



Air Quality Assessment:
**Long Lawford Phase 4,
Rugby**

January 2018



Experts in air quality
management & assessment

Document Control

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Job Number	J3133
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Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J3133A/1/F1	11 January 2018	Final	Laurence Caird (Principal Consultant)

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1 Introduction

- 1.1 This report describes the potential air quality impacts associated with the proposed residential development at Long Lawford, west of Rugby. The assessment has been carried out by Air Quality Consultants Ltd on behalf of Bloor Homes.
- 1.2 The proposed development will consist of up to 120 dwellings, including both houses and apartments. It lies within an Air Quality Management Area (AQMA) declared by Rugby Borough Council (RBC) for exceedences of the annual mean nitrogen dioxide objective. The development will lead to an increase in traffic on the local roads, which may impact on air quality at existing residential properties. The new residential properties will also be subject to the impacts of road traffic emissions from the adjacent road network. The main air pollutants of concern related to traffic emissions are nitrogen dioxide and fine particulate matter (PM₁₀ and PM_{2.5}).
- 1.3 This report describes existing local air quality conditions (base year 2016), and the predicted air quality in the future assuming that the proposed development does, or does not proceed. The assessment of traffic-related impacts focuses on 2021, which is the anticipated year of opening.
- 1.4 This report has been prepared taking into account all relevant local and national guidance and regulations.

2 Policy Context and Assessment Criteria

Air Quality Strategy

- 2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Planning Policy

National Policies

- 2.2 The National Planning Policy Framework (NPPF) (2012) sets out planning policy for England in one place. It places a general presumption in favour of sustainable development, stressing the importance of local development plans, and states that the planning system should perform an environmental role to minimise pollution. One of the twelve core planning principles notes that planning should “contribute to...reducing pollution”. To prevent unacceptable risks from air pollution, planning decisions should ensure that new development is appropriate for its location. The NPPF states that the “effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account”.
- 2.3 More specifically the NPPF makes clear that:
- “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 The NPPF is now supported by Planning Practice Guidance (PPG) (DCLG, 2017), which includes guiding principles on how planning can take account of the impacts of new development on air

quality. The PPG states that “Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values” and “It is important that the potential impact of new development on air quality is taken into account ... where the national assessment indicates that relevant limits have been exceeded or are near the limit”. The role of the local authorities is covered by the LAQM regime, with the PPG stating that local authority Air Quality Action Plans “identify measures that will be introduced in pursuit of the objectives”.

2.5 The PPG states that:

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

2.6 The PPG sets out the information that may be required in an air quality assessment, making clear that “Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality”. It also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that “Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact”.

Local Transport Plan

2.7 The third Warwickshire Local Transport Plan (LTP3) (Warwickshire County Council, 2011) covers Rugby and includes six policies referring to air quality:

- Policy AQA1: The contribution of air quality improvements to the national targets on greenhouse gases;
- Policy AQA2: Improving poor air quality through partnership working;
- Policy AQA3: Maintaining areas of good air quality;
- Policy AQA4: Education and information;
- Policy AQA5: Integration of air quality and transport planning; and
- Policy AQA6: Strategy review.

2.8 Policy AQA5 is of particular relevance, and states that:

“Through the planning process, the County Council and the five Warwickshire District/Borough Councils will take into account known and emerging air quality issues to ensure that new development:

- *Does not exacerbate an existing air quality problem, or trigger the declaration of a new Air Quality Management Area;*
- *Is well served by public transport, walking and cycling facilities; and*
- *Is supported by measures such as Travel Plans to ensure that sustainable travel patterns are maintained.”*

Local Policies

- 2.9 Rugby Borough Council issued a draft version (Rugby Borough Council, 2016) of its new Local Plan for consultation in September of 2016. The draft Local Plan includes Policy HS5 on Traffic Generation and Air Quality, which states that:

“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 of all development proposed in this Local Plan (and any other known developments) on traffic generation and air quality”.

- 2.10 Until the new Local Plan is adopted, Rugby Borough Council's Core Strategy (Rugby Borough Council, 2011), adopted in June 2011, remains the key relevant planning policy document. It includes Policy CS11 on Transport and New Development, which states that:

“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.”

- 2.11 In March 2012, the Council adopted a Supplementary Planning Document (SPD) on Planning Obligations (Rugby Borough Council, 2012), which includes a section on air quality. The SPD 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.”

- 2.12 It also states that:

“an air quality assessment will be required where the development is anticipated to give rise to significant changes in air quality”.

2.13 It goes on to recommend that mitigation measures may be required in order to offset any increases in local pollutant emissions, such as:

- *“Improved access to public transport;*
- *The provision of on and off site facilities for cycling and walking;*
- *The management of car parking;*
- *Traffic management;*
- *Road infrastructure improvements;*
- *Green Travel Plans; and*
- *Monitoring of air pollution”.*

Air Quality Action Plans

National Air Quality Plan

2.14 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017a). Alongside a package of national measures, the Plan requires those Local Authorities that are predicted to have exceedances of the limit values beyond 2020 to produce local action plans by March 2018. These plans must have measures to achieve the statutory limit values within the shortest possible time. There is currently no practical way to take account of the effects of the national Plan in the modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed development. This assessment has principally been carried out in relation to the air quality objectives, rather than the EU limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

2.15 Rugby Borough Council declared an AQMA for nitrogen dioxide that covers the entire Rugby urban area in 2004. In 2010 the Council published its current Air Quality Action Plan (Rugby Borough Council, 2010). This sets out a range of proposed actions by which the Council aims to improve air quality in Rugby, most of which focus on transport emissions.

Assessment Criteria

2.16 The Government has established a set of air quality standards and objectives to protect human health. The ‘standards’ are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small.

They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).

- 2.17 The objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM_{2.5} objective is to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m³ (Defra, 2016). Measurements have also shown that the 24-hour PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³ (Defra, 2016). The predicted annual mean PM₁₀ concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM₁₀ objective. Where predicted annual mean concentrations are below 32 µg/m³ it is unlikely that the 24-hour mean objective will be exceeded.
- 2.18 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2016). The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 2.19 The European Union has also set limit values for nitrogen dioxide, PM₁₀ and PM_{2.5} (The European Parliament and the Council of the European Union, 2008). The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.
- 2.20 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
Fine Particles (PM ₁₀)	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³ ^a
Fine Particles (PM _{2.5}) ^b	Annual Mean	25 µg/m ³

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible (Defra, 2016).

^b The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Screening Criteria for Road Traffic Assessments

2.21 Environmental Protection UK (EPUK) and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A1, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m² of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment. The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that *“the criteria provided are precautionary and should be treated as indicative”*, and *“it may be appropriate to amend them on the basis of professional judgement”*.

Descriptors for Air Quality Impacts and Assessment of Significance

2.22 There is no official guidance in the UK in relation to development control on how to describe air quality impacts, nor how to assess their significance. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. This includes defining descriptors of the impacts at individual receptors, which take account of the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix A1. The approach

includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A2.

3 Assessment Approach

Existing Conditions

- 3.1 Existing sources of emissions within the study area have been defined using a number of approaches. Industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2017b). Local sources have also been identified through examination of the Council's Air Quality Review and Assessment reports.
- 3.2 Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. Background concentrations have been defined using the national pollution maps published by Defra (2017c). These cover the whole country on a 1x1 km grid.
- 3.3 Exceedances of the annual mean EU limit value for nitrogen dioxide in the study area have been identified using the maps of roadside concentrations published by Defra (2017d) as part of its 2017 Air Quality Plan for the baseline year 2015 and for the future years 2017 to 2030. These maps are used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to EU data quality standards, to report exceedances of the limit value to the EU. The national maps of roadside PM₁₀ and PM_{2.5} concentrations (Defra, 2017e), which are available for the years 2009 to 2015, show no exceedances of the limit values anywhere in the UK in 2015.

Road Traffic Impacts

Screening

- 3.4 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 2.21 and detailed further in Appendix A1. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

Sensitive Locations

- 3.5 Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} will be predicted at a number of locations both within, and close to, the proposed development. Receptors have been identified to represent a range of exposure within the development, including the worst-case locations (these being at the façades of the residential properties closest to the sources). When selecting receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become

congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the proposed development will be greatest.

- 3.6 Existing residential properties have been identified as receptors for the assessment which lie close to roads on which traffic will increase as a result of the proposed development. In addition receptor locations have been identified within the new development, which represent exposure to existing sources.

Assessment Scenarios

- 3.7 Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations will be predicted for a base year (2016) and the proposed year of opening (2021). For 2021, predictions have been made assuming both that the development does proceed (With Scheme), and does not proceed (Without Scheme).

Modelling Methodology

- 3.8 Concentrations are to be predicted using the ADMS-Roads dispersion model. Details of the model inputs, assumptions and the verification are provided in Appendix A3, together with the method used to derive base and future year background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted.

Traffic Data

- 3.9 Traffic data for the assessment have been provided by Travis Baker Ltd, who produced a Transport Assessment for the proposed development.

Uncertainty in Road Traffic Modelling Predictions

- 3.10 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 3.11 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A3). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2016) concentrations.
- 3.12 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions.

Railway Impacts

- 3.13 Diesel or coal fired stationary locomotives can give rise to elevated levels of sulphur dioxide close to the point of emission. In addition, large numbers of moving diesel locomotives can give rise to high levels of nitrogen dioxide close to the track (Defra, 2009).
- 3.14 Defra guidance (Defra, 2009) outlines an approach to assess the potential for exceedence of the nitrogen dioxide and sulphur dioxide objectives as a result of emissions from diesel and steam locomotives. Outdoor areas within 15 m of railway lines where trains may be stationary for 15 minutes or more may experience elevated sulphur dioxide concentrations. Residential properties within 30 m of railway lines where there are large numbers of diesel locomotive movements (identified in the Defra guidance), and where background nitrogen dioxide concentrations are greater than $25 \mu\text{g}/\text{m}^3$, may be at risk of elevated nitrogen dioxide concentrations. Only locations which meet these criteria require further assessment.
- 3.15 The proposed development site is over 100 m from the railway line that runs east to west out of Rugby to the north of the site. The criteria described in the paragraph above are therefore not met, and there is no need to assess the impacts of emissions from the railway on the proposed development site. Railway emissions are not considered further in this assessment.

4 Site Description and Baseline Conditions

- 4.1 The proposed development site is located approximately 3 km to the west of Rugby town centre, to the north of Coventry Road, Long Lawford. The site currently consists of agricultural land with new residential estates on land to the north and east.

Industrial sources

- 4.2 A search of the UK Pollutant Release and Transfer Register (Defra, 2012a) has not identified any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality. The Rugby Cement Plant, located on Lawford Road is approximately 1 km from the proposed development. Emissions of particulate matter from the cement works have been included in this study through consideration of Defra's Background Maps (Defra, 2017c), however it is unlikely that particulate matter emissions from the works will have a significant direct impact on the proposed development site. An existing residential estate occupies land between the works and the proposed development, which are not known to be significantly affected by emissions from the cement works.

Air Quality Management Areas

- 4.3 Rugby Borough Council has investigated air quality within its area as part of its responsibilities under the LAQM regime. In 2004 an Air Quality Management Area (AQMA) was declared covering the Rugby urban area for exceedances of the nitrogen dioxide objective. The AQMA covers the whole Rugby area including rural and suburban spaces where exceedances of the objectives are less likely. The proposed development site is within this area. The declared AQMA(s) is/are shown in Figure 1.
- 4.4 In terms of PM₁₀, the Council concluded that there are no exceedances of the objectives. It is therefore highly unlikely that current PM₁₀ levels will exceed the objectives within the study area.

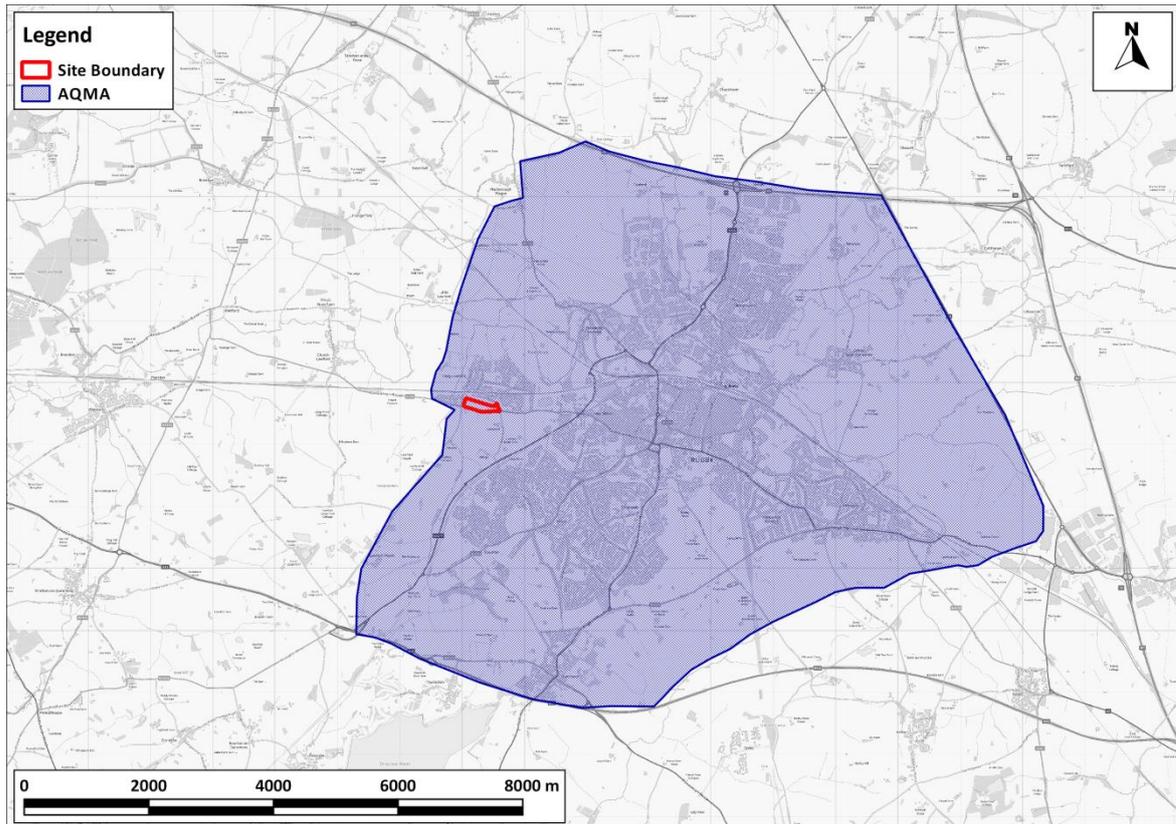


Figure 1: Declared AQMAs

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Local Air Quality Monitoring

- 4.5 Rugby Borough Council operates one automatic monitoring station within its area which measures for particulate matter, and no automatic monitors which measure for nitrogen dioxide. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Environmental Services Group (ESG) Didcot (using the 50% TEA in acetone method). These include one deployed on School Street, one on Parkfield Road, one at Avon Valley School, one on West Field Road, two on Lawford Road, and one on Avenue Road. Results for the years 2012 to 2016 are summarised in Table 2 and the monitoring locations are shown in Figure 2.

Table 2: Summary of Nitrogen Dioxide (NO₂) Monitoring (2012-2016) ^a

Site No.	Site Type	Location	2012	2013	2014	2015	2016
Diffusion Tubes - Annual Mean (µg/m³)							
S3	Urban Background	69 School Street	16	18.3	15.5	15.6	15.5
S6	Urban Background	2 West Field Road	17.2	17.9	15.7	17.3	16.3
S15	Kerbside	Lawford Road / Jubilee Street	28.2	28.9	28.9	30.9	28.3
S26	Near-road	Lawford Road (former Simms Scrap Yard)	20.7	21.8	21	20.3	22.4
S27	Roadside	Avenue Road /Campbell Street	-	-	-	-	27.5
S28	Roadside	256 Parkfield Road	19.5	20.3	19.7	20.9	19.7
S29	Urban Background	Avon Valley School	22.6	23.5	23	24.9	21.7
Objective			40				

^a Data have been taken from the 2017 Annual Status Report (Rugby Borough Council, 2017).

- 4.6 The monitoring data for the past five years have been consistently below the annual mean nitrogen dioxide objective at all monitoring locations proximal to the proposed development site. Due to the location of site S26 on the same road as the proposed development site and away from any major junctions, monitored concentrations at S26 are considered most representative of conditions at the proposed development site.
- 4.7 There are no clear trends in monitoring results for the past five years. This contrasts with the expected decline due to the progressive introduction of new vehicles operating to more stringent standards.

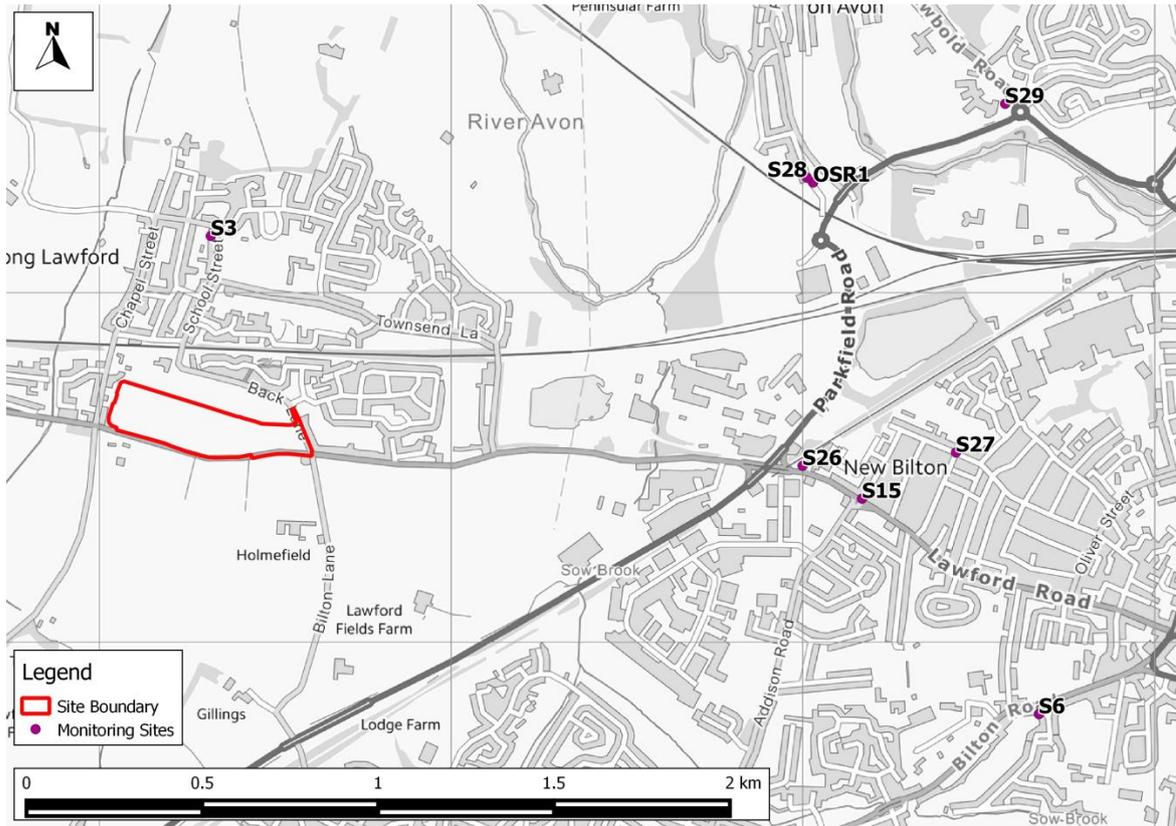


Figure 2: Development Site Boundary and Monitoring Locations

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4.8 The OSR1 roadside automatic monitoring station, located on Parkfield Road 1.6 km north east of the proposed development site, is the closest station which measured PM₁₀ concentrations in 2016. PM_{2.5} concentrations are also measured at the OSR1 monitor. Results for 2015 and 2016 are presented in Table 3 and are all well below relevant objectives.

Table 3: Summary of PM₁₀ and PM_{2.5} Automatic Monitoring (2015-2016)

Site No.	Site Type	Location	2015	2016
PM₁₀ Annual Mean (µg/m³)				
OSR1	Roadside	Parkfield Road	12.8	12.5
Objective			40	
PM₁₀ No. Days >50 µg/m³				
OSR1	Roadside	Parkfield Road	3	1
Objective			35	
PM_{2.5} Annual Mean (µg/m³)				
OSR1	Roadside	Parkfield Road	6.6	5.9
Objective			25^a	

^a The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Exceedances of EU Limit Value

- 4.9 There are no AURN monitoring sites within 1 km of the development site with which to identify exceedances of the annual mean nitrogen dioxide limit value. Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2017d), which are used to report exceedances of the limit value to the EU, and which have been updated to support the 2017 Air Quality Plan, do not identify any exceedances within 1 km of the development site in 2015. Defra's predicted concentrations for 2021, presented for three scenarios ('baseline', 'with Clean Air Zones' and 'with Clean Air Zones and additional actions' – the latter two taking account of the measures contained in its 2017 Air Quality Plan (Defra, 2017a)), also do not identify any exceedances within 1 km of the development site in any scenario. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

Background Concentrations

- 4.10 Estimated background concentrations at the proposed development have been determined for 2016 and the opening year 2021 using Defra's background maps (Defra, 2017c). The background concentrations are set out in Table 4 and have been derived as described in Appendix A3. The background concentrations are all well below the objectives.

Table 4: Estimated Annual Mean Background Pollutant Concentrations in 2016 and 2021 ($\mu\text{g}/\text{m}^3$)

Year	NO ₂	PM ₁₀	PM _{2.5}
2016	12.8	13.4	9.1
2021	10.5	12.9	8.6
Objectives	40	40	25 ^a

N/A = not applicable. The range of values is for the different 1x1 km grid squares covering the study area.

^a The PM_{2.5} objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

5 Impact Assessment

Impacts at Existing Receptors

Initial Screening Assessment of Development-Generated Road Traffic Emissions

- 5.1 The trip generation of the proposed development on local roads (as provided by Travis Baker Ltd) has initially been compared to the screening criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Paragraphs A1.7 to A1.10 in Appendix A1) The changes in traffic flows on local roads will all be greater than the screening criterion of 100 LDVs as an AADT flow within an AQMA, and therefore a detailed assessment of road traffic emissions is required.

Detailed Assessment of Development-Generated Road Traffic Emissions

- 5.2 The detailed results of the dispersion modelling of road traffic emissions generated by the scheme will be provided in a subsequent version of this report. The baseline air quality conditions in the study area, as set out in this document, are generally good, with concentrations well below relevant air quality objectives. Although the traffic data generated by the scheme triggers the need for a detailed assessment because the area is designated as an AQMA, if the scheme were not in an AQMA then it would be possible to screen out the need for the detailed assessment based on the IAQM criteria. Considering these low baseline concentrations in the area, and the moderate traffic data generated by the site, it is judged that the air quality impacts will be likely be negligible at all existing nearby receptors.

Impacts of Existing Sources on Future Residents of the Development

- 5.3 The proposed development site is adjacent to the A428, but the proposed properties will be set back from the road by at least 10 m. Air quality monitoring adjacent to the A428 (see data for sites S15 and S26 in Table 2) demonstrates that nitrogen dioxide concentrations are well below the annual mean objective at the roadside, despite the road being within an AQMA. It is unlikely that air quality conditions adjacent to the A428 at the proposed development site will be worse to those adjacent to the A428 at sites S15 and S26, which are nearer to the centre of Rugby (see Figure 2) and therefore it is judged that air quality for future residents of the proposed development will be acceptable.

Significance of Operational Air Quality Effects

- 5.4 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A1 and is based on professional experience. The judgement takes account of the low baseline

concentrations in the area which mean there are no significant impacts on the development site itself, and increases in emissions from traffic generated by the scheme are likely to lead to negligible air quality impacts. The results of dispersion modelling to demonstrate this will be provided in a subsequent version of this report.

6 Mitigation

6.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The proposed development incorporates the following good design and best practice measures:

- setting back of the development buildings from roads by at least 5 m;
- setting back of the development buildings from the railway lines by at least 5 m;
- provision of pedestrian and cycle access to the new development, including cycle parking;
- installation of ultra-low NO_x boilers into dwellings; and
- the scheme does not include any CHP plant.

7 Conclusions

- 7.1 A review of local baseline air quality conditions has identified that despite the site being within and AQMA, baseline pollutant concentrations at the site are all likely to be well below relevant objectives. Air quality conditions at the site are therefore suitable for residential development and no mitigation is required.
- 7.2 The operational impacts of increased traffic emissions arising from the additional traffic on local roads, due to the development, have been considered. The development is predicted to generate an increase in traffic on local roads, however based on the predicted scale of this traffic generation and the low baseline concentrations, it is anticipated that the impacts of emissions from road traffic will be negligible. The results of dispersion modelling to demonstrate this will be provided in a subsequent version of this report.
- 7.3 Overall the air quality impacts are judged to be not significant. The proposed development is consistent with the NPPF, and does not conflict with the requirements of Policy HS5 of the draft Local Plan, nor does it conflict with, or render unworkable, any elements of the Air Quality Action Plan.

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9 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQC	Air Quality Consultants
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CHP	Combined Heat and Power
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
EV	Electric Vehicle
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LGV	Light Goods Vehicle
µg/m³	Microgrammes per cubic metre
NO	Nitric oxide
NO₂	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO ₂ + NO)

NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PM₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM_{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide

10 Appendices

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A1 EPUK & IAQM Planning for Air Quality Guidance

A1.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

“Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations”.*

Recommended Best Practice

A1.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

“The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions”.

A1.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m² of commercial floorspace;
- are carried out on land of 1 ha or more.

A1.4 The good practice principles are that:

- New developments should not contravene the Council’s Air Quality Action Plan, or render any of the measures unworkable;

- Wherever possible, new developments should not create a new “street canyon”, as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) “rapid charge” point per 10 residential dwellings and/or 1000 m² of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNO_x/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
 - Spark ignition engine: 250 mgNO_x/Nm³;
 - Compression ignition engine: 400 mgNO_x/Nm³;
 - Gas turbine: 50 mgNO_x/Nm³.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNO_x/Nm³ and 25 mgPM/Nm³.

A1.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

“It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the “damage cost approach” used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential”.

A1.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to

offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

“There may be a requirement to carry out an air quality assessment for the impacts of the local area’s emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development”.*

Impacts of the Development on the Local Area

A1.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m² of floor space for all other uses or a site area greater than 1 ha.

A1.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or

- the development will have a centralised energy facility or other centralised combustion process.

A1.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor; and

A1.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A1.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

“Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NO_x gas boiler or a 30kW CHP unit operating at <95mg/Nm³.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent

buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable”.

A1.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

“The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive ‘trigger’ for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality”.

A1.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

“The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer”.

A1.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Impact Descriptors and Assessment of Significance

A1.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

Impact Descriptors

A1.16 Impact description involves expressing the magnitude of incremental change as a proportion of a relevant assessment level and then examining this change in the context of the new total concentration and its relationship with the assessment criterion. Table A1.1 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table A1.1: Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^a

Long-Term Average Concentration At Receptor In Assessment Year ^b	Change in concentration relative to AQAL ^c				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

^a Values are rounded to the nearest whole number.

^b This is the “Without Scheme” concentration where there is a decrease in pollutant concentration and the “With Scheme” concentration where there is an increase.

^c AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency ‘Environmental Assessment Level (EAL)’.

Assessment of Significance

A1.17 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either ‘significant’ or ‘not significant’. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as ‘*slight*’ individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a ‘*moderate*’ or ‘*substantial*’

impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and

- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A1.18 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A1.19 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A2.

A2 Professional Experience

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Mr Caird is a Principal Consultant with AQC, with twelve years' experience in the field of air quality including the detailed assessment of emissions from road traffic, airports, heating and energy plant, and a wide range of industrial sources including the thermal treatment of waste. He has experience in ambient air quality monitoring for numerous pollutants using a wide range of techniques and is also competent in the monitoring and assessment of nuisance odours and dust. Mr Caird has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers and process operators. He is a Member of the Institute of Air Quality Management and is a Chartered Scientist.

Marko Ristic-Smith, BA (Hons) MSc DIC AMEnvSc AMIAQM

Mr Ristic-Smith is an Assistant Consultant with AQC, having joined the company in September 2016. He is gaining experience of air quality assessments for a range of developments using air quality monitoring and modelling techniques. Prior to joining AQC he completed his MSc in Environmental Technology, with his thesis examining the air quality and health impacts of transport policy scenarios in London. He is a Graduate Member of the Institute of Environmental Management and Assessment.

Dr Aidan Farrow, BSc (Hons) PhD

Dr Farrow is a Consultant with AQC, having joined the company in 2016. He previously worked for four years as a research scientist at the University of Hertfordshire's Centre for Atmospheric and Instrumentation Research. There he was responsible for the National Centre for Atmospheric Science Air Quality Forecast, as well as working on research projects with a variety of Climate, Weather and Air Quality models. He is now gaining experience in the field of air quality assessment.

Full CVs are available at www.aqconsultants.co.uk.

A3 Modelling Methodology

A3.1 Details of the modelling methodology will be provided in a subsequent version of this report.