

Air Quality Assessment
Locke Road, Gilroyd

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Executive Summary

Redmore Environmental Ltd was commissioned by The UK Development Group Ltd to undertake an Air Quality Assessment in support of a planning application for the installation of two biomass boilers at Water Royd Care Home, Locke Road, Gilroyd, Barnsley.

Combustion emissions from the plant have the potential to cause air quality impacts during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and assess potential changes in pollution levels as a result of the development.

Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the biomass boilers. The results indicated that impacts on pollutant concentrations were not predicted to be significant at any receptor location in the vicinity of the site.

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

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1.0 INTRODUCTION

1.1 Background

- 1.1.1 Redmore Environmental Ltd was commissioned by The UK Development Group Ltd to undertake an Air Quality Assessment in support of a planning application for the installation of two biomass boilers at Water Royd Care Home, Locke Road, Gilroyd, Barnsley.
- 1.1.2 Combustion emissions from the plant have the potential to cause air quality impacts during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and assess potential changes in pollution levels as a result of the development.

1.2 Site Location and Context

- 1.2.1 Water Royd Care Home is located on land off Locke Road, Gilroyd, Barnsley S75 3QH, at approximate National Grid Reference (NGR): 432340, 404800. Reference should be made to Figure 1 for a map of the site location and surrounding area.
- 1.2.2 It is proposed to install two 60kW Windhager biomass boilers at the site. The plant will be housed within a container on the south-eastern section of the care home plot. Emissions from the boilers will be released to atmosphere at a height of 5.9m via two dedicated flues.
- 1.2.3 Combustion emissions from the plant have the potential to cause air quality impacts at sensitive locations during normal operation. These have been assessed within the following report.

2.0 LEGISLATION AND POLICY

2.1 Legislation

2.1.1 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO₂);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Particulate matter with an aerodynamic diameter of less than 2.5µm;
- Benzene; and,
- Carbon monoxide.

2.1.2 Target Values were also provided for an additional 5 pollutants. These include:

- Ozone;
- Arsenic;
- Cadmium;
- Nickel; and,
- Benzo(a)pyrene.

2.1.3 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.

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

¹ The AQS 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 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

2.1.5 Table 2 summarises the advice provided in DEFRA guidance² on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building 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

² Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
1-hour mean	All locations where the annual mean and 24 mean objective applies. 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

2.2 **Local Air Quality Management**

2.2.1 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities 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 are likely to be exceeded, the Local Authority 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.

2.3 **National Planning Policy**

2.3.1 The revised National Planning Policy Framework³ (NPPF) was published in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

2.3.2 The purpose of the planning system is to contribute to the achievement of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives, including the following of relevance to air quality:

"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving

³ NPPF, Ministry of Housing, Communities and Local Government, 2021.

biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

2.3.3 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

[...]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality [...]"

2.3.4 The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

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

2.4 National Planning Practice Guidance

2.4.1 The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making 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 considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

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

2.5 Local Planning Policy

2.5.1 The Barnsley Metropolitan Borough Council (BMBC) Local Plan⁵ sets out the planning framework for the borough up to the year 2033.

2.5.2 A review of the document indicated the following in relation to air quality of relevance to this assessment:

"Policy GD1 General Development

Proposals for development will be approved if:

[...]

⁴ <https://www.gov.uk/guidance/air-quality--3>.

⁵ BMBC, Barnsley Local Plan, 2019.

Any adverse impact on the environment, natural resources, waste and pollution is minimised and mitigated;

[...]."

"Policy Poll1 Pollution Control and Protection

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.

We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against.

Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate."

2.5.3 Policy AQ1 discusses development which may affect AQMAs:

"Development which impacts on areas sensitive to air pollution in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the development in terms of air quality (including residents, employees, visitors and customers), taking into account any suitable and proportionate mitigation required for the development.

We will only allow residential development which impacts on areas sensitive to air pollution, where the developer provides an assessment that shows living conditions will be acceptable for future residents, subject to any required mitigation.

We will only allow development which impacts on areas sensitive to air pollution which could cause more air pollution, where the developer provides an assessment that shows there will not be a significantly harmful effect on air quality, subject to any required mitigation.

Furthermore, development which impacts on areas sensitive to air pollution due to traffic emissions will be expected to demonstrate suitable and proportionate mitigation relative to the increased traffic emissions generated by the development."

- 2.5.4 The implications of 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 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), BMBC 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 AQOs within the borough. Six AQMAs have therefore been declared. The closest to the development is AQMA No. 1, which is described as follows:

"An area along the M1 between Junction 35a and Junction 38, including Haigh, Darton, Cawthorne Dike, Higham, Dodworth, Gilroyd, Rockley, Birdwell, and Tankersley. The area extends 100m either side of the central reservation."

- 3.2.2 The development is located approximately 250m south-west of the AQMA.
- 3.2.3 BMBC 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 BMBC throughout their area of jurisdiction. However, the closest site to the development is situated approximately 1.2km north-east of the boundary at the A628/ M1 junction. It is not considered likely that similar pollution levels would occur at the two positions due to the distance between the locations and difference in surrounding emission sources. As such, this source of data has not been considered further in the context of the assessment.

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 site is located in grid square NGR: 432500, 404500. Data for this location was downloaded from the DEFRA website⁶ for the purpose of the assessment and is summarised in Table 3.

Table 3 Background Pollutant Concentration Predictions

Pollutant	Predicted 2021 Background Pollutant Concentration (µg/m ³)
NO ₂	12.10
PM ₁₀	12.40

3.4.2 As shown in Table 3, the predicted background pollutant concentrations are below the relevant AQOs at the site.

⁶ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

4.0 METHODOLOGY

4.1 Introduction

4.1.1 The development has the potential to cause air quality impacts as a result of combustion emissions from the biomass boilers. In order to assess pollutant concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

4.2 Dispersion Model

4.2.1 Dispersion modelling was undertaken using ADMS-5 (v5.2.4.0), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-5 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

4.2.2 The model utilises hourly meteorological data to define conditions for plume rise, transport and diffusion. It estimates the concentration for each source and receptor combination for each hour of input meteorology and calculates user-selected long-term and short-term averages.

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

- Assessment area;
- Process conditions;
- Pollutant emission rates;
- Terrain information;
- Building dimensions;
- Meteorological data;
- Roughness length (z_0); and,
- Monin-Obukhov length.

4.2.4 These are detailed in the following Sections.

4.3 Modelling Scenarios

4.3.1 The scenarios considered in the modelling assessment are summarised in Table 4.

Table 4 Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
NO ₂	99.8 th percentile (%ile) 1-hour mean	Annual mean
PM ₁₀	90.4 th %ile 24-hour mean	Annual mean

4.3.2 Some short-term air quality criteria are framed in terms of the number of occasions in a calendar year on which the concentration should not be exceeded. As such, the percentiles shown in Table 4 were selected to represent the relationship between the permitted number of exceedences of short-term concentrations and the number of periods within a calendar year.

4.4 Sensitive Receptors

4.4.1 A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that required specific consideration during the assessment. These are summarised in Table 5 and were selected to represent ground and upper floor windows as appropriate.

Table 5 Sensitive Receptor Locations

Receptor		NGR (m)		Height (m)
		X	Y	
R1	Water Royd Care Home	432341.9	404801.4	1.5
R2	Water Royd Care Home	432341.9	404801.4	4.5
R3	Water Royd Care Home	432346.6	404802.9	1.5
R4	Water Royd Care Home	432346.6	404802.9	4.5
R5	Water Royd Care Home	432338.3	404802.2	4.5
R6	Water Royd Care Home	432314.0	404787.7	1.5

Receptor		NGR (m)		Height (m)
		X	Y	
R7	Water Royd Care Home	432314.0	404787.7	4.5
R8	Water Royd Care Home	432314.0	404787.7	7.5
R9	Water Royd Care Home	432312.0	404793.9	1.5
R10	Water Royd Care Home	432312.0	404793.9	4.5
R11	Water Royd Care Home	432312.0	404793.9	7.5
R12	Water Royd Care Home	432310.4	404802.8	1.5
R13	Water Royd Care Home	432310.4	404802.8	4.5
R14	Water Royd Care Home	432310.4	404802.8	7.5
R15	Green Lane	432305.6	404756.8	1.5
R16	Green Lane	432305.6	404756.8	4.5
R17	4 Locke Road	432324.0	404766.0	1.5
R18	4 Locke Road	432324.0	404766.0	4.5
R19	8 Locke Road	432339.2	404774.9	1.5
R20	8 Locke Road	432339.2	404774.9	4.5
R21	10 Locke Road	432355.3	404782.0	1.5
R22	10 Locke Road	432355.3	404782.0	4.5
R23	12 Locke Road	432363.3	404784.9	1.5
R24	12 Locke Road	432363.3	404784.9	4.5
R25	14 Locke Road	432382.4	404785.2	1.5
R26	14 Locke Road	432382.4	404785.2	4.5

4.4.2 Reference should be made to Figure 2 for a graphical representation of the sensitive receptors.

4.5 Process Conditions

4.5.1 Emissions from the biomass boilers were represented by two point sources within the model. A summary of the data is provided in Table 6. These were provided by The UK Development Group Ltd.

Table 6 Process Conditions

Parameter	Unit	Boiler 1	Boiler 2
Stack location	NGR	432339.9, 404799.4	432340.4, 404797.8
Stack diameter	m	0.15	0.15
Stack height	m	5.9	5.9
Flue gas efflux velocity	m/s	3.06	3.06
Exhaust gas temperature	°C	154	154
Exhaust gas flow rate	m ³ /s	0.054	0.054
NO _x emission rate	g/GJ	78	78
PM emission rate	g/GJ	8	8
NO _x emission rate	g/s	0.0047	0.0047
PM emission rate	g/s	0.0005	0.0005

4.5.2 The emission rate for PM is stated as total dust. However, for the purposes of dispersion modelling it was considered that the entire PM emission consisted of only PM₁₀. This allowed the maximum ground level impacts, with respect to the relevant criteria, to be assessed. Actual plant emissions of PM are unlikely to only consist of only one PM fraction, resulting in a worst-case assessment.

4.5.3 The proposed plant will operate over a period of 2,000 hours per year. As such, the predicted annual mean results were factored to represent the proportion of likely emissions per annum in accordance with Environment Agency (EA) guidance⁷.

4.5.4 Reference should be made to Figure 3 for a graphical representation of the stack locations.

⁷ <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.

4.6 NO_x to NO₂ Conversion

- 4.6.1 Emissions of NO_x from combustion processes are predominantly in the form of nitrogen oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to NO₂. Comparisons of ambient NO and NO₂ concentrations in the vicinity of point sources in recent years has indicated that it is unlikely that more than 30% of the NO_x is present at ground level as NO₂.
- 4.6.2 Ground level NO_x concentrations were predicted through dispersion modelling. NO₂ concentrations reported in the results section assume 70% conversion from NO_x to NO₂ for annual means and 35% conversion for 1-hour concentrations, based upon EA guidance⁸.

4.7 Terrain Data

- 4.7.1 Ordnance Survey OS Terrain 50 data was included in the model for the site and surrounding area in order to take account of the specific flow field produced by variations in ground height throughout the assessment extents. This was pre-processed using the method suggested by CERC.

4.8 Building Effects

- 4.8.1 The dispersion of substances released from elevated sources can be influenced by the presence of buildings close to the emission point. Structures can interrupt the wind flows and cause significantly higher ground-level concentrations close to the source than would arise in the absence of the buildings.
- 4.8.2 Analysis of the site layout indicated a number of structures that should be included within the model in order to take account of effects on pollutant dispersion. Building input geometries are shown in Table 7. Reference should be made to Figure 3 for a graphical representation of building locations.

8 <https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports>.

Table 7 Building Geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
	X	Y				
Cabin	432340.7	404797.8	4.0	5.4	4.6	160.6
Building 1	432336.7	404829.9	7.7	57.1	14.8	160.6
Building 2	432306.1	404841.8	7.7	14.5	35.1	160.6
Building 3	432297.6	404803.8	9.0	48.4	21.2	162.4

4.9 Meteorological Data

4.9.1 Meteorological data used in the assessment was taken from Doncaster Sheffield Airport meteorological station over the period 1st January 2015 to 31st December 2019 (inclusive). This observation station is located at NGR: 465930, 398920, which is approximately 34.4km south-east of the site. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

4.9.2 All meteorological files used in the assessment were provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 4 for wind roses of utilised meteorological records.

4.10 Roughness Length

4.10.1 A z_0 of 0.5m was used within the model to describe the modelling extents. This value is considered appropriate for the morphology of the area and is suggested within ADMS-5 as being suitable for 'parkland, open suburbia'.

4.10.2 A z_0 of 0.2m was used within the model to describe the meteorological site. This value is considered appropriate for the morphology of the area and is suggested within ADMS-5 as being suitable for 'agricultural areas (min)'.

4.11 Monin-Obukhov Length

4.11.1 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 10m was used to describe the modelling extents and the meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-5 as being suitable for 'small towns <50,000'.

4.12 Background Concentrations

4.12.1 Review of existing data in the vicinity of the site was undertaken Section 3.4 in order to identify suitable background values for use in the assessment. This indicated the closest monitors are positioned a significant distance from the site and results are unlikely to be representative of the facility location. As such, the background concentrations predicted by DEFRA were utilised to represent existing concentrations.

4.12.2 It is not possible to add short-term peak baseline and process concentrations. This is because the conditions which give rise to peak ground-level concentrations of substances emitted from an elevated source at a particular location and time are likely to be different to the conditions which give rise to peak concentrations due to emissions from other sources. This point is addressed in EA guidance⁹ which advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum predicted short-term concentration due to emissions from the source to twice the annual mean baseline concentration. This approach was adopted throughout the assessment.

4.13 Impact Significance

4.13.1 The significance of predicted air quality impacts was determined in accordance with the guidance provided within the Institute of Air Quality Management (IAQM) document 'Land-Use Planning & Development Control: Planning for Air Quality'¹⁰. Using this methodology impacts on annual mean concentrations are defined based on the interaction between the predicted pollutant concentration with the development in place (PEC) and the magnitude of change (PC), as outlined in Table 8.

⁹ <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.

¹⁰ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Table 8 Significance of Impact - Annual Mean Concentrations

Concentration at Receptor in Assessment Year (PEC)	Predicted Concentration Change as Proportion of EQS (PC) (%)			
	1	2 - 5	6 - 10	> 10
75% or less of EQS	Negligible	Negligible	Slight	Moderate
76 - 94% of EQS	Negligible	Slight	Moderate	Moderate
95 - 102% of EQS	Slight	Moderate	Moderate	Substantial
103 - 109% of EQS	Moderate	Moderate	Substantial	Substantial
110% or more of EQS	Moderate	Substantial	Substantial	Substantial

4.13.2 The matrix shown in Table 8 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

4.13.3 The significance of impacts on short-term pollutant concentrations was determined in accordance with the criteria outlined in the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'¹¹, as summarised in Table 9.

Table 9 Significance of Impact - Short Term Concentrations

Predicted Concentration Change as Proportion of EQS (PC) (%)	Significance of Impact
Less than 10	Negligible
11 - 20	Slight
21 - 50	Moderate
Greater than 51	Substantial

4.13.4 Following the prediction of impacts at discrete receptor locations, the IAQM¹² provides guidance on determining the overall air quality impact significance of the operation of a development and states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**,

¹¹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹² Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**. The determination of significance relies on professional judgement and reasoning has been provided as far as practicable.

4.14 Modelling Uncertainty

4.14.1 Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty - due to model limitations;
- Data uncertainty - due to errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and,
- Variability - randomness of measurements used.

4.14.2 Potential uncertainties in the model results were minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- Choice of model - ADMS-5 is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible;
- Meteorological data - Modelling was undertaken using five meteorological data sets from an observation station within the vicinity of the site to take account of local conditions. The assessment was based on the worst-case year for each averaging period to ensure maximum concentrations were considered;
- Surface characteristics - The z_0 and Monin-Obukhov length were determined for both the dispersion and meteorological sites based on the surrounding land uses and guidance provided by CERC. Terrain data was included and processed using the method outline by CERC;
- Plant operating conditions - Operational parameters for the biomass boilers were provided by The UK Development Group Ltd. As such, these are considered to be representative of likely operating conditions;
- Emission rates - Emission rates were obtained from the biomass boiler specifications. As such, these are considered to be representative of anticipated emissions;

- Background concentrations - Background pollutant concentrations were obtained from the DEFRA website. As such, they are considered suitable for an assessment of this nature;
- Receptor locations - Receptor points were included at sensitive locations to provide specific consideration of these areas; and,
- Variability - All model inputs are as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

4.14.3 Results were considered in the context of the relevant AQOs and relevant significance criteria. It is considered that the use of the stated measures to reduce uncertainty and the use of worst-case assumptions when necessary has resulted in model accuracy of an acceptable level.

5.0 **ASSESSMENT**

5.1 **Introduction**

5.1.1 Dispersion modelling was undertaken with the inputs described in Section 4.0. The results are provided in the following Sections.

5.2 **Nitrogen Dioxide**

5.2.1 Predicted annual mean NO₂ PECs at the receptor locations, inclusive of background levels, are summarised in Table 10.

Table 10 Predicted Annual Mean NO₂ Concentrations

Receptor		Predicted Annual Mean NO ₂ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R1	Water Royd Care Home	14.65	14.35	14.07	14.43	14.15
R2	Water Royd Care Home	15.43	15.09	14.89	15.05	14.90
R3	Water Royd Care Home	14.73	14.42	14.16	14.50	14.22
R4	Water Royd Care Home	15.76	15.39	15.35	15.38	15.19
R5	Water Royd Care Home	14.91	14.62	14.40	14.79	14.51
R6	Water Royd Care Home	12.50	12.47	12.45	12.53	12.41
R7	Water Royd Care Home	12.48	12.44	12.42	12.49	12.40
R8	Water Royd Care Home	12.51	12.47	12.43	12.51	12.44
R9	Water Royd Care Home	12.49	12.45	12.43	12.51	12.42
R10	Water Royd Care Home	12.51	12.46	12.43	12.52	12.44
R11	Water Royd Care Home	12.54	12.48	12.43	12.53	12.48
R12	Water Royd Care Home	12.28	12.29	12.28	12.36	12.31
R13	Water Royd Care Home	12.31	12.32	12.29	12.40	12.34
R14	Water Royd Care Home	12.35	12.36	12.32	12.43	12.39
R15	Green Lane	12.14	12.17	12.14	12.16	12.15

Receptor		Predicted Annual Mean NO ₂ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R16	Green Lane	12.14	12.17	12.13	12.16	12.15
R17	4 Locke Road	12.19	12.26	12.17	12.24	12.20
R18	4 Locke Road	12.19	12.27	12.17	12.24	12.20
R19	8 Locke Road	12.45	12.69	12.42	12.63	12.51
R20	8 Locke Road	12.46	12.71	12.41	12.62	12.49
R21	10 Locke Road	12.58	12.73	12.64	12.62	12.62
R22	10 Locke Road	12.63	12.78	12.69	12.67	12.68
R23	12 Locke Road	12.42	12.42	12.48	12.40	12.43
R24	12 Locke Road	12.41	12.42	12.46	12.40	12.45
R25	14 Locke Road	12.27	12.26	12.32	12.25	12.28
R26	14 Locke Road	12.27	12.27	12.32	12.26	12.29

5.2.2 As indicated in Table 10, NO₂ PECs were below the annual mean AQO of 40µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.2.3 The significance of predicted impacts on annual mean NO₂ concentrations at the sensitive receptors are summarised in Table 11. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 11 Predicted Impacts - Annual Mean NO₂ Concentrations

Receptor		Predicted PEC	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Water Royd Care Home	Below 75% of EQS	6 - 10	Slight
R2	Water Royd Care Home	Below 75% of EQS	6 - 10	Slight
R3	Water Royd Care Home	Below 75% of EQS	6 - 10	Slight
R4	Water Royd Care Home	Below 75% of EQS	6 - 10	Slight
R5	Water Royd Care Home	Below 75% of EQS	6 - 10	Slight

Receptor		Predicted PEC	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R6	Water Royd Care Home	Below 75% of EQS	1	Negligible
R7	Water Royd Care Home	Below 75% of EQS	1	Negligible
R8	Water Royd Care Home	Below 75% of EQS	1	Negligible
R9	Water Royd Care Home	Below 75% of EQS	1	Negligible
R10	Water Royd Care Home	Below 75% of EQS	1	Negligible
R11	Water Royd Care Home	Below 75% of EQS	1	Negligible
R12	Water Royd Care Home	Below 75% of EQS	1	Negligible
R13	Water Royd Care Home	Below 75% of EQS	1	Negligible
R14	Water Royd Care Home	Below 75% of EQS	1	Negligible
R15	Green Lane	Below 75% of EQS	0	Negligible
R16	Green Lane	Below 75% of EQS	0	Negligible
R17	4 Locke Road	Below 75% of EQS	0	Negligible
R18	4 Locke Road	Below 75% of EQS	0	Negligible
R19	8 Locke Road	Below 75% of EQS	1	Negligible
R20	8 Locke Road	Below 75% of EQS	2 - 5	Negligible
R21	10 Locke Road	Below 75% of EQS	2 - 5	Negligible
R22	10 Locke Road	Below 75% of EQS	2 - 5	Negligible
R23	12 Locke Road	Below 75% of EQS	1	Negligible
R24	12 Locke Road	Below 75% of EQS	1	Negligible
R25	14 Locke Road	Below 75% of EQS	1	Negligible
R26	14 Locke Road	Below 75% of EQS	1	Negligible

5.2.4 As indicated in Table 11, impacts on annual mean NO₂ concentrations as a result of the proposed development were predicted to be **slight** at five receptors and **negligible** at 21 locations.

5.2.5 The IAQM guidance states that states that only if the impact is greater than **slight**, the effect is considered **significant**. As such, overall impacts on annual mean NO₂ concentrations are considered to be **not significant**, in accordance with the stated guidance.

5.2.6 Predicted 99.8th %ile 1-hour mean NO₂ PECs, inclusive of background levels, are summarised in Table 12.

Table 12 Predicted 99.8th Percentile 1-hour Mean NO₂ Concentrations

Receptor		Predicted 99.8 th %ile 1-hour Mean NO ₂ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R1	Water Royd Care Home	61.14	60.64	59.99	61.12	61.14
R2	Water Royd Care Home	61.39	61.89	60.96	61.69	64.04
R3	Water Royd Care Home	61.14	60.64	59.99	61.12	61.14
R4	Water Royd Care Home	61.14	60.64	59.99	61.16	61.24
R5	Water Royd Care Home	61.14	60.64	59.99	61.12	61.14
R6	Water Royd Care Home	52.57	50.91	54.76	54.32	52.48
R7	Water Royd Care Home	52.57	50.51	52.78	52.89	52.40
R8	Water Royd Care Home	52.57	50.56	52.78	52.89	52.40
R9	Water Royd Care Home	52.57	50.65	54.23	53.22	52.40
R10	Water Royd Care Home	52.57	50.65	54.23	53.16	52.40
R11	Water Royd Care Home	53.04	50.96	53.04	52.89	52.46
R12	Water Royd Care Home	41.11	41.94	39.57	49.58	39.19
R13	Water Royd Care Home	41.11	41.94	39.57	49.58	39.19
R14	Water Royd Care Home	46.24	46.75	46.58	49.58	46.58
R15	Green Lane	27.94	28.21	27.83	28.21	27.97
R16	Green Lane	28.14	28.47	27.95	28.49	28.16
R17	4 Locke Road	30.07	30.94	29.92	30.38	30.29
R18	4 Locke Road	32.68	33.85	31.30	33.31	33.10

Receptor		Predicted 99.8 th %ile 1-hour Mean NO ₂ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R19	8 Locke Road	57.95	58.41	57.77	58.92	58.07
R20	8 Locke Road	57.76	57.60	54.43	57.72	55.05
R21	10 Locke Road	57.75	57.51	57.50	57.72	57.77
R22	10 Locke Road	57.75	57.49	57.50	57.72	57.77
R23	12 Locke Road	39.56	41.03	39.67	39.48	38.59
R24	12 Locke Road	34.34	35.43	34.51	35.93	35.61
R25	14 Locke Road	28.71	28.92	28.71	28.58	28.73
R26	14 Locke Road	29.74	29.94	29.99	30.56	29.42

5.2.7 As indicated in Table 12, 1-hour mean NO₂ PECs were below the AQO of 200µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.2.8 The significance of predicted impacts on 1-hour mean NO₂ concentrations at the sensitive receptors are summarised in Table 13. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 13 Predicted Impacts on 1-hour Mean NO₂ Concentrations

Receptor		Predicted Concentration Change as Proportion of EQS (PC) (%)	Impact Significance
R1	Water Royd Care Home	11 - 20	Slight
R2	Water Royd Care Home	11 - 20	Slight
R3	Water Royd Care Home	11 - 20	Slight
R4	Water Royd Care Home	11 - 20	Slight
R5	Water Royd Care Home	11 - 20	Slight
R6	Water Royd Care Home	11 - 20	Slight
R7	Water Royd Care Home	11 - 20	Slight

Receptor		Predicted Concentration Change as Proportion of EQS (PC) (%)	Impact Significance
R8	Water Royd Care Home	11 - 20	Slight
R9	Water Royd Care Home	11 - 20	Slight
R10	Water Royd Care Home	11 - 20	Slight
R11	Water Royd Care Home	11 - 20	Slight
R12	Water Royd Care Home	11 - 20	Slight
R13	Water Royd Care Home	11 - 20	Slight
R14	Water Royd Care Home	11 - 20	Slight
R15	Green Lane	Less than 10	Negligible
R16	Green Lane	Less than 10	Negligible
R17	4 Locke Road	Less than 10	Negligible
R18	4 Locke Road	Less than 10	Negligible
R19	8 Locke Road	11 - 20	Slight
R20	8 Locke Road	11 - 20	Slight
R21	10 Locke Road	11 - 20	Slight
R22	10 Locke Road	11 - 20	Slight
R23	12 Locke Road	Less than 10	Negligible
R24	12 Locke Road	Less than 10	Negligible
R25	14 Locke Road	Less than 10	Negligible
R26	14 Locke Road	Less than 10	Negligible

5.2.9 As indicated in Table 13, impacts on 1-hour mean NO₂ concentrations as a result of the proposed development were predicted to be **slight** at 18 receptors and **negligible** at 8 locations. As such, overall impacts on 1-hour mean NO₂ concentrations are considered to be **not significant**, in accordance with the IAQM guidance.

5.3 Particulate Matter

5.3.1 Predicted annual mean PM₁₀ PECs at the receptor locations, inclusive of background levels, are summarised in Table 14.

Table 14 Predicted Annual Mean PM₁₀ Concentrations

Receptor		Predicted Annual Mean PM ₁₀ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R1	Water Royd Care Home	12.79	12.74	12.70	12.75	12.71
R2	Water Royd Care Home	12.91	12.85	12.82	12.85	12.83
R3	Water Royd Care Home	12.80	12.75	12.71	12.76	12.72
R4	Water Royd Care Home	12.96	12.90	12.89	12.90	12.87
R5	Water Royd Care Home	12.83	12.78	12.75	12.81	12.77
R6	Water Royd Care Home	12.46	12.46	12.45	12.46	12.45
R7	Water Royd Care Home	12.46	12.45	12.45	12.46	12.45
R8	Water Royd Care Home	12.46	12.46	12.45	12.46	12.45
R9	Water Royd Care Home	12.46	12.45	12.45	12.46	12.45
R10	Water Royd Care Home	12.46	12.45	12.45	12.46	12.45
R11	Water Royd Care Home	12.47	12.46	12.45	12.47	12.46
R12	Water Royd Care Home	12.43	12.43	12.43	12.44	12.43
R13	Water Royd Care Home	12.43	12.43	12.43	12.45	12.44
R14	Water Royd Care Home	12.44	12.44	12.43	12.45	12.44
R15	Green Lane	12.41	12.41	12.41	12.41	12.41
R16	Green Lane	12.41	12.41	12.41	12.41	12.41
R17	4 Locke Road	12.41	12.43	12.41	12.42	12.41
R18	4 Locke Road	12.41	12.43	12.41	12.42	12.42
R19	8 Locke Road	12.45	12.49	12.45	12.48	12.46
R20	8 Locke Road	12.45	12.49	12.45	12.48	12.46
R21	10 Locke Road	12.47	12.50	12.48	12.48	12.48

Receptor		Predicted Annual Mean PM ₁₀ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R22	10 Locke Road	12.48	12.50	12.49	12.49	12.49
R23	12 Locke Road	12.45	12.45	12.46	12.45	12.45
R24	12 Locke Road	12.45	12.45	12.46	12.45	12.45
R25	14 Locke Road	12.43	12.42	12.43	12.42	12.43
R26	14 Locke Road	12.43	12.43	12.43	12.42	12.43

5.3.2 As indicated in Table 14, PM₁₀ PECs were below the annual mean AQO of 40µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.3.3 The significance of predicted impacts on annual mean PM₁₀ concentrations at the sensitive receptors are summarised in Table 15. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 15 Predicted Impacts - Annual Mean PM₁₀ Concentrations

Receptor		Predicted PEC	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Water Royd Care Home	Below 75% of EQS	1	Negligible
R2	Water Royd Care Home	Below 75% of EQS	1	Negligible
R3	Water Royd Care Home	Below 75% of EQS	1	Negligible
R4	Water Royd Care Home	Below 75% of EQS	1	Negligible
R5	Water Royd Care Home	Below 75% of EQS	1	Negligible
R6	Water Royd Care Home	Below 75% of EQS	0	Negligible
R7	Water Royd Care Home	Below 75% of EQS	0	Negligible
R8	Water Royd Care Home	Below 75% of EQS	0	Negligible
R9	Water Royd Care Home	Below 75% of EQS	0	Negligible
R10	Water Royd Care Home	Below 75% of EQS	0	Negligible
R11	Water Royd Care Home	Below 75% of EQS	0	Negligible

Receptor		Predicted PEC	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R12	Water Royd Care Home	Below 75% of EQS	0	Negligible
R13	Water Royd Care Home	Below 75% of EQS	0	Negligible
R14	Water Royd Care Home	Below 75% of EQS	0	Negligible
R15	Green Lane	Below 75% of EQS	0	Negligible
R16	Green Lane	Below 75% of EQS	0	Negligible
R17	4 Locke Road	Below 75% of EQS	0	Negligible
R18	4 Locke Road	Below 75% of EQS	0	Negligible
R19	8 Locke Road	Below 75% of EQS	0	Negligible
R20	8 Locke Road	Below 75% of EQS	0	Negligible
R21	10 Locke Road	Below 75% of EQS	0	Negligible
R22	10 Locke Road	Below 75% of EQS	0	Negligible
R23	12 Locke Road	Below 75% of EQS	0	Negligible
R24	12 Locke Road	Below 75% of EQS	0	Negligible
R25	14 Locke Road	Below 75% of EQS	0	Negligible
R26	14 Locke Road	Below 75% of EQS	0	Negligible

5.3.4 As indicated in Table 15, impacts on annual mean PM₁₀ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations. As such, overall impacts on annual mean PM₁₀ concentrations are considered to be **not significant**, in accordance with the IAQM guidance.

5.3.5 Predicted 24-hour mean PM₁₀ PECs at the receptor locations, inclusive of background levels, are summarised in Table 16.

Table 16 Predicted 90.4th %ile 24-hour mean PM₁₀ Concentrations

Receptor		Predicted 90.4 th %ile 24-hour Mean PM ₁₀ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R1	Water Royd Care Home	28.86	28.41	28.20	28.55	28.20
R2	Water Royd Care Home	29.80	29.30	28.79	29.22	29.27
R3	Water Royd Care Home	28.93	28.43	28.22	28.56	28.25
R4	Water Royd Care Home	29.75	29.27	28.98	29.32	29.17
R5	Water Royd Care Home	28.95	28.51	28.22	28.93	28.47
R6	Water Royd Care Home	25.58	25.49	25.55	25.57	25.44
R7	Water Royd Care Home	25.56	25.46	25.50	25.50	25.38
R8	Water Royd Care Home	25.59	25.51	25.55	25.50	25.53
R9	Water Royd Care Home	25.58	25.46	25.52	25.54	25.38
R10	Water Royd Care Home	25.58	25.50	25.55	25.50	25.46
R11	Water Royd Care Home	25.65	25.52	25.55	25.62	25.64
R12	Water Royd Care Home	25.18	25.23	25.16	25.24	25.23
R13	Water Royd Care Home	25.25	25.29	25.18	25.32	25.32
R14	Water Royd Care Home	25.32	25.36	25.22	25.40	25.36
R15	Green Lane	24.92	25.00	24.89	24.98	24.93
R16	Green Lane	24.92	24.98	24.89	24.98	24.93
R17	4 Locke Road	25.04	25.24	24.94	25.19	25.06
R18	4 Locke Road	25.05	25.22	24.95	25.18	25.08
R19	8 Locke Road	25.66	26.06	25.52	25.97	25.69
R20	8 Locke Road	25.73	26.25	25.53	26.02	25.74
R21	10 Locke Road	25.81	26.00	25.70	25.87	25.87
R22	10 Locke Road	25.89	26.07	25.83	26.00	26.01
R23	12 Locke Road	25.45	25.49	25.55	25.44	25.53
R24	12 Locke Road	25.42	25.46	25.45	25.45	25.50
R25	14 Locke Road	25.14	25.12	25.19	25.13	25.14

Receptor		Predicted 90.4 th %ile 24-hour Mean PM ₁₀ PEC (µg/m ³)				
		2015	2016	2017	2018	2019
R26	14 Locke Road	25.13	25.13	25.18	25.15	25.15

5.3.6 As indicated in Table 16, predicted 90.4th %ile 24-hour mean PM₁₀ concentrations were below the relevant AQO at all sensitive receptors for all modelled meteorological data sets.

5.3.7 The significance of predicted impacts on 24-hour mean PM₁₀ concentrations at the sensitive receptors are summarised in Table 17. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 17 Predicted Impacts on 24-hour Mean PM₁₀ Concentrations

Receptor		Predicted Concentration Change as Proportion of EQS (PC) (%)	Impact Significance
R1	Water Royd Care Home	Less than 10	Negligible
R2	Water Royd Care Home	Less than 10	Negligible
R3	Water Royd Care Home	Less than 10	Negligible
R4	Water Royd Care Home	Less than 10	Negligible
R5	Water Royd Care Home	Less than 10	Negligible
R6	Water Royd Care Home	Less than 10	Negligible
R7	Water Royd Care Home	Less than 10	Negligible
R8	Water Royd Care Home	Less than 10	Negligible
R9	Water Royd Care Home	Less than 10	Negligible
R10	Water Royd Care Home	Less than 10	Negligible
R11	Water Royd Care Home	Less than 10	Negligible
R12	Water Royd Care Home	Less than 10	Negligible
R13	Water Royd Care Home	Less than 10	Negligible
R14	Water Royd Care Home	Less than 10	Negligible

Receptor		Predicted Concentration Change as Proportion of EQS (PC) (%)	Impact Significance
R15	Green Lane	Less than 10	Negligible
R16	Green Lane	Less than 10	Negligible
R17	4 Locke Road	Less than 10	Negligible
R18	4 Locke Road	Less than 10	Negligible
R19	8 Locke Road	Less than 10	Negligible
R20	8 Locke Road	Less than 10	Negligible
R21	10 Locke Road	Less than 10	Negligible
R22	10 Locke Road	Less than 10	Negligible
R23	12 Locke Road	Less than 10	Negligible
R24	12 Locke Road	Less than 10	Negligible
R25	14 Locke Road	Less than 10	Negligible
R26	14 Locke Road	Less than 10	Negligible

5.3.8 As indicated in Table 17, impacts on 24-hour mean PM₁₀ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations. As such, overall impacts on 24-hour mean PM₁₀ concentrations are considered to be **not significant**, in accordance with the IAQM guidance.

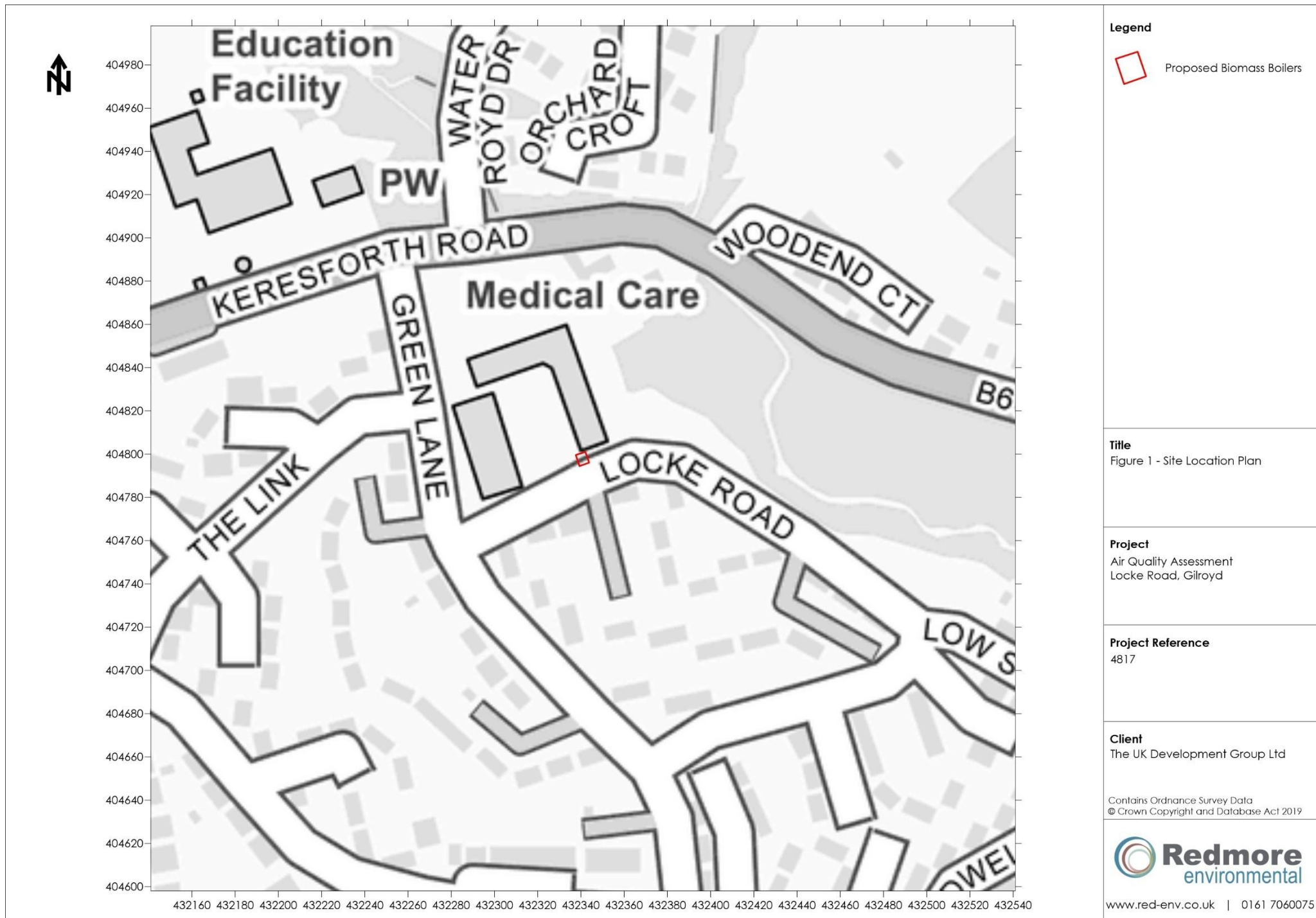
6.0 CONCLUSION

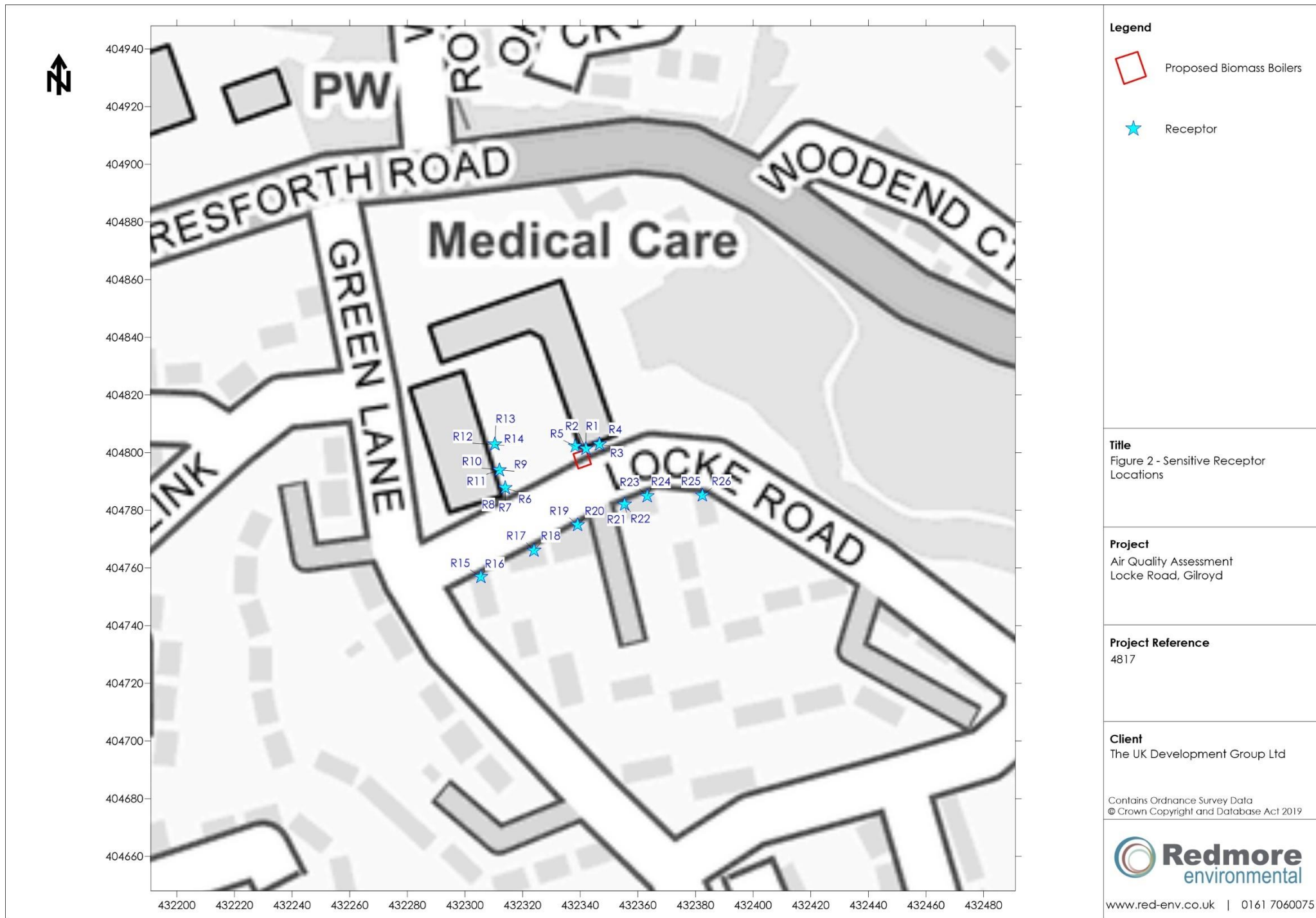
- 6.1.1 Redmore Environmental Ltd was commissioned by The UK Development Group Ltd to undertake an Air Quality Assessment in support of a planning application for the installation of two biomass boilers at Water Royd Care Home, Locke Road, Gilroyd, Barnsley.
- 6.1.2 Combustion emissions from the plant have the potential to cause air quality impacts during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and assess potential changes in pollution levels as a result of the development.
- 6.1.3 Dispersion modelling was undertaken using ADMS-5 in order to predict pollutant levels as a result of emissions from the biomass boilers. Impacts at sensitive receptors were quantified and the results compared with the relevant AQOs and IAQM significance criteria.
- 6.1.4 Predicted concentrations of all pollutants were below the relevant AQOs at all receptor locations for all meteorological data sets modelled. Review of the dispersion modelling results indicated the following:
- Impacts on annual mean NO₂ concentrations were predicted to be **slight** at five receptors and **negligible** at 21 locations;
 - Impacts on 1-hour mean NO₂ concentrations were predicted to be **slight** at 18 receptors and **negligible** at 8 locations; and,
 - Impacts on annual and 24-hour mean PM₁₀ concentrations were predicted to be **negligible** at all receptors.
- 6.1.5 Based on the assessment results, overall impacts are considered to be **not significant**, in accordance with the IAQM guidance. As such, air quality issues are not considered a constraint to planning consent for the proposals.

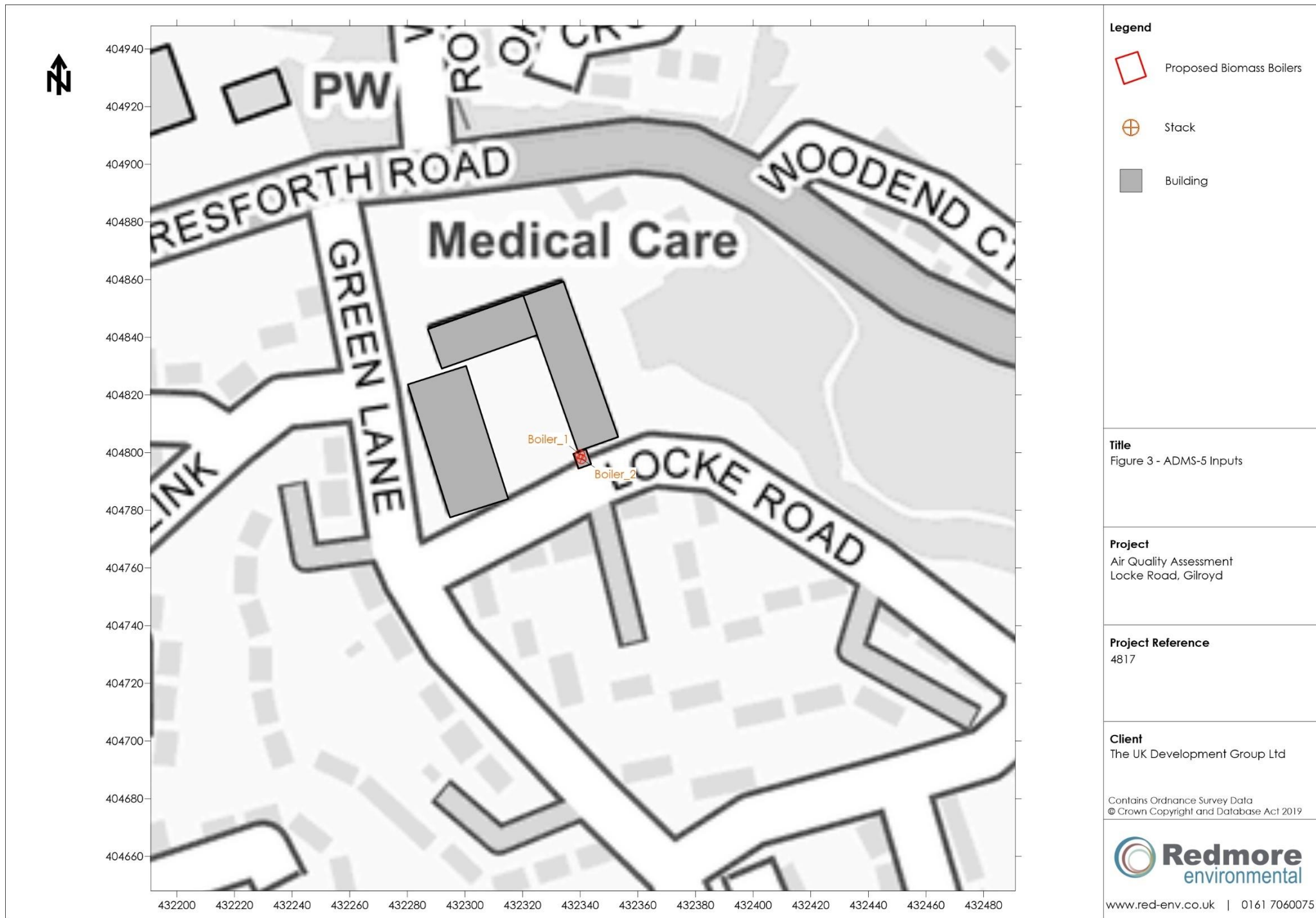
7.0 **ABBREVIATIONS**

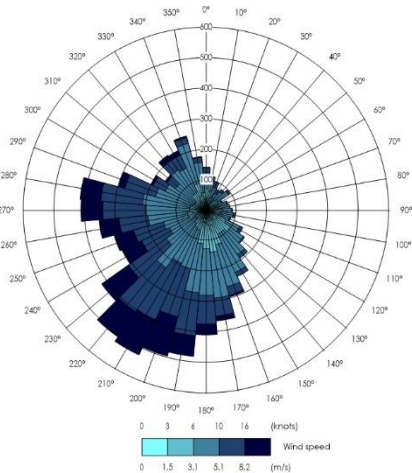
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
BMBC	Barnsley Metropolitan Borough Council
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
LAQM	Local Air Quality Management
NGR	National Grid Reference
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PC	Process Contribution
PEC	Predicted Environmental Concentration
PM	Particulate matter
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
Z ₀	Roughness length
%ile	Percentile

Figures

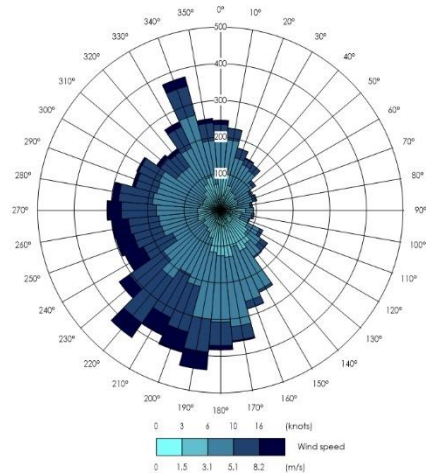




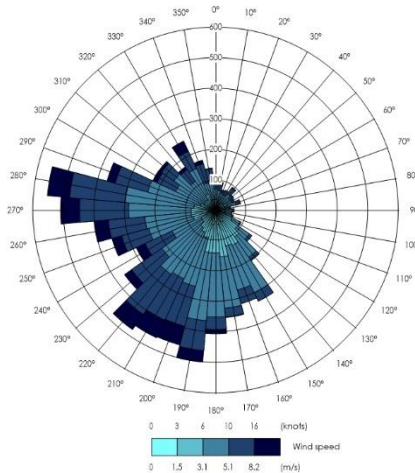




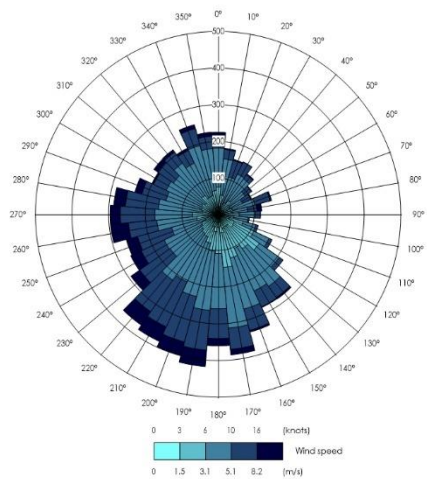
2015 Meteorological Data



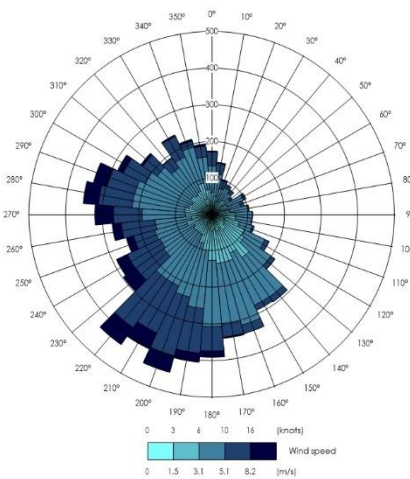
2016 Meteorological Data



2017 Meteorological Data



2018 Meteorological Data



2019 Meteorological Data

Legend

Title

Figure 4 - Wind Roses of 2015 to 2019
Doncaster Sheffield Airport
Meteorological Data

Project

Air Quality Assessment
Locke Road, Gilroyd

Project Reference

4817

Client

The UK Development Group Ltd