



## **Air Quality Assessment: 39 Brunswick Hill, Reading**

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December 2017



Experts in air quality  
management & assessment

## Document Control

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## Executive Summary

The air quality impacts associated with the proposed residential development adjacent to Brunswick Hill, Reading have been assessed.

The site lies within an Air Quality Management Area declared by Reading Borough Council for exceedances of the annual mean nitrogen dioxide objective. However, poor air quality conditions are only currently experienced alongside the busiest roads, such as Oxford Road (A329).

Air quality conditions for new residents of the proposed development have been considered. Pollutant concentrations are predicted to be below the air quality objectives across the proposed development site, and air quality conditions for new residents will thus be acceptable.

Overall, the operational impacts of the proposed development, without mitigation, are judged to be 'not significant'.

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# 1 Introduction

- 1.1 This report describes the potential air quality impacts associated with the proposed residential development adjacent to Brunswick Hill, Reading. The assessment has been carried out by Air Quality Consultants Ltd on behalf of EB Solutions Ltd.
- 1.2 The proposed development will be three storeys in height, and will provide 10 residential units with 13 associated parking spaces. The site lies within an Air Quality Management Area (AQMA) declared by Reading Borough Council for exceedances of the annual mean nitrogen dioxide objective. The new residential properties will be subject to the impacts of emissions from the adjacent road network, as well as emissions from the nearby railway lines. The proposed development will also generate additional traffic on local roads, which may impact on air quality at existing residential properties. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO<sub>2</sub>) and fine particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), whilst the main air pollutant of concern related to railway locomotives is nitrogen dioxide.
- 1.3 This report describes existing local air quality conditions, and identifies the suitability of the site for residential development. It also considers the potential air quality impact of additional traffic generated by the proposed development.
- 1.4 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with Reading Borough Council.

## 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 Local Transport Plan 3: Strategy 2011 – 2026 (Reading Borough Council, 2011), adopted in April 2011, includes four policies that are directly relevant to air quality:

- *“to support the Air Quality Management Plan in improving air quality”;*
- *“to use all available tools and techniques to evaluate and appraise major scheme proposals.....and to consider.....air quality.....impacts in such assessments as appropriate”;*
- *“to pursue the introduction of a central Reading Low Emission Zone, targeting the most polluting Heavy Goods and Passenger Carrying Vehicles as a means of addressing identified air quality issues in the declared Air Quality Management Area”;* and
- *“to work with freight operators to help them operate a service that reduces impacts on neighbourhoods in terms of noise and air pollution.....”*.

### **Local Policies**

2.8 The Core Strategy (Reading Borough Council, 2008) was adopted in January 2008 and amended in January 2015. The Core Strategy includes Environmental Objective 4: *“Minimise*

*air.....pollution*" and one policy that is directly relevant to air quality; Policy CS34 'Pollution and Water Resources' states that:

- *"Development will only be permitted where it would not be damaging to the environment through air.....pollution.....Proposals for development that are sensitive to the effects of air.....pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution."*

2.9 The Sites and Detailed Policies Document (Reading Borough Council, 2012) was adopted in 2012, with amendments made in 2015. It contains two policies that are directly relevant to air quality:

- Policy DM3 'Infrastructure Planning' states that *".....other measures, as follows, may also be considered [regarding priority], where a specific need is identified and justified:- .....measures to tackle poor air quality or for on-going air quality monitoring"*; and
- Policy DM19 'Air Quality' states that *"Development should have regard to the need to improve air quality and reduce the effects of poor air quality.*
  - o *i. Development that would detrimentally affect air quality will not be permitted unless the effect is to be mitigated. The following criteria should be taken into account:*
    - § *Whether the proposal, including when combined with the cumulative effect of other developments already permitted, would significantly reduce air quality;*
    - § *Whether the development is within, or accessed via, an Air Quality Management Area; and*
    - § *Whether it can be demonstrated that a local reduction in air quality would be offset by an overall improvement in air quality, for instance through reduction in the need to travel;*
  - o *ii. Where a development would introduce sensitive users (such as residential, schools and nurseries, hospitals, care facilities) into, or intensify such uses within, and Air Quality Management Area, detrimental effects on that use will be mitigated. Mitigation measures should be detailed in any planning application;*
  - o *iii. Where required, planning obligations will be used to secure contributions to measures to tackle poor air quality of for air quality monitoring".*

2.10 Reading Borough Council is currently producing a new Local Plan, which will replace the current development plans (including the Core Strategy and the Sites and Detailed Policies Document).

The Pre-Submission Draft Local Plan (Reading Borough Council, 2017) includes three policies that are directly relevant to air quality:

- Policy CC9 'Infrastructure Planning' states that *".....other measures, as follows, may also be considered [regarding priority], where a specific need is identified and justified:- .....measures to tackle poor air quality or for on-going air quality monitoring";*
- Policy EN15 'Air Quality' states that *"Development should have regard to the need to improve air quality and reduce the effects of poor air quality.*
  - o *i. Development that would detrimentally affect air quality will not be permitted unless the effect is to be mitigated. The following criteria should be taken into account:*
    - § *Whether the proposal, including when combined with the cumulative effect of other developments already permitted, would worsen air quality;*
    - § *Whether the development is within, or accessed via, an Air Quality Management Area; and*
    - § *Whether it can be demonstrated that a local worsening in air quality that would not detrimentally affect human health or the environment would be offset by an overall improvement in air quality, for instance through reduction in the need to travel;*
  - o *ii. Where a development would introduce sensitive users (such as residential, schools and nurseries, hospitals, care facilities) into, or intensify such uses within, and Air Quality Management Area, detrimental effects on that use will be mitigated. Mitigation measures should be detailed in any planning application. If there are significant detrimental effects that cannot be mitigated, the application should be refused;*
  - o *iii. Where required, planning obligations will be used to secure contributions to measures to tackle poor air quality or for air quality monitoring"; and*
- Policy CR6 'Living in Central Reading' states that: *".....Proposals for residential development within the central area will be required to demonstrate how the issue of.....air quality implications of residential development, have been considered and, if necessary, mitigated."*

## Air Quality Action Plans

### *National Air Quality Plan*

- 2.11 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*

- 2.12 Reading Borough Council declared an AQMA (Reading AQMA) in 2009 for exceedances of the nitrogen dioxide annual mean objective. Reading AQMA covers Reading Town and areas along the major radial road routes into Reading (including J11 of the M4), and along the railway lines where they pass through built-up areas. The Council has since developed an Air Quality Action Plan (Reading Borough Council, 2009) that sets out policies and measures to address air quality issues across the borough (with a focus on areas within an AQMA) and to work towards meeting the air quality objectives for nitrogen dioxide.

## Assessment Criteria

- 2.13 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).
- 2.14 The objectives for nitrogen dioxide and PM<sub>10</sub> were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The PM<sub>2.5</sub> 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/m<sup>3</sup> (Defra, 2016). Therefore, 1-hour nitrogen dioxide concentrations will only be

considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour PM<sub>10</sub> objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m<sup>3</sup> (Defra, 2016). The predicted annual mean PM<sub>10</sub> concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM<sub>10</sub> objective. Where predicted annual mean concentrations are below 32 µg/m<sup>3</sup> it is unlikely that the 24-hour mean objective will be exceeded.

- 2.15 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 PM<sub>10</sub> 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 PM<sub>10</sub> 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.
- 2.16 The European Union has also set limit values for nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> (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.
- 2.17 The relevant air quality criteria for this assessment are provided in Table 1.

**Table 1: Air Quality Criteria for Nitrogen Dioxide, PM<sub>10</sub> and PM<sub>2.5</sub>**

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

<sup>a</sup> A proxy value of 32 µg/m<sup>3</sup> as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM<sub>10</sub> objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM<sub>10</sub> objective are possible (Defra, 2016).

- <sup>b</sup> The PM<sub>2.5</sub> 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**

- 2.18 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)<sup>1</sup> 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 comprises ten or more residential units or covers more than 0.5 ha, or is non-residential and will provide more than 1,000 m<sup>2</sup> of floor space or cover a site area greater than 1 ha, in combination with provision of more than ten parking spaces, then there is a need to progress to a detailed assessment. If these criteria do not apply, then the need for a detailed assessment may be screened out. 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”*.

### **Screening Criteria for Railway Locomotive Emissions**

- 2.19 Defra guidance (Defra, 2016) outlines that large numbers of moving diesel locomotives can give rise to high levels of nitrogen dioxide close to railway tracks. The guidance outlines where there may be the potential for an exceedance of the nitrogen dioxide objectives as a result of emissions from diesel locomotives. Residential properties within 30 m of railway lines where there are large numbers of diesel locomotive movements (these lines are identified in the Defra guidance), and where background annual mean nitrogen dioxide concentrations are greater than 25 µg/m<sup>3</sup>, may be at risk of elevated nitrogen dioxide concentrations. Only locations which meet these criteria require further assessment.

### **Assessment of Significance**

- 2.20 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. The overall significance of the air quality impacts is determined using professional judgement. Full details of the EPUK/IAQM approach are provided in Appendix A1 and the experience of the consultants preparing the report is set out in Appendix A2.

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<sup>1</sup> The IAQM is the professional body for air quality practitioners in the UK.

## 3 Assessment Approach

### Consultation

- 3.1 The assessment follows a methodology agreed with Reading Borough Council via email correspondence between Ross Jarvis (Senior Technical Officer of the Department of Environment and Neighbourhood Services, Reading Borough Council) and Nicole Holland (Air Quality Consultants) held in December 2017.

### Existing Conditions

- 3.2 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 discussion with Reading Borough Council's Environment and Neighbourhood Services department, as well as through examination of the Council's Air Quality Review and Assessment reports.
- 3.3 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.
- 3.4 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 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 PM<sub>10</sub> and PM<sub>2.5</sub> 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.

### Additional Road Traffic Impacts

#### Screening

- 3.5 The first step in considering the road traffic impacts of the proposed development has been to compare the traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 2.18 and detailed further in Appendix A1. Where impacts can be screened out there is no need to progress to a more detailed assessment, as has been the case for this assessment.

## **Impact of Existing Sources on Future Residents of the Proposed Development**

### ***Railway Impacts***

- 3.6 The potential for significant impacts as a result of emissions from railway locomotives on the lines near to the proposed development has been considered by comparing the specific development scenario to the criteria set out in the Defra guidance (Defra, 2016).

### ***Background Air Quality and Existing Road Traffic Impacts***

- 3.7 The impacts of background air quality and existing road traffic on the proposed development have been assessed qualitatively. The assessment considers the site location and existing air quality conditions within the study area (see Paragraphs 3.2 to 3.4). The assessment assumes that air quality conditions in future years are represented by the existing climate. This assumption is considered to be worst-case as it is generally expected that nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations will decline in future years.

## 4 Site Description and Baseline Conditions

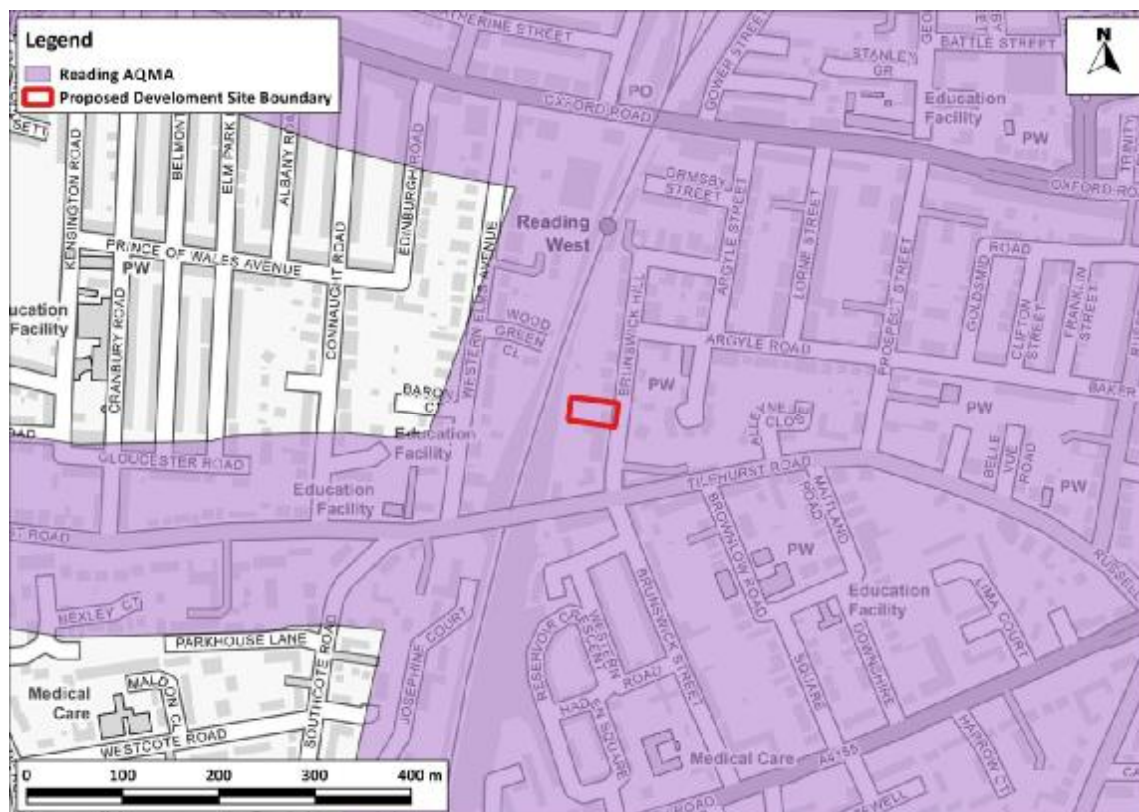
- 4.1 The proposed development is located adjacent to Brunswick Hill (a minor road), approximately 70 m from Tilehurst Road to the south, and approximately 290 m from Oxford Road (A329) to the north. The site is bounded by Brunswick Hill to the east, existing residential properties to the north and south and a railway line to the west. The site is located in a predominantly residential area, and currently consists of existing residential properties.

### Industrial sources

- 4.2 A search of the UK Pollutant Release and Transfer Register (Defra, 2017b) has not identified any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality.

### Air Quality Management Areas

- 4.3 Reading Borough Council has investigated air quality within its area as part of its responsibilities under the LAQM regime. In 2009 an AQMA (Reading AQMA) was declared for exceedances of the annual mean nitrogen dioxide objective. Reading AQMA covers Reading Town and areas along the major radial road routes into Reading (including J11 of the M4) and along the railway lines where they pass through built-up areas. The proposed development is located within the AQMA (see Figure 1).
- 4.4 In terms of  $PM_{10}$  and  $PM_{2.5}$ , the Reading Borough Council concluded that there were no exceedances of the objectives in 2015 (Reading Borough Council, 2016). It is, therefore, reasonable to assume that existing  $PM_{10}$  and  $PM_{2.5}$  concentrations are unlikely to exceed the objectives within the study area.



**Figure 1: Reading AQMA and the Proposed Development Boundary**

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## Local Air Quality Monitoring

- 4.5 Reading Borough Council operates four automatic monitoring stations, however, none of these are located in close proximity to the proposed development. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International (using the 50% TEA in acetone method). These include seven sites that are located close to the proposed development; this includes three sites adjacent to Oxford Road (A329) and one site adjacent to Tilehurst Road. Results for the years 2011 to 2016 are summarised in Table 2 and the monitoring locations are shown in Figure 2.

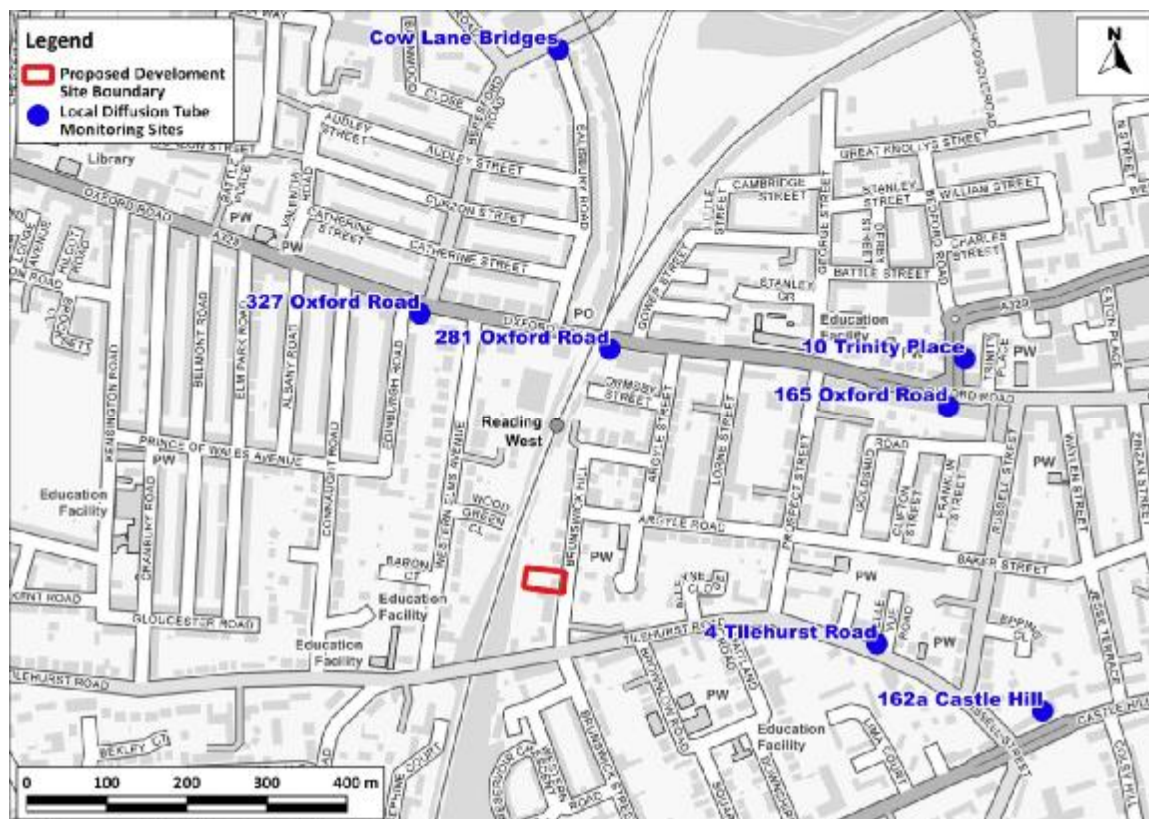
**Table 2: Summary of Nitrogen Dioxide (NO<sub>2</sub>) Diffusion Tube Monitoring (2011-2016)** <sup>a, b</sup>

| Site Name / Location                  | Site Type | 2011      | 2012      | 2013      | 2014      | 2015      | 2016      |
|---------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Annual Mean (µg/m<sup>3</sup>)</b> |           |           |           |           |           |           |           |
| <b>Cow Lane Bridges</b>               | Roadside  | 33        | 34        | 35        | 37        | 31        | 32        |
| <b>327 Oxford Road</b>                | Roadside  | <b>46</b> | <b>50</b> | <b>47</b> | <b>49</b> | <b>43</b> | <b>40</b> |
| <b>281 Oxford Road</b>                | Roadside  | <b>45</b> | <b>47</b> | <b>49</b> | <b>48</b> | <b>45</b> | <b>44</b> |
| <b>165 Oxford Road</b>                | Roadside  | <b>48</b> | <b>52</b> | <b>48</b> | <b>51</b> | <b>47</b> | <b>44</b> |
| <b>10 Trinity Place</b>               | Roadside  | 31        | 33        | 37        | 32        | 31        | 31        |
| <b>4 Tilehurst Road</b>               | Roadside  | 29        | 33        | 35        | 35        | 29        | 30        |
| <b>162a Castle Hill</b>               | Roadside  | 33        | 40        | 39        | 40        | 36        | 37        |
| <b>Objective</b>                      |           | <b>40</b> |           |           |           |           |           |

<sup>a</sup> Exceedances of the objectives are shown in bold.

<sup>b</sup> 2011 to 2016 data have been downloaded from the Air Quality England website (Air Quality England, 2017).

- 4.6 The three monitoring sites located adjacent to Oxford Road (A329) have consistently measured exceedances of the annual mean objective from 2011 to 2016. Measured concentrations at all other sites have been consistently below the annual mean nitrogen dioxide objective.
- 4.7 The monitoring sites adjacent to Tilehurst Road (4 Tilehurst Road), and adjacent to the junction between Salisbury Road and Beresford Road (Cow Lane Bridges), are considered to be the most representative of air quality conditions at the proposed development, due to their proximity to relatively minor roads, and over 150 m from the nearest busy A-road.
- 4.8 There are no clear trends in monitoring results for the past six years. This contrasts with the expected decline due to the progressive introduction of new vehicles operating to more stringent standards.
- 4.9 No monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> concentrations is undertaken in close proximity to the proposed development site.



**Figure 2: Local Diffusion Tube Monitoring Sites and the Proposed Development Site Boundary**

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## Exceedances of EU Limit Value

- 4.10 There are no AURN monitoring sites within the study area 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 (Defra, 2017a), do not identify any exceedances within the study area in 2015. Defra's predicted future year concentrations from 2017 to 2030, 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), also do not identify any exceedances within the study area in any scenario. Reading has been identified within the 2017 Air Quality Plan as one of the local authorities with roads with concentrations of nitrogen dioxide forecast above legal limits (assuming no additional measures are taken), with limit values predicted to be exceeded until 2020. However, as there are no roads predicted to exceed the limit value within the study area itself, it is considered unlikely

that any limit value exceedance will occur in the vicinity of the proposed development during the earliest year of occupation.

### Background Concentrations

- 4.11 Estimated background concentrations at the proposed development site have been determined for 2016 using Defra's background maps (Defra, 2017c), which cover the whole country on a 1x1 km grid and are published for each year from 2013 until 2030. The background maps for 2016 have been calibrated against concurrent measurements from national monitoring sites.
- 4.12 The background concentrations are set out in Table 3. The background concentrations are all below the objectives.

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

| Year       | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
|------------|-----------------|------------------|-------------------|
| 2016       | 30.1            | 15.2             | 9.4               |
| Objectives | 40              | 40               | 25 <sup>a</sup>   |

<sup>a</sup> The PM<sub>2.5</sub> 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 proposed development has only 13 on-site parking spaces allocated. It is highly unlikely that the proposed development will generate more than 100 AADT along any road in the local area; this falls below 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). As such, there is no requirement for a detailed assessment of road traffic impacts at existing receptors, and the impacts can be considered negligible.

### Impacts of Existing Sources on Future Residents of the Proposed Development

#### *Assessment of Railway Locomotive Emissions*

- 5.2 Defra guidance (Defra, 2016) outlines that there is only the potential for an exceedance of the annual mean nitrogen dioxide objective where there is long-term exposure within 30 m of railway lines, these lines experience a high volume of diesel passenger trains and the annual mean background concentration of nitrogen dioxide is above 25  $\mu\text{g}/\text{m}^3$ .
- 5.3 The proposed development falls outside the above criteria; the predicted background concentration at the proposed development site in 2016 (15.2  $\mu\text{g}/\text{m}^3$ , see Table 3) falls below 25  $\mu\text{g}/\text{m}^3$  and the nearby railway lines (to the west of the proposed development site) are not identified within the Defra guidance as having a high volume of diesel passenger trains. Furthermore, while the proposed development site boundary is within 30 m of the railway lines (approximately 25 m distance), the residential units would be located at approximately 55 m distance. It can, therefore, be concluded that there is no risk of the objectives being exceeded as a result of emissions from locomotives using the nearby railway lines.

#### *Background Air Quality and Existing Traffic Impacts*

- 5.4 It is generally expected that concentrations of nitrogen dioxide,  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  will decline in future years, but for the purposes of this assessment the assumption has been made that future residents will experience air quality similar to existing (2016) conditions. As such, the assessment is considered to be conservative.
- 5.5 The proposed development is located on a minor road (Brunswick Hill) and is situated well away from any busy roads (the closest A-road (Oxford Road (A329)) is located approximately 290 m away). Furthermore, the proposed residential units are set back from Brunswick Hill by

approximately 7 m. It is considered that pollutant concentrations at the proposed development site will be close to background levels, which are well below the annual mean objectives for nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> (see Table 3).

- 5.6 Furthermore, measured concentrations of nitrogen dioxide at the closest representative monitoring site ('4 Tilehurst Road') have been below the annual mean objective for the last six years. In reality, concentrations of nitrogen dioxide at the proposed development are likely to be even lower than at this monitoring site, given the set-back distance from the local road.
- 5.7 As both the estimated background annual mean nitrogen dioxide concentration at the proposed development and the measured annual mean concentration at the closest representative monitoring site are well below 60 µg/m<sup>3</sup>, exceedances of the 1-hour mean nitrogen dioxide objective at the proposed development are highly unlikely. In terms of the PM<sub>10</sub> 24-hour objective, the estimated background annual mean PM<sub>10</sub> concentration is well below 32 µg/m<sup>3</sup>, and exceedances of the 24-hour mean objective at the proposed development site are also unlikely.
- 5.8 It can, therefore, be concluded that future residents of the proposed development will experience acceptable air quality.

### Significance of Operational Air Quality Effects

- 5.9 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.
- 5.10 More specifically, the judgement that the air quality effects will be 'not significant' without mitigation takes account of the assessment that concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> at the proposed development will be below the relevant objectives and the impact of any additional traffic generated by the development will be negligible.

## 6 Mitigation

### Mitigation Included by Design

- 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; and
  - setting back of the development buildings from the railway lines by at least 5 m.

### Recommended Mitigation

- 6.2 The assessment has demonstrated that the proposed development will not experience any exceedances of the relevant air quality objectives. It is, therefore, not considered necessary to propose further mitigation measures for this development.
- 6.3 Furthermore, as the proposed development will not 'detrimentally affect air quality', mitigation will not be required to satisfy Policy DM19 of the Sites and Detailed Policies Document.
- 6.4 Measures to reduce air pollution in the long term are principally being delivered by the introduction of more stringent emissions standards, largely via European legislation. The Reading Air Quality Action Plan will also be helping to deliver improved air quality.

## 7 Conclusions

- 7.1 The impacts of local sources of air pollution on the air quality that will be experienced by future residents of the proposed development has been assessed based on the location of the proposed development, and current air quality conditions at the proposed development site and in the local area.
- 7.2 It is concluded that concentrations of nitrogen dioxide, PM<sub>10</sub> and PM<sub>2.5</sub> will remain below the relevant air quality objectives at the proposed development site, and any potential impacts of the proposed development on existing residential properties in the local area has been screened out as 'negligible'.
- 7.3 The proposed development is consistent with the NPPF. Furthermore, the proposed development does not conflict with the requirements of Policy CS34 of the Core Strategy, Policies DM3 or DM19 of the Site and Detailed Policies document or relevant policies within the Local Transport Plan, nor does it conflict with, or render unworkable, any elements of the Air Quality Action Plan.
- 7.4 The overall air quality effects of the proposed development are, therefore, judged to be 'not significant'.

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## 9 Glossary

|                         |                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AADT</b>             | Annual Average Daily Traffic                                                                                                                                                                                                                                                                        |
| <b>AQC</b>              | Air Quality Consultants                                                                                                                                                                                                                                                                             |
| <b>AQMA</b>             | Air Quality Management Area                                                                                                                                                                                                                                                                         |
| <b>AURN</b>             | Automatic Urban and Rural Network                                                                                                                                                                                                                                                                   |
| <b>DCLG</b>             | Department for Communities and Local Government                                                                                                                                                                                                                                                     |
| <b>Defra</b>            | Department for Environment, Food and Rural Affairs                                                                                                                                                                                                                                                  |
| <b>EPUK</b>             | Environmental Protection UK                                                                                                                                                                                                                                                                         |
| <b>Exceedance</b>       | 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                                                                                                                            |
| <b>EV</b>               | Electric Vehicle                                                                                                                                                                                                                                                                                    |
| <b>HDV</b>              | Heavy Duty Vehicles (> 3.5 tonnes)                                                                                                                                                                                                                                                                  |
| <b>HMSO</b>             | Her Majesty's Stationery Office                                                                                                                                                                                                                                                                     |
| <b>IAQM</b>             | Institute of Air Quality Management                                                                                                                                                                                                                                                                 |
| <b>LAQM</b>             | Local Air Quality Management                                                                                                                                                                                                                                                                        |
| <b>LDV</b>              | Light Duty Vehicles (<3.5 tonnes)                                                                                                                                                                                                                                                                   |
| <b>µg/m<sup>3</sup></b> | Microgrammes per cubic metre                                                                                                                                                                                                                                                                        |
| <b>NO<sub>2</sub></b>   | Nitrogen dioxide                                                                                                                                                                                                                                                                                    |
| <b>NPPF</b>             | National Planning Policy Framework                                                                                                                                                                                                                                                                  |
| <b>Objectives</b>       | 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 |
| <b>PM<sub>10</sub></b>  | Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter                                                                                                                                                                                     |
| <b>PM<sub>2.5</sub></b> | Small airborne particles less than 2.5 micrometres in aerodynamic diameter                                                                                                                                                                                                                          |
| <b>PPG</b>              | Planning Practice Guidance                                                                                                                                                                                                                                                                          |
| <b>Standards</b>        | 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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| A2 | Professional Experience .....                       | 32 |

## 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 m<sup>2</sup> 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 m<sup>2</sup> 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<sub>x</sub>/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
  - o Spark ignition engine: 250 mgNO<sub>x</sub>/Nm<sup>3</sup>;
  - o Compression ignition engine: 400 mgNO<sub>x</sub>/Nm<sup>3</sup>;
  - o Gas turbine: 50 mgNO<sub>x</sub>/Nm<sup>3</sup>.
- 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<sub>x</sub>/Nm<sup>3</sup> and 25 mgPM/Nm<sup>3</sup>.

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 m<sup>2</sup> 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<sub>x</sub> 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<sub>x</sub> gas boiler or a 30kW CHP unit operating at <95mg/Nm<sup>3</sup>.*

*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.

### **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.

## Assessment of Significance

A1.16 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. The guidance is 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. 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.

A1.17 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.

A1.18 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

### **Stephen Moorcroft, BSc (Hons) MSc DIC MEnvSc MIAQM CEnv**

Mr Moorcroft is a Director of Air Quality Consultants, and has worked for the company since 2004. He has over thirty-five years' postgraduate experience in environmental sciences. Prior to joining Air Quality Consultants, he was the Managing Director of Casella Stanger, with responsibility for a business employing over 100 staff and a turnover of £12 million. He also acted as the Business Director for Air Quality services, with direct responsibility for a number of major Government projects. He has considerable project management experience associated with Environmental Assessments in relation to a variety of development projects, including power stations, incinerators, road developments and airports, with particular experience related to air quality assessment, monitoring and analysis. He has contributed to the development of air quality management in the UK, and has been closely involved with the LAQM process since its inception. He has given expert evidence to numerous public inquiries, and is frequently invited to present to conferences and seminars. He is a Member of the Institute of Air Quality Management.

### **Penny Wilson, BSc (Hons) CSci MEnvSc MIAQM**

Ms Wilson is an Associate Director with AQC, with more than seventeen years' relevant experience in the field of air quality. She has been responsible for air quality assessments of a wide range of development projects, covering retail, housing, roads, ports, railways and airports. She has also prepared air quality review and assessment reports and air quality action plans for local authorities and appraised local authority assessments and air quality grant applications on behalf of the UK governments. Ms Wilson has arranged air quality and dust monitoring programmes and carried out dust and odour assessments. She has provided expert witness services for planning appeals and is Member of the Institute of Air Quality Management and a Chartered Scientist.

### **Nicole Holland, BSc (Hons) AMEnvSc AMIAQM**

Miss Holland is an Assistant Consultant with AQC, having joined in March 2016. Nicole has experience in the assessment of air quality impacts for a range of projects using qualitative and quantitative methods, including dispersion modelling using ADMS-5 and ADMS-Roads. Nicole has also gained experience in undertaking construction dust risk assessments and Air Quality Neutral assessments, and in preparing local authority Annual Status Reports (ASRs), as well as undertaking odour assessments and preparing air quality chapters for Environmental Statements (ES). Prior to joining AQC, Nicole worked as an Environmental Consultant at RSK, where she was responsible for the development of a variety of environmental and social management documents for Environmental and Social Management Systems (ESMSs) and Environmental and Social

Impact Assessments (ESIAs). She is an Associate Member of the Institute of Air Quality Management and of the Institute of Environmental Sciences.

Full CVs are available at [www.aqconsultants.co.uk](http://www.aqconsultants.co.uk).