where sustainable measures cannot be introduced which prevent receptors from being exposed to unsafe levels of air pollution, development will not be permitted.

All development will be carried out in accordance with the most relevant and up to date strategies, guidance, legal requirements and action plans."

2.6.4 The above policies were taken into consideration throughout the undertaking of the assessment.

3.0 BASELINE

3.1 Introduction

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

3.2 Local Air Quality Management

3.2.1 As required by the Environment Act (1995), KC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO₂ are above the AQO at one location within the council's administrative extents. This is described as:

"An area encompassing properties along two sections of the A62 Leeds Road, in the vicinity of the junctions with the A6107 Bradley Road, and with the A644."

3.2.2 The council have also identified that 24-hour PM₁₀ concentrations are above the AQO at one location within the council's administrative extents. This is described as:

"Incorporating a number of properties along part of the Huddersfield Road A644"

3.2.3 The AQMAs are situated over 7km from the site. As such, they are not considered to be representative of pollutant concentrations at the proposed location. Thus, the AQMAs have not been considered further in the context of the assessment.

3.2.4 KC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

3.3 Air Quality Monitoring

3.3.1 Monitoring of pollutant concentrations is undertaken by KC using continuous and periodic methods throughout their area of jurisdiction. Recent NO₂ concentrations from positions in the vicinity of the site are shown in Table 3. Exceedences of the relevant AQOs are shown in **bold**.

Table 3 NO₂ Monitoring Results

Monitoring Site		Monitored NO ₂ Concentration (µg/m ³)		
		2012	2013	2014
-	Roadside 4	42.9	36.9	43.6
62	Birkenshaw A651	42.60	36.63	36.18
63	Birkenshaw A58	50.62	42.63	40.68

3.3.2 As shown in Table 3, the annual mean AQO for NO₂ was exceeded at all three monitoring positions in recent years. As these sites are all located in close vicinity to busy roads, elevated pollutant concentrations would be expected. Reference should be made to Figure 2 for a map of the monitoring locations.

3.3.3 Recent PM₁₀ monitoring results are summarised in Table 4.

Table 4 PM₁₀ Monitoring Results

Monitoring Site		Annual Mean PM ₁₀ Concentration (µg/m ³)			Number of Days with PM ₁₀ Concentrations Greater than 50µg/m ³		
		2012	2013	2014	2012	2013	2014
-	Roadside 4	19.87	22.29	20.84	13	13 (40.57) ^a	8 (33.77) ^a

Note: (a) Where results were captured for less than 90% of the calendar year, the 90th percentile of 24-hour means is shown in brackets.

3.3.4 As shown in Table 4, the annual mean and 24-hour mean AQOs for PM₁₀ have been achieved consistently at the Roadside 4 analyser in recent years.

3.4 Background Pollutant Concentrations

3.4.1 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 site is located in grid square NGR: 420500, 427500.

Data for this location was downloaded from the DEFRA website⁷ for the purpose of the assessment and is summarised in Table 5.

Table 5 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration ($\mu\text{g}/\text{m}^3$)		
	2014	2015	2018
NO ₂	27.64	26.69	23.14
PM ₁₀	18.73	18.40	17.93

3.4.2 As shown in Table 5, predicted background pollutant concentrations are below the relevant AQOs at the proposed site.

⁷ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011>.

4.0 METHODOLOGY

4.1 Introduction

4.1.1 Residential development at the proposed location may lead to the exposure of future occupants to elevated pollution levels. In order to assess whether concentrations are a constraint to the allocation of the site for residential use, detailed dispersion modelling was undertaken in accordance with the following methodology.

4.1.2 Modelling was undertaken for 2014 to allow verification against recent monitoring results and 2018 to represent future concentrations should the site be allocated for residential land use.

4.1.3 Review of the PM₁₀ monitoring results indicated concentrations significantly below the relevant AQOs at the Roadside 4 analyser in recent years, as shown in Table 4. It is considered likely that levels at the proposed site are lower than these values due to increased distance from the M62. As such, exceedences of the relevant AQOs is considered unlikely and modelling of PM₁₀ concentrations was not carried out as part of the assessment. This allowed the analysis to focus on NO₂, which was identified as the pollutant of most concern.

4.2 Dispersion Model

4.2.1 Dispersion modelling was undertaken in order to predict NO₂ concentrations across the site using the ADMS-Roads dispersion model (version 3.4.2.0). 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.

4.2.2 The model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;

- Street width;
- Meteorological data;
- Roughness length; and,
- Monin-Obukhov length.

4.2.3 These are detailed in the following Sections.

4.3 Assessment Area

4.3.1 Ambient concentrations were predicted over the area NGR: 420225, 426900 to 420625, 427300. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.

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

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

4.4 Traffic Flow Data

4.4.1 Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as Heavy Duty Vehicle (HDV) proportion, was obtained from the Department for Transport (DfT)⁸. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network in Great Britain for the years 1999 to 2014. It should be noted that the DfT matrix is referenced in DEFRA guidance LAQM.TG(09)⁹ as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

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

⁹ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

4.4.2 Baseline traffic data was obtained and converted to 2018 flows for future year predictions utilising factors obtained from TEMPro. This software package has been developed by the DfT to calculate traffic growth throughout the UK.

4.4.3 Road widths were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the assessment is provided in Table 6.

Table 6 Traffic Data

Link		Road Width (m)	24-hour AADT Flow		HDV Proportion of Fleet (%)	Mean Vehicle Speed (km/h)
			2014	2018		
L1	M62 Southbound	11.7	76,159	79,023	13.75	90
L2	M62 Northbound	11.7	76,159	79,023	13.75	90
L3	Whitehall Road	8.3	14,875	15,434	2.45	35
L4	Whitehall Road	8.4	15,359	15,936	3.17	45
L5	Bradford Road	9.8	9,553	9,912	2.93	45
L6	Roundabout	10.8	15,390	15,969	3.17	25
L7	Oxford Road	9.8	15,421	16,001	2.68	45
L8	Oxford Road	9.9	15,421	16,001	2.68	30
L9	Dewsbury Road	11.0	11,566	12,001	2.39	25
L10	Dewsbury Road	9.9	11,566	12,001	2.39	45
L11	Oxford Road	10.9	9,407	9,761	2.97	45
L12	Oxford Road	9.9	9,407	9,761	2.97	30

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

4.5 Emission Factors

4.5.1 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 6.0.2). This has been produced by DEFRA and

incorporates updated COPERT4v10 vehicle emissions factors for NO_x and vehicle fleet information.

4.5.2 There is current uncertainty over NO₂ concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2014 emission factors were utilised in preference to the potential opening year in order to provide robust concentration predictions. As predictions for 2014 were verified, it is considered results are a robust indication of worst case concentrations for the future year.

4.6 Road Gradients

4.6.1 Review of mapping data indicated a significant gradient of 3.8% on Whitehall Road. This can lead to additional emissions associated with increased engine effort when a vehicle travels uphill. As such, the procedure provided within Appendix 2 of DEFRA Guidance LAQM.TG(09)¹⁰ was utilised in order to calculate appropriate adjusted emission factors for use in the model.

4.7 Meteorological Data

4.7.1 Meteorological data used in the assessment was taken from Leeds Bradford Airport meteorological station over the period 1st January 2014 to 31st December 2014 (inclusive). Leeds Bradford Airport is located at NGR: 422676, 441150, which is approximately 14.3km north-east of the proposed site. DEFRA guidance LAQM.TG(09)¹¹ recommends meteorological stations within 30km of an assessment area as being suitable for detailed modelling.

4.7.2 All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 4 for a wind rose of the utilised meteorological values.

¹⁰ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

¹¹ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

4.8 Roughness Length

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

4.8.2 A z_0 of 0.2m was used to describe the meteorological site. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural areas (min)'.

4.9 Monin-Obukhov Length

4.9.1 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used in the dispersion modelling study. This value is considered appropriate for the nature of the modelling extents and meteorological site and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

4.10 Background Concentrations

4.10.1 The background concentration used in the assessment was obtained from the DEFRA mapping study. This is shown in Table 5.

4.10.2 Similarly to emission factors, background concentrations from 2014 were utilised in preference to the potential opening year, should the land be allocated for residential use. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of future proposals.

4.11 NO_x to NO₂ Conversion

4.11.1 Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 4.1) provided by DEFRA, which is the method detailed within DEFRA guidance LAQM.TG(09)¹².

¹² Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

4.12 Verification

4.12.1 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.

4.12.2 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.

4.12.3 For the purpose of the assessment model verification was undertaken for 2014 using traffic data, meteorological data and monitoring results from this year.

4.12.4 KC undertook monitoring of NO₂ concentrations at three locations within the modelling extents during 2014. However, results from the Roadside 4 monitor were excluded from the verification process as it is significantly elevated when compared with the M62 due to its positioning on an overpass. This could not be accurately represented within the model and would have resulted in an overestimation of road emissions should the monitor have been included.

4.12.5 Results from the remaining two monitors were obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance LAQM.TG(09)¹³. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table 7.

Table 7 Verification - Monitoring Results

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
62	Birkenshaw A651	36.20	18.37

¹³ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
63	Birkenshaw A58	40.68	28.86

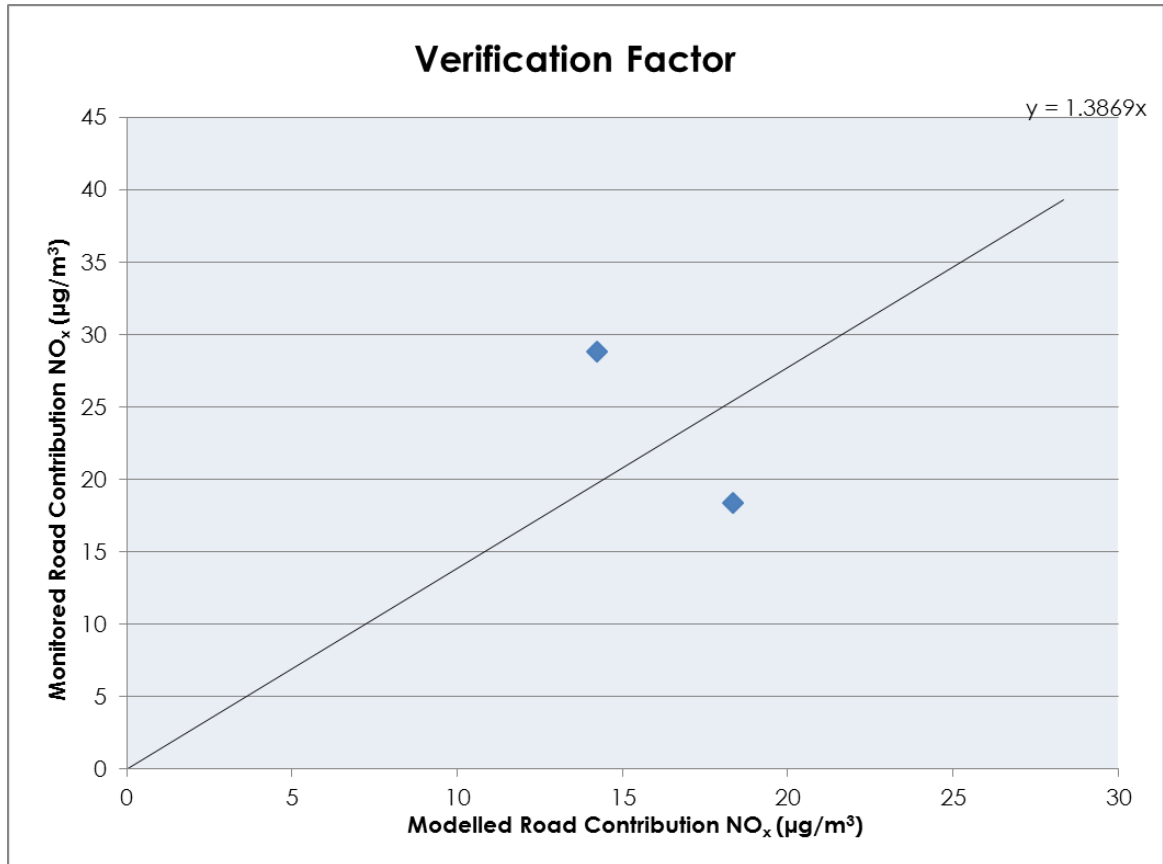
4.12.6 The annual mean road NO_x concentrations predicted from the dispersion model and the calculated 2014 road NO_x monitoring results are summarised in Table 8.

Table 8 Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
62	Birkenshaw A651	18.37	18.34
63	Birkenshaw A58	28.86	14.24

4.12.7 The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 1.3869 was required to be applied to all road NO_x modelling results, as shown in Graph 1.

Graph 1 Verification



5.0 ASSESSMENT

5.1 Potential Development Constraints

5.1.1 Allocation of the development site for residential land use may lead to the exposure of future occupants to poor air quality. Dispersion modelling was therefore undertaken with the inputs described in Section 4.0 to quantify air quality conditions at the site. Reference should be made to Figure 5 for a graphical representation of the results.

5.1.2 As shown in Figure 5, annual mean NO₂ concentrations were predicted to be below the AQO of 40µg/m³ at all locations across the site. The maximum level at the boundary was 38.61µg/m³. As such, it is considered unlikely that residential development would lead to exposure of future occupants to exceedences of the AQOs. Air quality should therefore not be viewed as a constraint to the proposed allocation.

5.1.3 It should be noted that the M62 runs through a cutting in the vicinity of the site. This could not be accurately represented within the model and all roads were therefore included at the same level. This is likely to overestimate pollutant concentrations throughout the assessment extents as reduced emission dispersion was not included in the outputs. As such, the model results are considered a worst-case estimation of air quality conditions at the proposed site.

5.2 Further Assessment

5.2.1 Should the parcel of land be allocated for residential use there is the potential for any development to cause air quality impacts as a result of vehicles travelling to and from the site. These could be fully assessed in accordance with the requirements of the Institute of Air Quality Management document 'Land-Use Planning & Development Control: Planning for Air Quality'. This would allow an analysis of potential effects generated by future proposals and identification of suitable mitigation measures to reduce impacts, should this be deemed necessary.

5.2.2 Due to the size of the parcel of land it is considered that any air quality impacts could be adequately controlled through standard mitigation techniques. As such, potential effects associated with traffic exhaust emissions from vehicle trips generated by any future development is not considered a constraint to allocation of the site for residential use.

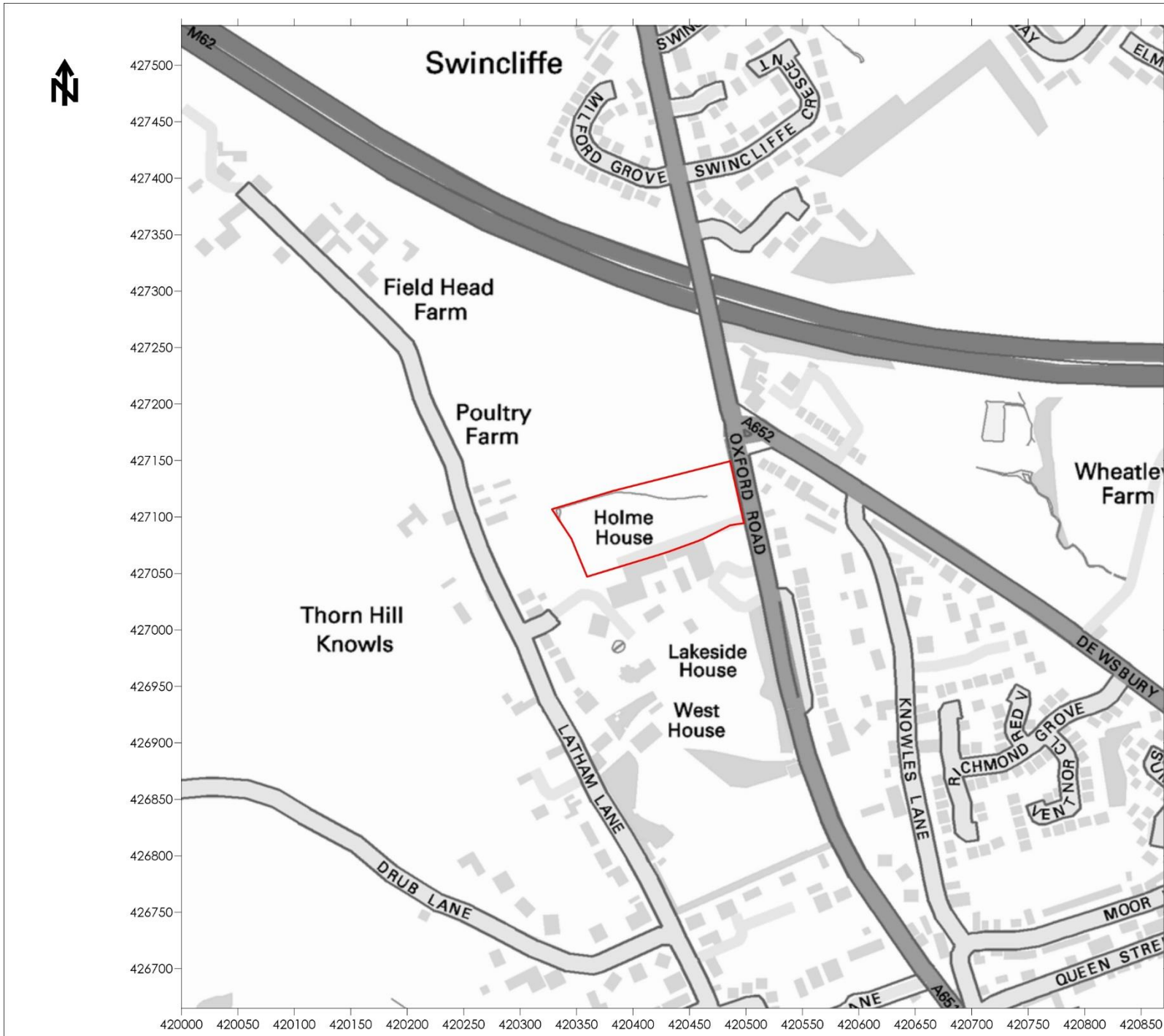
6.0 CONCLUSION

- 6.1.1 Redmore Environmental Ltd was commissioned by Robert Martin to undertake an Air Quality Assessment in support of the allocation of a parcel of land to the north of Holme House, Oxford Road, Gomersal, for residential use through the development plan process.
- 6.1.2 The site is located in the vicinity of a number of busy roads. These may cause elevated pollution levels due to vehicle exhaust emissions and act as a constraint to residential land use across the parcel of land. As such, an Air Quality Assessment has been undertaken in order to determine baseline conditions at the site, consider its suitability for the proposed end-use and support its allocation within forthcoming development plan.
- 6.1.3 Dispersion modelling was undertaken using ADMS-Roads in order to predict pollutant concentrations as a result of emissions from the local highway network. Outputs were subsequently verified using monitoring data obtained from KC.
- 6.1.4 The results of the dispersion modelling assessment indicated that NO₂ concentrations were below the relevant AQO at all locations across the site. Exposure of potential future occupants to poor air quality is therefore considered unlikely should the land be allocated for residential use.
- 6.1.5 Based on the assessment results, it is concluded that poor air quality is not considered a constraint to allocation of the site for residential land use through the development plan process.

7.0 ABBREVIATIONS

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

Figures



Legend



Title
Figure 1 - Site Location Plan

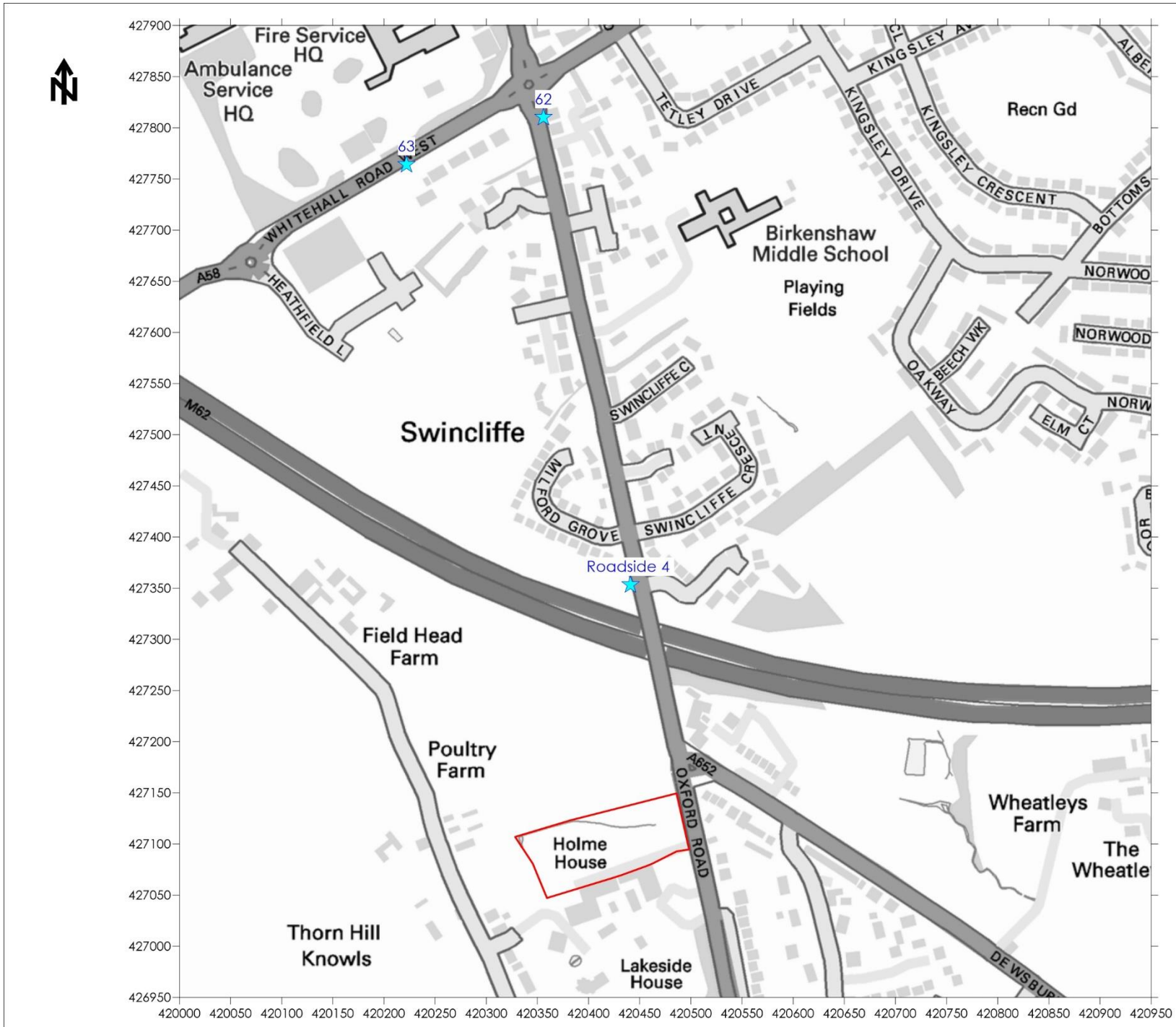
Project
Air Quality Assessment
Land north of Holme House,
Oxford Road, Gomersal

Project Reference
1182

Client
Robert Martin

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Legend

-  Site Boundary
-  Monitoring Location

Title
Figure 2 - Monitoring Locations

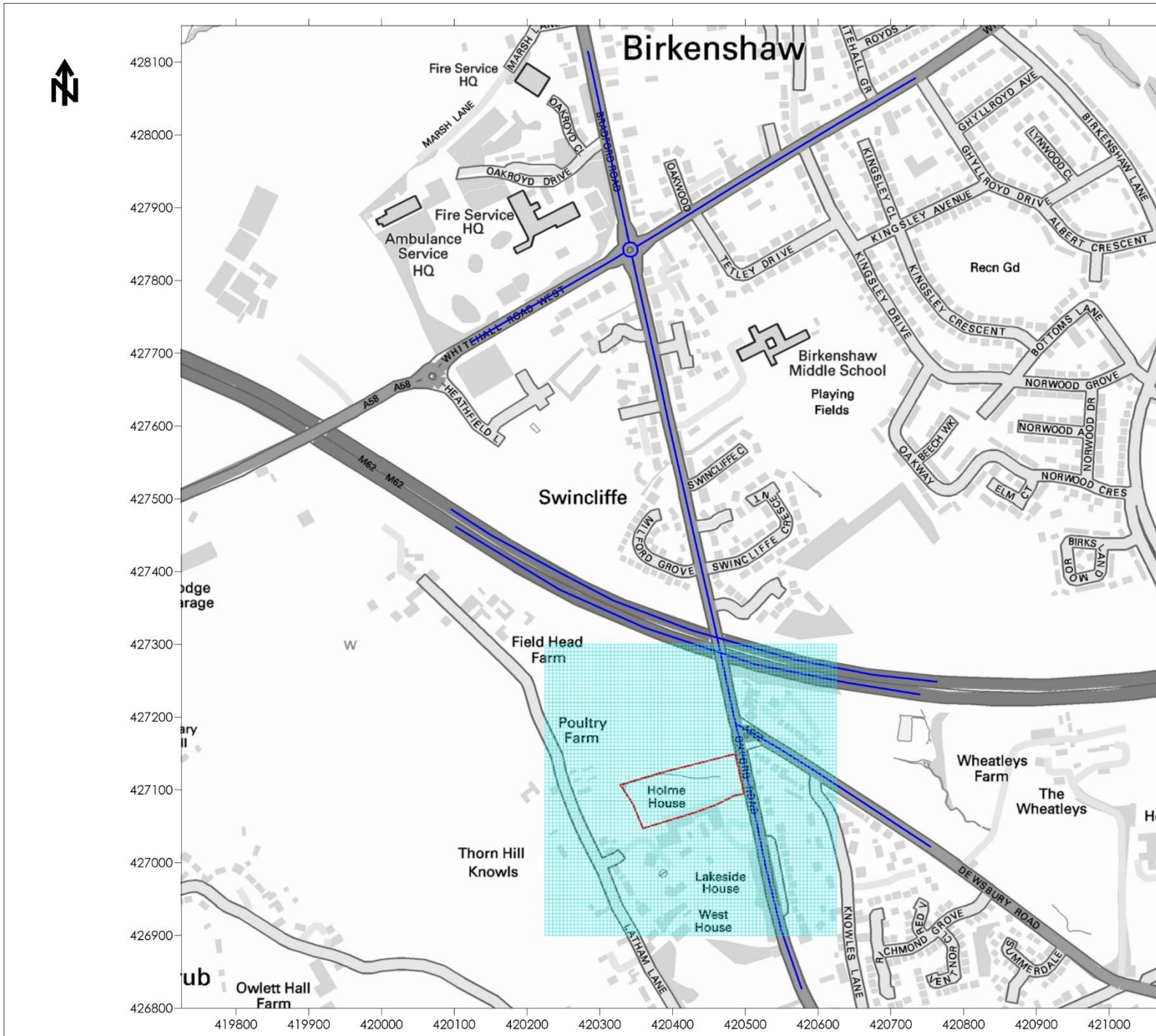
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Legend

-  Site Boundary
-  Output Grid
-  Road Link

Title

Figure 3 - ADMS-Roads Inputs

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Air Quality Assessment
Land north of Holme House,
Oxford Road, Gomersal

Project Reference

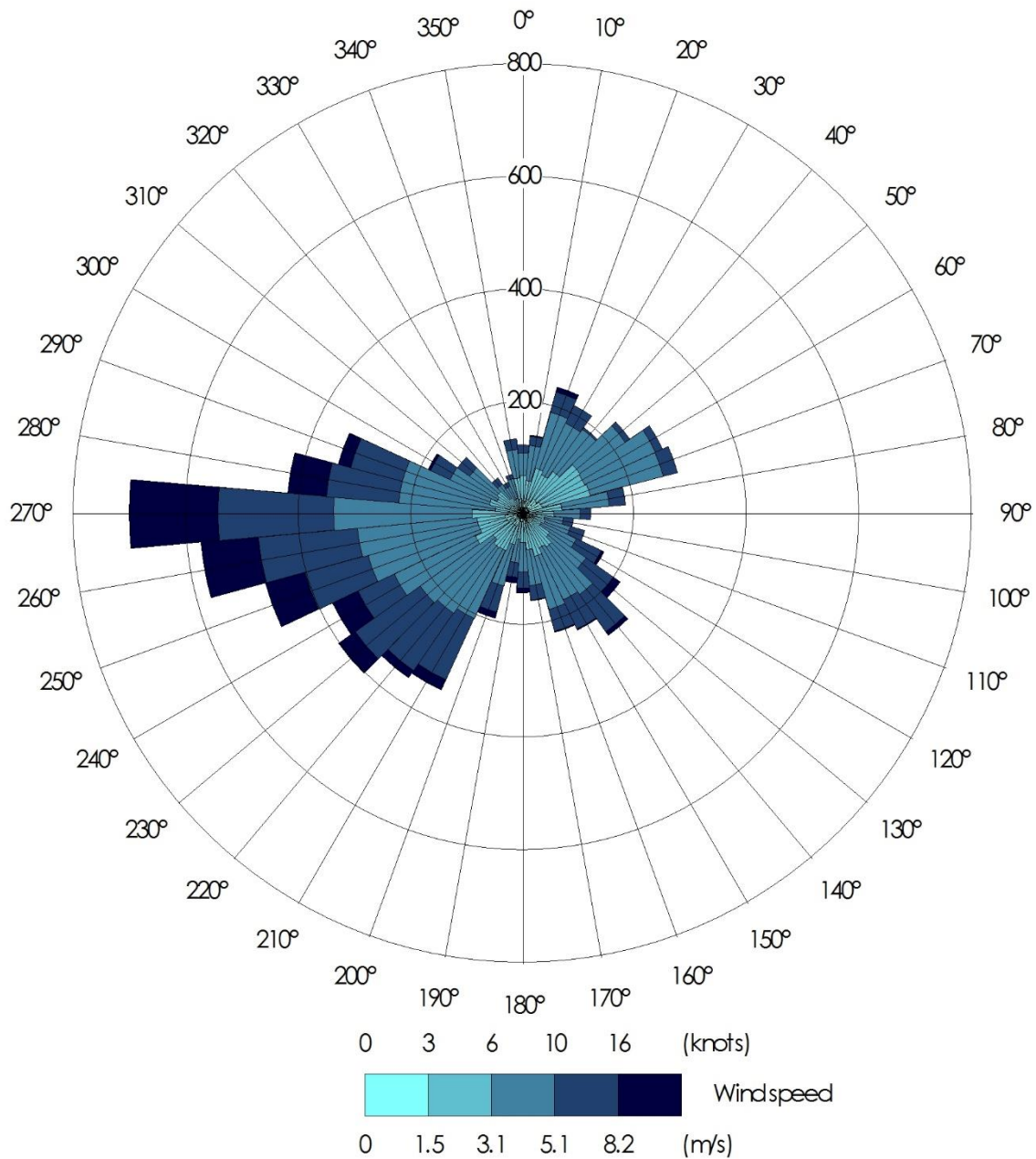
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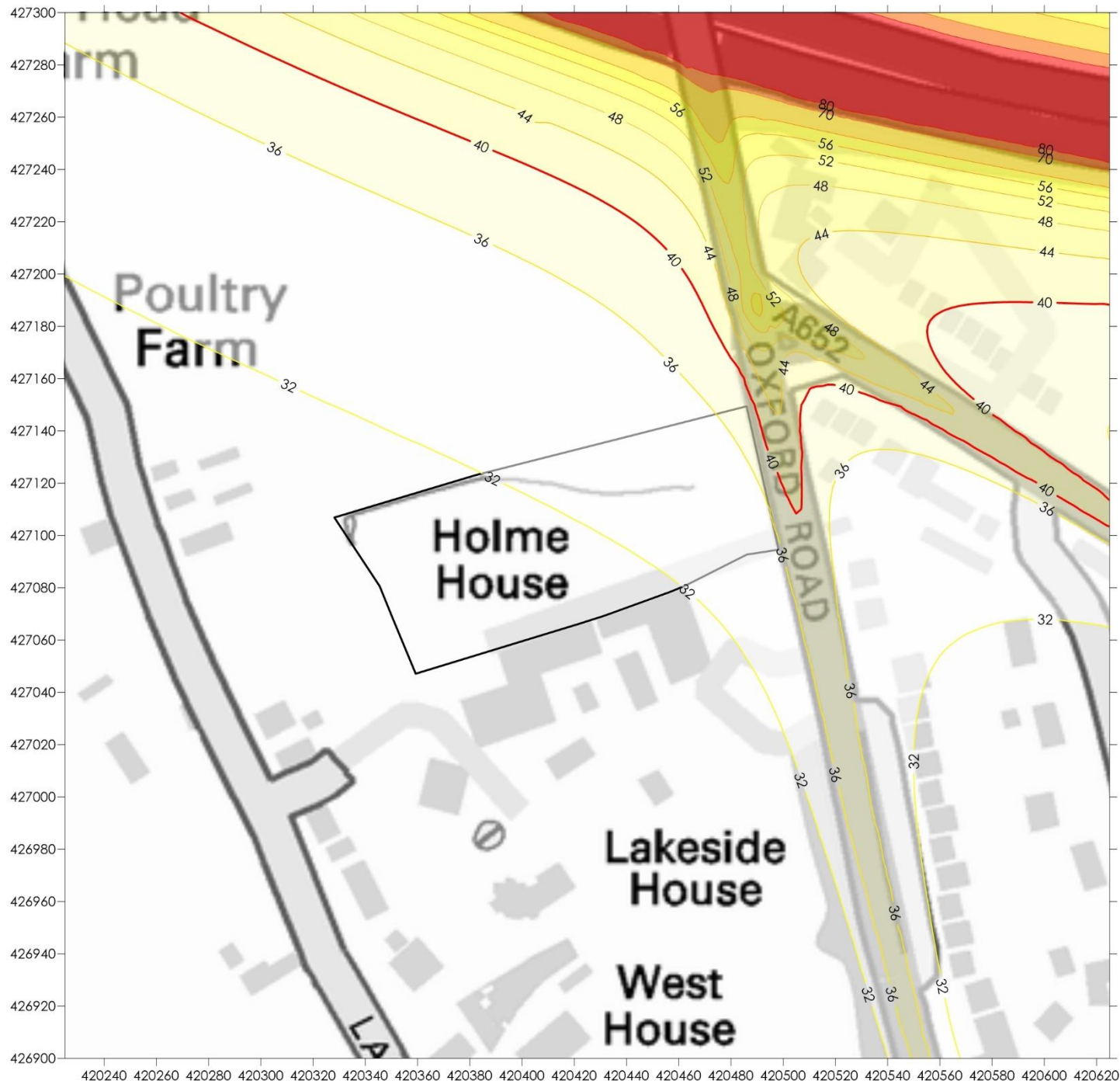
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 Figure 4 - Wind Rose of 2014
 Leeds Bradford Airport
 Meteorological Data

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 Air Quality Assessment
 Land north of Holme House,
 Oxford Road, Gomersal

Project Reference
 1182

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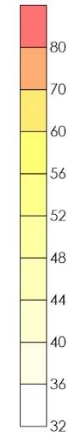




Legend



Site Boundary



Predicted Annual Mean NO₂ Concentration (µg/m³)

Title

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

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