Air Quality Assessment:
1 Longcroft Green, Welwyn Garden City

February 2022

Experts in air quality management & assessment

Document Control

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Job Number	J10/12737A/10

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Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J10/12737A/10/1/F2	15 February 2022	Final	Dr Clare Beattie (Associate Director)

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Executive Summary

The air quality impacts associated with the proposed residential development of 1 Longcroft Green, Welwyn Hatfield, have been assessed. The proposed development involves the demolition of the existing two-storey house on the site and the construction of one new house and six residential apartments.

The proposed development is located adjacent to the roundabout joining Stanborough Road, Broadwater Road and Osborn Way, and is also adjacent to a railway line. However, the assessment has demonstrated that future residents of 1 Longcroft Green will experience acceptable air quality, with pollutant concentrations below the air quality objectives.

The operational impacts of emissions from the additional traffic on local roads due to the development have also been considered. The development-generated trip generation is well below published screening criteria and thus the effect on local air quality will be ‘not significant’.

Overall, the operational air quality effects of the proposed development at 1 Longcroft Green are judged to be ‘not significant’.

Contents

1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed residential development at 1 Longcroft Green in Welwyn Garden City. The proposed development involves the demolition of the existing two-storey house on the site and the construction of one new house and six residential apartments.

1.2 The proposed development is located adjacent to the busy roundabout joining Stanborough Road, Broadwater Road and Osborn Way, and is also adjacent to a railway line. The proposed development will introduce new residential exposure into this area of potentially poor air quality, thus an assessment is required to determine the air quality conditions that future residents will experience. The proposed development will also lead to changes in vehicle flows on local roads, which may impact on air quality at existing residential properties along the affected road network. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.3 The new properties within the proposed development will be provided with heating and hot water via Air Source Heat Pumps (ASHPs) and PV panels; there will be no centralised energy plant and thus no significant point sources of emissions within the proposed development.

1.4 The location and setting of the proposed development are shown in Figure 1.

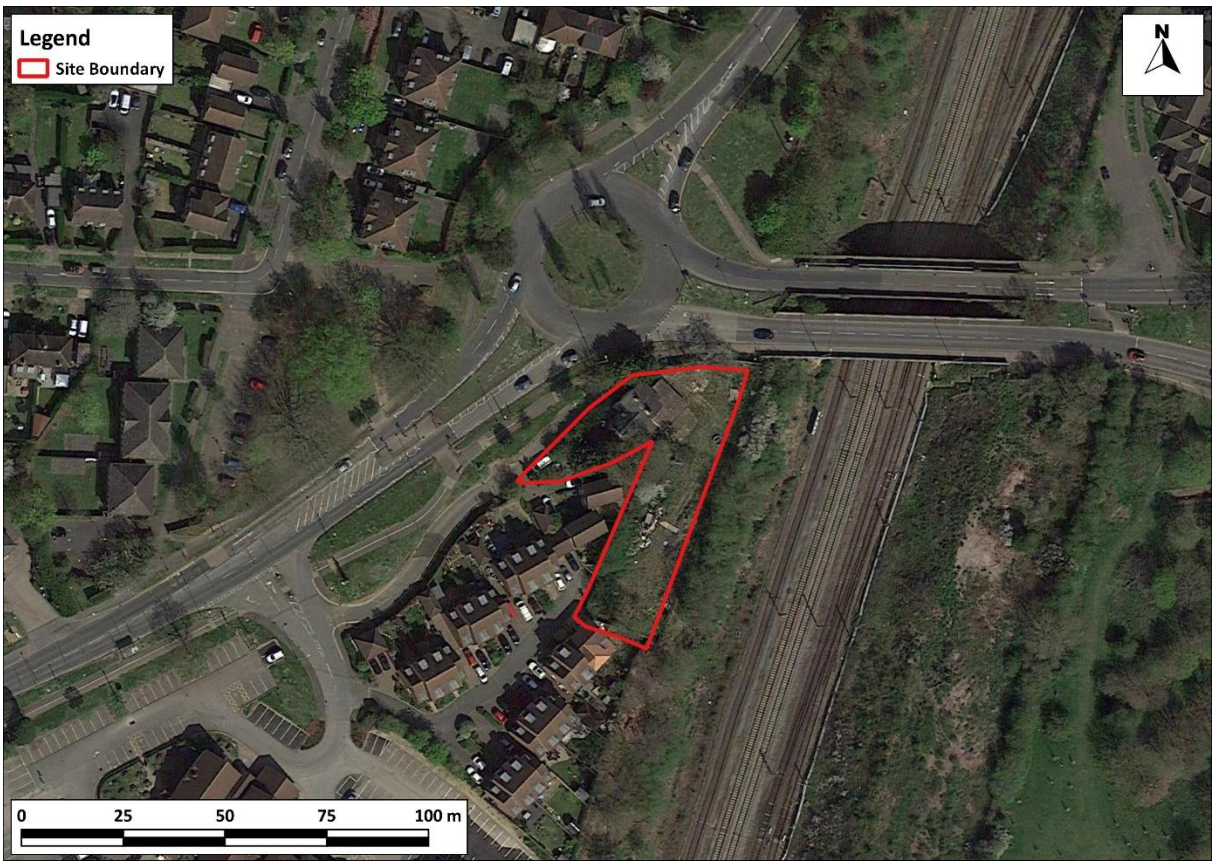

Figure 1: Proposed Development Setting in the Context of Air Quality

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1.5 This report describes existing local air quality conditions in the vicinity of the proposed development (base year 2019) and considers air quality conditions at the proposed development in 2023, which is the anticipated first year of occupation of any of the new homes. This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with Welwyn Hatfield Borough Council (hereafter referred to as WHBC).

2 Policy Context

2.1 All European legislation referred to in this report is written into UK law and remains in place, although there is uncertainty at this point in time as to who will enforce the requirements of some of this legislation.

Air Quality Strategy

2.2 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.

Clean Air Strategy 2019

2.3 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Reducing Emissions from Road Transport: Road to Zero Strategy

2.4 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

2.5 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government has since announced that the phase-out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030 and that all new cars and vans must be fully zero emission at the tailpipe from 2035. If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Planning Policy

National Policies

2.6 The National Planning Policy Framework (NPPF) (2021) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

2.7 To prevent unacceptable risks from air pollution, Paragraph 174 of the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality".

2.8 Paragraph 185 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".

2.9 More specifically, on air quality, Paragraph 186 makes clear that:

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

approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan".

2.10 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), 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 Limit Values. 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, or where the need for emissions reductions has been identified".

2.11 Regarding plan-making, the PPG states:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality".

2.12 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan "*identifies measures that will be introduced in pursuit of the objectives and can have implications for planning*".

2.13 Regarding the need for an air quality assessment, the PPG states that:

"Whether 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 have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity".

2.14 The PPG sets out the information that may be required in an air quality assessment, making clear that:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific".

2.15 The PPG 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 will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work

with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented".

Local Transport Plan

2.16 Hertfordshire's Local Transport Plan establishes the county-wide approach for future transport provision up to 2031 (Hertforshire County Council, 2018). Two policies are of particular relevance for air quality. Policy 19 entitled 'Emissions reduction' aims to reduce levels of emissions by:

"a) Promoting a change in people's travel behaviour to encourage a modal shift in journeys from cars to walking, cycling and passenger transport.

b) Addressing any barriers to and supporting the uptake of ULEVs in the county, particularly where this can positively affect areas with identified poor air quality.

c) Reducing emissions from its operations."

2.17 Additionally, Policy 20 entitled 'Air Quality' seeks to reduce the impact of poor air quality on health by:

"a) Investigating the use of Clean Air Zones.

b) Working with district/borough councils to monitor and assess air pollution levels, and working in partnership with them to deliver any declared AQMA joint action plans.

c) Implementing, monitoring and reviewing the county council's Air Quality Strategic Plan"

Local Policies

2.18 The WHBC District Plan: District-wide Policies document (Welwyn Hatfield Borough Council, 2005) was adopted in 2005, and is a constituent of the current adopted Local Plan. This document includes one policy relevant to air quality, Policy R18, 'Air Quality', which states that:

"The Council will have regard to the potential effects of a development on local air quality when determining planning applications. Consideration will be given to both the operational characteristics of the development and to the traffic generated by it. Any development within areas designated as Air Quality Management Area must have regard to guidelines for ensuring air quality is maintained at acceptable levels as set out in the Air Quality Strategy".

2.19 A new draft Local Plan for Welwyn Hatfield (Welwyn Hatfield Borough Council, 2016) was submitted for consultation in 2016 and is currently being examined by a Planning Inspector. Once adopted, the new Local Plan will replace the District Plan and will set out the Council's planning framework up to 2032. Within this new Plan there are two policies relevant to air quality:

2.20 Policy SADM 11, 'Amenity and Layout', which states that:

"All proposals will be required to create and protect a good standard of amenity for buildings and external open space in line with the Council's Supplementary Design Guidance, and in particular should ensure: …b) dwellings are dual aspect to enable passive ventilation and avoid the need for mechanical ventilation, subject to any noise and air pollution mitigation measures that are required to make the proposal acceptable".

2.21 Policy SADM 18, 'Environmental Pollution', which states:

"Air Quality

Prevailing air quality and potential impacts upon air quality arising from airborne emissions, dust and odour associated with the construction and operation of a proposal (including vehicular traffic) will be considered when determining planning applications. Proposals that would result in or be subject to unacceptable risk to human health and the natural environment from air pollution, or would prejudice compliance with national air quality objectives, will be refused.

An Air Quality Assessment that demonstrates how prevailing air quality and potential impacts upon air quality have been considered and how air quality will be kept to an acceptable standard through avoidance and mitigation will be required for major and minor development proposals that are:

i. Likely, due to the nature of the development, to give rise to significant air pollution;

ii. Within an Air Quality Management Area;

iii. Within 50 metres of a major road or heavily trafficked route;

iv. Within proximity to a source of air pollution which could present a significant risk to human health; and/or

v. Particularly sensitive to air pollution due to their nature, such as schools, health care establishments or housing for older people."

Building Standards

2.22 Part F of the Building Regulations (Ministry of Housing, Communities & Local Government, 2020) sets legal requirements related to ventilation for buildings. It identifies performance criteria for ventilation systems for dwellings and offices, stating that nitrogen dioxide concentrations of 288 µg/m^3 as a 1-hour average and 40 µg/m^3 as a long-term average should not be exceeded. While these are building control requirements rather than planning requirements, they highlight that where ambient (outdoor) air exceeds the annual mean nitrogen dioxide objective, it is expected that an appropriate ventilation system will be installed to ensure that indoor concentrations are below the performance criterion.

Air Quality Action Plans

National Air Quality Plan

2.23 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a CAZ. There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in 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 limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

2.24 WHBC has not declared any AQMAs and thus has not prepared an air quality action plan.

3 Assessment Criteria

3.1 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).

3.2 The UK-wide objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The $PM_{2.5}$ objective was 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^3 (Defra, 2021a). 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 mean PM_{10} objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m^3 (Defra, 2021a).

3.3 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, 2021a). The annual mean objectives for nitrogen dioxide and PM_{10} 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_{10} 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.

3.4 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010). 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 normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

3.5 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} 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
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]
$PM_{2.5}$ [b]	Annual Mean	25 µg/m^3

[a] A proxy value of 32 µg/m^3 as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM_{10} objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM_{10} objective are possible (Defra, 2021a).

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

Screening Criteria

Road Traffic Assessments

3.6 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)[1] 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 m^2 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.

3.7 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A1) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500 light duty vehicles. Where these criteria are exceeded, a detailed assessment is likely to be 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"*.

Railway Locomotive Emissions

3.8 Defra guidance (Defra, 2021a) outlines that large numbers of moving diesel locomotives can give rise to high levels of nitrogen dioxide close to railway tracks.

[1] The IAQM is the professional body for air quality practitioners in the UK.

3.9 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^3, may be at risk of elevated nitrogen dioxide concentrations. Only locations which meet these criteria require further assessment.

4 Assessment Approach

Consultation

4.1 The assessment follows a methodology agreed with WHBC via email correspondence between Terry Vincent (Environmental Protection Officer at WHBC) and Dr Imogen Heard (Air Quality Consultants) on 6th October 2021. Specifically, the Officer recommended a qualitative screening assessment would be sufficient, using the diffusion tube WH16 located along Stanborough Road (A6129) as being representative of nitrogen dioxide concentrations at the proposed development.

Existing Conditions

4.2 Existing sources of emissions and baseline air quality conditions 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, 2021c);
- local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
- 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 Defra's 2018-based background maps (Defra, 2021b). These cover the whole of the UK on a 1x1 km grid. The background annual mean nitrogen oxides and nitrogen dioxide maps for 2019 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2020). The calibration factor calculated has also been applied to future year backgrounds. Mapped background concentrations of PM_{10} and $PM_{2.5}$ have not been adjusted;
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra (2020) (2021d). These are the maps used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards, to identify and report exceedances of the limit value. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2021d), which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

Road Traffic Impacts

4.3 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 3.6 and detailed further in Appendix A1. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Railway Impacts

4.4 The potential for significant impacts as a result of emissions from railway locomotives on the lines adjacent to the proposed development has been considered by comparing the specific development scenario to the criteria set out in the Defra guidance (Defra, 2021a).

Impact of Existing Sources on Future Residents of the Development

4.5 The impacts of concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ on future residents of the proposed development have been assessed qualitatively. The assessment considers air quality conditions within the site, taking account of local air quality monitoring data, background pollutant concentrations and proximity to local road traffic.

4.6 The assessment examines air quality conditions in 2019, and assumes these are representative of air quality conditions at the time the development is occupied; this assumption is considered to be worst-case as it is generally expected that nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations will decline in future years.

Assessment of Significance

4.7 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 developed jointly by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement; the experience of the consultants preparing the report is set out in Appendix A2. Full details of the EPUK/IAQM approach are provided in Appendix A1.

5 Baseline Conditions

Relevant Features

5.1 The proposed development is located adjacent to the roundabout joining Stanborough Road (A6129), Broadwater Road (A6129) and Osborn Way, and is also adjacent to a railway line. It currently consists of a single existing residential property and adjoining private garden.

5.2 There are existing neighbouring residential properties to the south-west of the proposed development (namely, Stanborough Mews), with further residential properties located on the other side of the aforementioned roundabout to the north and west. The railway tracks are located to the east of the proposed development. On the other side of the railway tracks is a parkland, with an industrial estate to the south-east.

Industrial sources

5.3 No significant industrial sources have been identified that are likely to affect the proposed development, in terms of air quality.

Local Air Quality Monitoring

5.4 WHBC operates 33 nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed in by Socotec (Didcot) (using the 50% TEA in acetone method). There are no automatic nitrogen dioxide monitoring sites within Welwyn Hatfield Borough. Annual mean results for the years 2015 to 2019 are summarised in Table 2 for the monitoring locations closest to the proposed development site. Exceedances of the objective are highlighted in bold. The monitoring locations are shown in Figure 2. The monitoring data have been taken from WHBC's 2020 Annual Status Report (Welwyn Hatfield Borough Council, 2020).

Table 2: Summary of Annual Mean NO_2 Monitoring (2015-2019) (µg/m^3) [a]

Site No.	Site Type	Distance from road (m)	Location	2015	2016	2017	2018	2019
WH2 [b]	Urban Background	3	Parkway, WGC	24	24	-	-	-
		6	Bus Station (2017) & Wigmores North (2018)	-	**43** [c]	35	21	-
		5	Wigmores North WGC	-	-	-	-	22
WH16	Roadside	3	Stanborough Road/Near Standborough Close, WGC	-	-	-	-	38
WH18	Roadside	5	B195 Broadwater Rd, WGC	35	40	37	35	31
WH23	Roadside	5	South Way, Bishops Rise	28	22	22	17	-
WH28	Roadside	5	Taxi Rank, WGC	-	33	27	25	24

[a] Exceedances of the objectives are shown in bold.

b Site WH2 has moved location multiple times.

c Low data capture (25%) as site WH2 was moved part-way through the year.

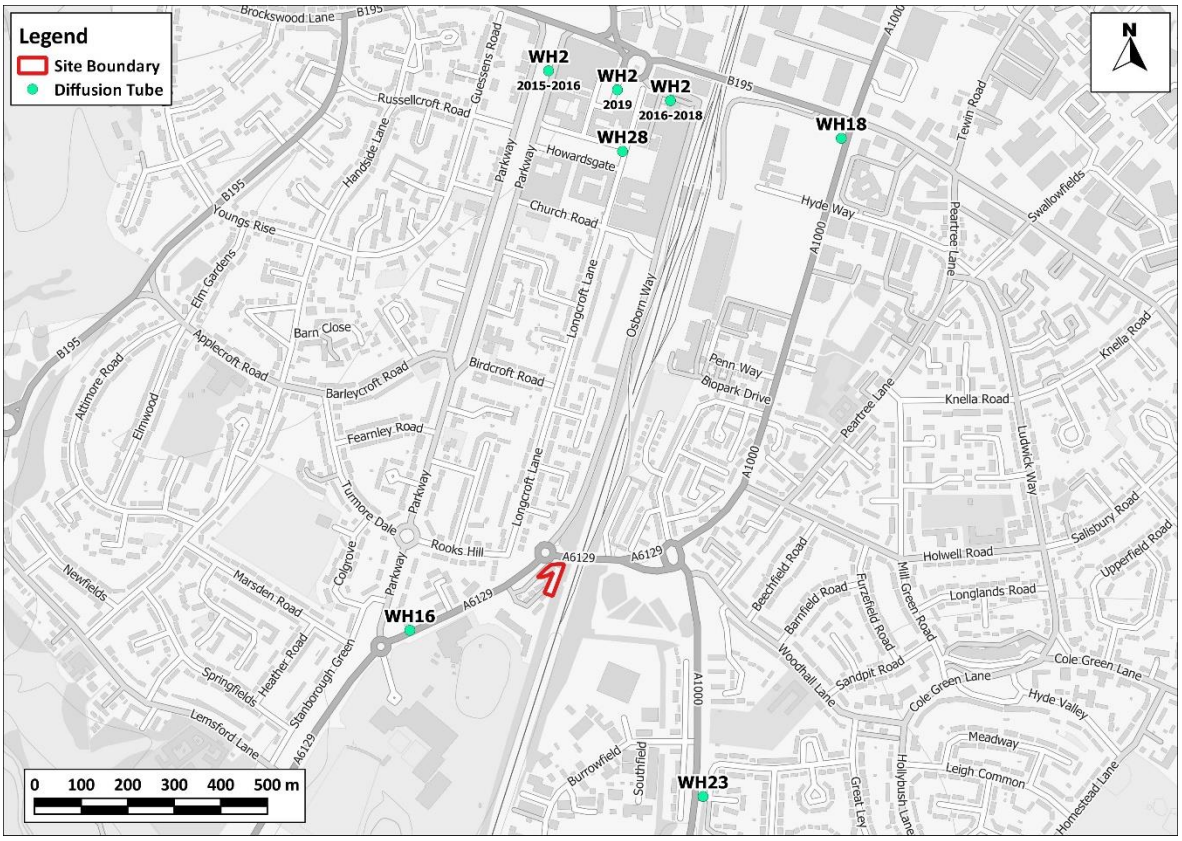

Figure 2: Monitoring Locations

5.5 Measured concentrations of nitrogen dioxide were below the objective across all selected diffusion tube sites in 2019 (Table 2). Notably, this includes the roadside site WH16, which is located approximately 350 m south-west of the proposed development along the A6129, which measured an annual mean concentration of 38 µg/m^3.

5.6 Diffusion tube sites WH18, WH23, and WH28 all broadly show a decline in nitrogen dioxide concentrations between 2015 and 2019. The WH2 site has been relocated twice by WHBC. Concentrations at all of the WH2 locations have been below the objective, with the exception of the Bus Station location in 2016, at which data capture was low (25%) due to the tube having been moved part-way through the year. The concentration presented at the Bus Station for 2016 is thus not an accurate representation of the annual mean concentration at that location.

5.7 The WHBAM roadside automatic monitoring station maintained by WHBC is the only station which measures $PM_{2.5}$ concentrations. The station is located adjacent to the Great North Road (A1000) in Hatfield and lies approximately 3 km south of the proposed development. Annual mean results for the years 2016 to 2019 are summarised in Table 3. All measured concentrations are well below the objective. There are no monitors measuring PM_{10} concentrations in Welwyn Hatfield Borough.

Table 3: Summary of Annual Mean $PM_{2.5}$ Monitoring (2016-2019) (µg/m^3)

Site No.	Site Type	Location	2016	2017	2018	2019
WHBAM	Roadside	Great North Road/A1000	9	13	11	10
Objective			**25 [a]**			

[a] The 25 µg/m^3 $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Exceedances of Limit Value

5.8 There are no AURN (Defra, 2021e) 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, 2021d), which are used to identify and report exceedances of the limit value, do not identify any exceedances within 1 km of the application site in 2019. 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

5.9 Estimated background concentrations at the proposed development are set out in Table 4 and are all well below the objectives.

Table 4: Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2023 (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2019	16.7	15.1	10.2
2023	14.2	14.2	9.5
Objective	**40**	**40**	**25 [a]**

[a] The 25 µg/m^3 $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

6 Impact Assessment

Impacts of the Proposed Development at Existing Receptors

6.1 The proposed development is for fewer than 10 residential properties, therefore the trips generated by the development can be screened out of the assessment based on EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Paragraph 3.6). There is no requirement for a detailed assessment of road traffic impacts at existing receptors and it can be concluded that the proposed development will not have a significant impact on local roadside air quality.

Impacts of Existing Sources on Future Residents of the Development

Screening Assessment of Traffic Emissions

6.2 Nearby diffusion tube monitoring shows that nitrogen dioxide concentrations were already below 40 µg/m^3 in 2019, and the data in Table 2 shows that concentrations are decreasing over time. The proposed development will be located further from the nearest road than diffusion tube WH16, which is located 3 m from the kerb. It is therefore expected that concentrations will be below the objective when the proposed development is occupied and future residents will experience acceptable air quality. There is thus no need for more detailed assessment.

Assessment of Railway Locomotive Emissions

6.3 Defra guidance (Defra, 2021a) 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 with a high volume of diesel passenger trains, and where the annual mean background concentration of nitrogen dioxide is above 25 µg/m^3. The application site falls outside these criteria; while there will be exposure within 30 m of the railway lines, the background concentration is below 25 µg/m^3 (see Table 4), and these specific railway lines are not identified in the Defra guidance as having a high volume of diesel passenger trains. It can, therefore, be concluded that there is no risk of an objective exceedance within the proposed development as a result of emissions from locomotives using the adjacent railway lines.

Significance of Operational Air Quality Effects

6.4 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 takes account of the assessment that:

- there is no risk of an exceedance of the objectives as a result of emissions from locomotives using the adjacent railway lines;

- pollutant concentrations within the proposed development, while taking into account road traffic emissions from the adjacent road network, will all be below the objectives in the opening year, thus future residents will experience acceptable air quality; and
- the additional traffic generated by the proposed development will be below recognised screening criteria, and thus any associated impacts can be screened as insignificant.

7 Mitigation

Good Design and Best Practice

7.1 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, which have been accounted for in the assessment as far as is possible:

- setting back of the development buildings from roads by at least 8 m;
- setting back of the development buildings from the railway lines by at least 25 m; and
- use of ASHPs and PV panels to minimise the need for on-site combustion.

Recommended Mitigation

7.2 The assessment has demonstrated that the proposed development will have an insignificant effect on local air quality as a result of development-generated road traffic emissions and that future residents of the development will experience acceptable air quality. It is, therefore, not considered appropriate to propose mitigation measures for this development.

7.3 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law).

8 Conclusions

8.1 The assessment has considered the impacts of the proposed development on local air quality in terms of emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future residents will experience due to nearby roads and railway lines. The assessment has been based on measurements made during 2019, and pre-pandemic activity and emissions forecasts, to ensure a worst-case assessment that does not take into account temporary reductions in pollutant concentrations as a result of reduced activity levels during the Covid-19 pandemic.

Operational Impacts

8.2 The assessment has demonstrated that the incremental changes to traffic flows on the local road network are below recognised screening thresholds, and that the effects of road traffic on local air quality will be insignificant.

8.3 Additionally, the assessment has determined that pollutant concentrations at the proposed development will be below the air quality objectives, thus future residents will experience acceptable air quality. The effects of emissions from locomotives on the adjacent rail line have been shown to be insignificant.

8.4 The overall operational air quality effects of the proposed development are judged to be 'not significant'.

Policy Implications

8.5 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 185 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 186, as it will not affect compliance with relevant limit values or national objectives.

8.6 The proposed development will also comply with WHBC new draft Local Plan Policy SADM 18 as it will not "*result in or be subject to unacceptable risk to human health"*, and it will not prejudice compliance with national air quality objectives.

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10 Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
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
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
µg/m^3	Microgrammes per cubic metre
NO	Nitric oxide
NO_2	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
OLEV	Office for Low Emission Vehicles

PM_{10}	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
WHBC	Welwyn Hatfield Borough Council

11 Appendices

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^2 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^2 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 mgNOx/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 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- 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 mgNOx/Nm^3 and 25 mgPM/Nm^3.

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^2 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; and
- 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.

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 NOx 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 NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

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.

A1.16 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.

A1.17 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. 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.

A1.18 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

Dr Clare Beattie, BSc (Hons) MSc PhD CSci MIEnvSc MIAQM

Dr Beattie is an Associate Director with AQC, with more than 20 years' relevant experience. She has been involved in air quality management and assessment, and policy formulation in both an academic and consultancy environment. She has prepared air quality review and assessment reports, strategies and action plans for local authorities and has developed guidance documents on air quality management on behalf of central government, local government and NGOs. She has led on the air quality inputs into Clean Air Zone feasibility studies and has provided support to local authorities on the integration of air quality considerations into Local Transport Plans and planning policy processes. Dr Beattie has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has carried out numerous assessments for new residential and commercial developments, including the negotiation of mitigation measures where relevant. She has also acted as an expert witness for both residential and commercial developments. She has carried out BREEAM assessments covering air quality for new developments. Dr Beattie has also managed contracts on behalf of Defra in relation to allocating funding for the implementation of air quality improvement measures. She is a Member of the Institute of Air Quality Management, Institution of Environmental Sciences and is a Chartered Scientist.

Dr Imogen Heard, BSc (Hons) MSc PhD MInstPhys

Dr Heard is an Associate (Senior Consultant) with AQC with over ten years' experience in the field of air quality. She has been involved in numerous development projects including road schemes, energy from waste facilities, urban extensions and energy centres. These have included the use of ADMS-5 and ADMS-Roads dispersion models to study the impacts of a variety of pollutants, including nitrogen dioxide, PM_{10} and $PM_{2.5}$, and the preparation of air quality assessment reports and air quality chapters for Environmental Statements. She also has experience in undertaking construction dust risk assessments and Air Quality Neutral assessments, as well as in preparing local authority reports. Prior to joining AQC she worked as a scientist in the Atmospheric Dispersion and Air Quality area at the UK Met Office for four years, modelling the dispersion of a range of pollutants over varying spatial and temporal scales.

Dr Helen Pearce, BSc (Hons) MSc PhD

Dr Pearce is an Assistant Consultant with AQC, having joined in September 2021. Prior to joining AQC she was based at the University of Birmingham, completing a BSc in Geography, MSc in Applied Meteorology and Climatology, and PhD in Environmental Health and Risk Management Her PhD research specialised in air quality modelling where she developed a range of tools to estimate real-time pollutant concentrations on Birmingham's road network, and to quantify the impacts of Low

Traffic Neighbourhoods on residential population exposure. Additionally, she provided the air quality modelling expertise on the NERC-funded project, 'GI4RAQ' (Green Infrastructure for Roadside Air Quality), to quantitively assess the impacts of 'green' interventions in street environments. She is now gaining experience in the field of air quality monitoring and assessment.