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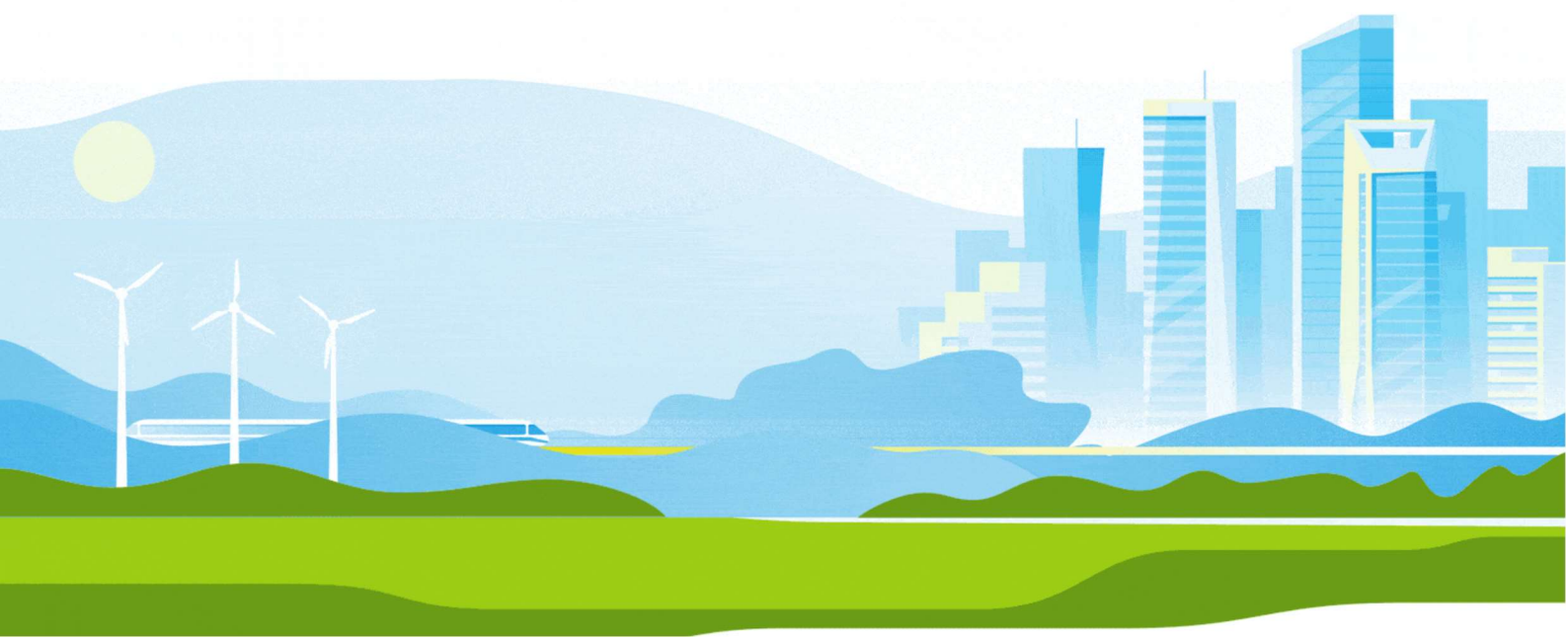
Air Quality Assessment: Haven Road, Exeter

Date: 8 July 2022



Quality Assurance

Client: Welbeck CP (Haven Road) **Reference:** P1134A_A1-1 **Date Published:** 8 July 2022

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Experts in Air Quality, Odour and Climate Change

Executive Summary

The air quality impacts associated with the proposed development at Haven Road in Exeter have been considered.

Impacts on the local area during the construction phase of the proposed development have been considered. The impacts from construction dust, construction traffic and NRMM emissions will be not significant. A package of mitigation measures is set out to help minimise air pollution during the construction phase.

Consideration has been given to air quality for future users at the proposed development. Pollutant concentrations have been estimated at relevant locations of sensitive exposure at the proposed development. All estimated concentrations are below the air quality objectives and limit values, and no new exposure to exceedances will occur.

The proposed development will be provided with heating and hot water electrically and is expected to result in a significant reduction in traffic generation compared with the existing use of the application site. The impacts of the proposed development have been found to be negligible and it will not lead to any exceedances of the air quality objectives, not significantly worsen existing exceedances, delay compliance with the limit values, or result in any significant worsening of air quality in relation to the World Health Organization guidelines.

Overall, the air quality effects of the proposed development will be not significant.

Contents

1. Introduction

1.1. Air Pollution Services (APS) has been commissioned by Welbeck CP (Haven Road) to assess the ambient air quality impacts associated with the proposed development at Haven Road, Exeter (herein the 'Proposed Development'). The residential-led mixed use development will comprise of residential dwellings, retail, cafe/restaurants and employment units within four buildings between two and six storeys in height. The location of the application site is shown in Figure 1.

Figure 1: Application Site Location

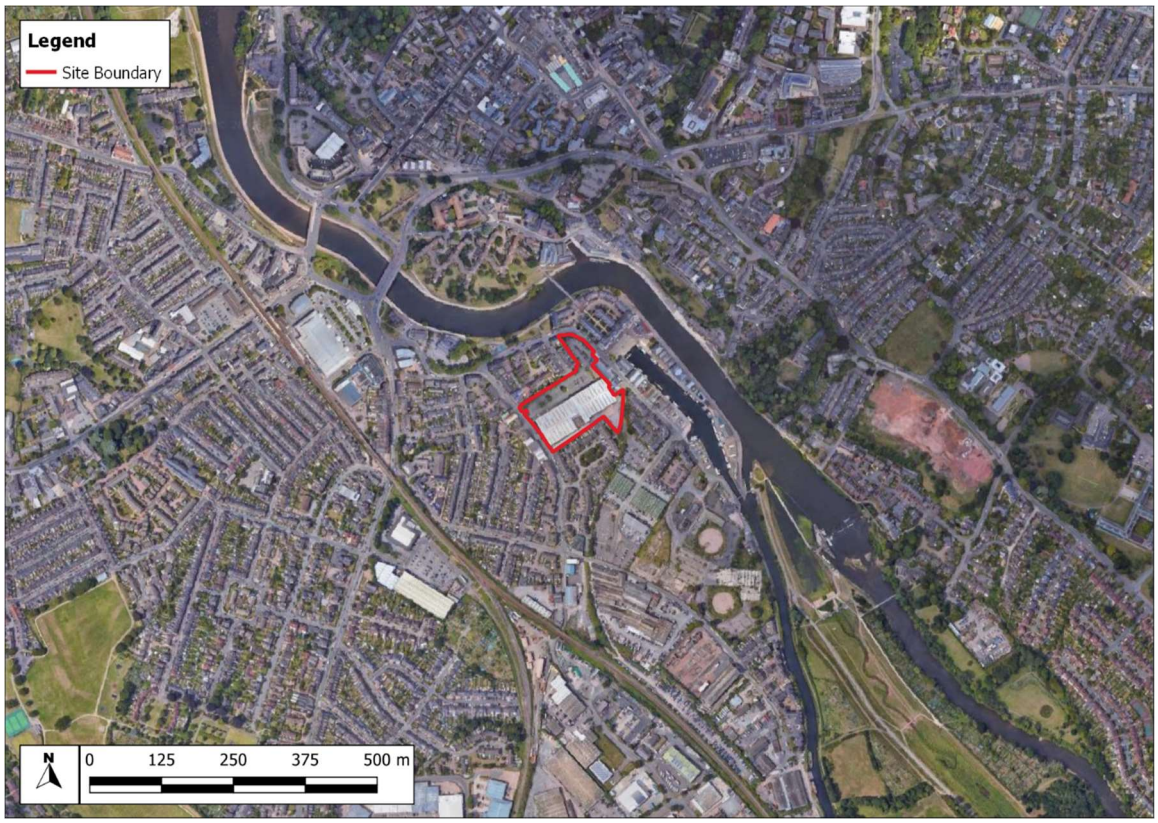

Figure notes: Imagery © 2022 Google, Map data © 2022.

1.2. The report is an assessment of air quality at locations of human health exposure which can be linked to health effects, however it is not an assessment of the effect on human health from poor air quality. Similarly for ecological assessments it is an assessment of the air quality at sensitive habitats rather than an assessment of the effects on the ecosystems.

Scope of assessment

Scoped In

1.3. The application site lies within a residential area with a marina and retail uses to the east and an industrial estate to the south. The nearest major road is the A377, 210 m to the west of the application site, and there are also two minor roads (Water Lane and Haven Road) close to the western, northern, and eastern boundaries of the application site. An Air Quality Management Area (AQMA), declared for breaches of the annual mean and 1-hour mean NO_2 air quality objectives, is

located 170 m to the west of the application site. The local area is therefore potentially sensitive to small changes in vehicle emissions.

1.4. The assessment describes the existing and future air quality in the local area and at the Proposed Development. Consideration has been given to nitrogen dioxide (NO_2) and particulate matter (both PM_{10} and $PM_{2.5}$) as these are the pollutants of most concern related to road traffic.

1.5. The air quality assessment will thus address the following aspects:

- impacts of emissions during the demolition and construction phase on sensitive receptors in the local area; and
- impacts from existing air quality in the local area on future users of the Proposed Development.

Scoped/Screened Out

1.6. Due to the size, nature and location of the Proposed Development, impacts due to the following have been considered and screened out based on the relevant screening criteria/thresholds:

- impacts on sensitive human health receptors in the local area from changes in road traffic on local roads due to the Proposed Development;
- impacts on sensitive ecological sites from changes in road traffic on local roads due to the Proposed Development; and
- impacts on the local area from on-site combustion.

1.7. Details are set out in Appendix A1.

1.8. The report does not consider the impacts of air quality on human health implications associated with Covid-19, as there remains too much uncertainty at this stage to consider explicitly.

2. Legislation, Policy and Guidance Documents

2.1. This section sets out the planning policy in relation to air quality which is a material consideration in determining planning applications; legislation; guidance documents; and other sources of useful information.

Planning Policy

National Planning Policy Framework

2.2. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2021) sets out planning policy for England. It includes advice on when air quality should be a material consideration in development control decisions. The paragraphs which have been considered and are set out in detail are in Appendix A2.2.

Local Planning Policy

Local Plan First Review

2.3. Exeter City Council's (ECC's) Local Plan First Review 1995 - 2011 (2005) sets out the planning policy and development plan for the city. It includes some wording and a policy relevant to air quality in the context of planning applications, which is set out below:

Air and Water Quality Section of 12.0 Environment

"12.7 Good air quality is important for sustaining human health. It is also an indicator of broader environmental quality. Poor air quality can directly damage flora, fauna and buildings and have significant adverse affects on soil and water. Emissions from industry and road transport, in particular, are major causes of pollution. Government guidance on the linkages between air quality considerations and the planning process are set out in the DETR report 'Air Quality and Land Use Planning'. This draws attention to guidance on air quality in PPG's 4, 6, 13 and 23.

12.8 The Council is required, under Section 82 of the Environment Act 1995, to undertake a review and assessment of air quality in the City, within the context of national air quality objectives, and to prepare a local air quality strategy. The Council will ensure that the proposals in this Local Plan are closely linked to, and complementary with, the air quality strategy.

12.9 In particular, the Plan aims to ensure that:

(i) the siting of industrial development will not cause pollution or harm;

(ii) there is no increase in the potential for harm by the location of residential or other sensitive developments in areas where they are likely to be affected by environmental pollution;

(iii) all development takes air quality considerations fully into account;

(iv) transport measures are introduced which reduce reliance on the private car".

Policy EN3 of the Air and Water Quality section

"EN3: DEVELOPMENT THAT WOULD HARM AIR OR WATER QUALITY WILL NOT BE PERMITTED UNLESS MITIGATION MEASURES ARE POSSIBLE AND ARE INCORPORATED AS PART OF THE PROPOSAL".

Core Strategy

2.4. ECC's Core Strategy (2012) sets out the vision, objectives and strategy for the spatial development of the city up to 2026. It includes a section on pollution which discusses air quality in a planning context, which is set out below:

Pollution

"10.3 The LDF plays a key role in determining the location of development that may give rise to pollution, either directly or indirectly, and in ensuring that other uses and development are not, as far as possible, affected by major existing or potential sources of pollution. Development should avoid and, if necessary, mitigate against environmental impacts.

10.4 The City Council has carried out a review and assessment of air quality in the city, within the context of national air quality objectives, and has prepared a local Air Quality Strategy that outlines the measures that the Council will take in order to protect and improve air quality throughout the city.

10.5 In accordance with the Air Quality Strategy, regular monitoring of air pollution is carried out, which shows that air quality in Exeter is generally very good. There is, however, a need to tackle emissions of nitrogen dioxide generated by motor vehicles along the busiest roads into the city. This has resulted in the designation of an Air Quality Management Area (AQMA) where the levels of nitrogen dioxide are unlikely to meet the air quality objective. Measures to reduce pollution by cutting congestion on the main routes into the city have been identified in the Air Quality Action Plan. The Local Transport Plan, produced by the Highways Authority (DCC), and the Air Quality Action Plan will bring forward measures collectively to tackle pollution caused by motor vehicles (see Section 8: Transport).

10.6 The City Council will ensure that the proposals in the LDF are closely linked to, and complementary with, the Air Quality Strategy and the Air Quality Action Plan.

10.7 The criteria against which applications for potentially polluting developments will be considered, together with environmental policies relating to noise, air, water and soil quality, will be set out in the Development Management DPD".

Policy CP11

"Development should be located and designed so as to minimise and if necessary, mitigate against environmental impacts. Within the Air Quality Management Area shown on the following map, measures to reduce pollution and meet air quality objectives, that are proposed by the Local Transport Plan and the Air Quality Action Plan, will be brought forward".

Air Quality Standards, Critical Levels/Loads, Limit Values and Air Quality Objectives

2.5. The Environment Act 1995 (HMSO, 1995) sets out the requirements of the Local Air Quality Management (LAQM) regime and the requirement for the Government to produce an Air Quality Strategy including standards and objectives.

2.6. The latest Air Quality Strategy was published in 2007 (Defra, 2007) and sets out the Air Quality Standards (AQSs), which consider the effects on human health and ecosystems, and the Air Quality Objectives (AQOs) for ambient pollution. The AQOs for use by local authorities when considering human health were incorporated into UK legislation within the Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002). In addition to the AQO for protection of human health set out in the Air Quality Regulations, both critical levels and critical loads are defined for protection of ecosystems and form part of the AQOs in the strategy.

2.7. The Strategy explains that the AQSs for the protection of human health are defined 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 at the time the Strategy was developed. An exceedence is a breach of the threshold for the concentration for the specific averaging period. In terms of ecosystems the AQS are based on the critical levels and critical loads, which are derived for habitats and exceedence of these values are used as an indication of the potential for harmful effects to systems at steady state thus giving an indication of risk to the system. Critical loads are values of pollutants deposited below which significant effects do not occur. Critical levels the concentrations of pollutants above which direct adverse effects on vegetation or ecosystems may occur.

2.8. The AQOs set out the extent to which the Government expects the AQS to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility, and possible timescales. AQO are policy targets often expressed as a maximum ambient concentration, for a specific averaging period, not to be exceeded, either without exception or with a permitted number of exceedences, within a specified timescale. The LAQM regime, introduced by the Environment Act 1995, requires local authorities to review air quality within their boundary and work towards achieving and maintaining the AQOs. If the AQOs are not achieved, the authority must declare an AQMA and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the AQOs. The strategy also provides the policy framework for air quality management and assessment in the United Kingdom (UK).

2.9. In additional to the AQOs set within the Air Quality Strategy, the European Union (EU) has also set Limit Values for the protection of human health and critical levels for the protection of ecosystems. These were transposed into the Air Quality Standards Regulations (HMSO, 2010) and amended in The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (HMSO, 2020), which sets out the UK Limit Values, target values and critical levels for specific pollutants. Like the AQOs, the Limit Values, target values and critical levels are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedences allowed per year (if any) and a date by which it must be achieved. Some pollutants

have more than one value covering different dates or averaging times. While the AQOs are policy targets, the government has the duty to ensure compliance with the legally binding Limit Values which is a national obligation rather than a local one.

2.10. The 2019 Clean Air Strategy (Defra, 2019a) includes a commitment to set a *"new, ambitious, long-term target to reduce people's exposure to $PM_{2.5}$"* which the Environment Act 2021 commits the Secretary of State to setting. The World Health Organization (WHO) acknowledges that current evidence suggests no safe level for $PM_{2.5}$. The WHO set a previous guideline, which was 10 µg/m^3 as an annual mean and more stringent than the current AQOs, to reflect the level at which increased mortality from exposure to $PM_{2.5}$ is likely. However, the WHO guidelines were updated in September 2021 and now include more stringent levels to reflect updated evidence of health effects (5 µg/m^3 for $PM_{2.5}$), since the previous guidelines were published in 2005. Following the UK leaving the EU the Government have published the Environment Act 2021, which puts a duty on the Secretary of State to lay before Parliament an annual mean target for $PM_{2.5}$ in ambient air before November 2022.

2.11. In addition, the recent coroners court case investigating a young girl's death in 2013 concluded that air pollution was a significant contributing factor to both the induction of her asthma and the exacerbation of her symptoms, due to exposure in exceedance of WHO guidelines for pollutants.

Useful Sources of Information

2.12. Summaries of relevant documents and useful information have been presented in Appendix A2. The documents cover The Planning Practice Guidance, The Clean Air Strategy, The Industrial Strategy, The Clean Growth Strategy, Road to Zero, Transport Decarbonisation Plan, The Ten Point Plan, The Hydrogen Strategy, and The National Air Quality Action Plans.

Local Air Quality Action Plans

2.13. ECC's most recent Air Quality Action Plan (AQAP) (2019) was published in 2019, and details the current AQMA within the city, and the plans for improving air quality across Exeter.

2.14. The AQAP outlines actions to improve air within the city that fall under five broad topics:

- Policy guidance and development control.
- Transport Planning and Infrastructure.
- Traffic Management.
- Promoting Travel Alternatives.
- Public Information.

Guidance Documents

Guidance on Land-Use Planning & Development Control: Planning For Air Quality

2.15. Environmental Protection UK (EPUK) in partnership with The Institute of Air Quality Management (IAQM) have produced guidance on *Land-Use Planning & Development Control: Planning For Air Quality* (2017). EPUK and IAQM have produced this guidance to ensure that air quality is adequately

considered in the land-use planning and development control processes. It provides a means of reaching sound decisions, having regard to the air quality implications of development proposals and provides guidance on how air quality considerations of individual schemes may be considered within the development control process, by suggesting a framework for the assessment of the impacts of developments on local air quality.

Guidance on the Assessment and Control of Dust from Demolition and Construction

2.16. The IAQM produced guidance on the assessment of dust from demolition and construction (2016). This document provides a risk-based methodology for assessing construction impacts, including demolition and earthworks where appropriate. The guidance has been used throughout this assessment, which should be read in conjunction with the guidance document.

LAQM Technical Guidance

2.17. Defra and the devolved administrations have published a guidance document on LAQM - *Local Air Quality Management Technical Guidance (TG16)* (2021). This document is designed to support local authorities in carrying out their duties under the Environment Act 1995, the Environment (England) Order 2002, and subsequent regulations. LAQM is the statutory process by which local authorities monitor, assess, and take action to improve local air quality. The Technical Guidance provides tools, approaches and technical information related to air quality.

3. Assessment of Significance

Criteria for this Assessment

3.1. The assessment criteria include three separate types, covered by different legislation, policy, and guidance. These include AQOs, Limit Values, and WHO guidelines.

3.2. No ecological assessment criteria are presented as impacts are screened at the stage prior to the need to define the criteria (see Appendix A1).

Air Quality Objectives and Limit Values

3.3. The human-health related to AQOs and Limit Values for England for the pollutants relevant to this project are detailed in Table 1.

Table 1: AQOs and Limit Values

Pollutant	Time Period	Criteria Type	Concentration, and the number of exceedences allowed per year (if any)	Date AQO / Limit Value to be Achieved From and Maintained After
Nitrogen Dioxide (NO_2)	1-hour Mean	AQO / Limit Value	200 µg/m^3 not to be exceeded more than 18 times a year	31st December 2005 / 1st January 2010
	Annual Mean	AQO / Limit Value	40 µg/m^3	31st December 2005 / 1st January 2010
Fine Particles (PM_{10})	24-hour Mean	AQO / Limit Value	50 µg/m^3 not to be exceeded more than 35 times a year	31st December 2004
	Annual Mean	AQO / Limit Value	40 µg/m^3	31st December 2004
Fine Particles ($PM_{2.5}$)	Annual Mean	AQO / Limit Value	25 µg/m^3 / 20 µg/m^3	2020 / 2020
Table notes: -				

WHO Guidelines

3.4. The World Health Organization (WHO) has recently revised its Air Quality Guidelines (AQGs) (2021) for six pollutants including PM_{10}, $PM_{2.5}$ and NO_2. The air quality guideline for these pollutants have become more stringent. Table 2 presents the WHO Guidelines and Interim Targets for the pollutants of concerns. For PM, the guidelines are lower, although it is noted that there is no safe level of PM.

3.5. In recognition of the difficultly of meeting the AQGs, a series of Interim Targets have been proposed by the WHO and these should be considered steps towards ultimately achieving the AQGs, rather than as end targets. The WHO document aims to provide quantitative health-based recommendations for air quality management.

3.6. The guidelines are not legally binding standards; however, they should be used to inform legislation and policy. Ultimately, the goal of the guidelines is to help reduce the health burden resulting from exposure to air pollution. Air pollution increases morbidity and mortality from cardiovascular and respiratory disease and from lung cancer and there is increasing evidence of effects on all other organ systems.

3.7. The WHO AQGs are based solely on the latest epidemiological evidence, whereas the AQOs and Limit Values were based on health evidence from the 1990s. They also take account of other factors such as the technical and economic feasibility of meeting the standard by a defined date.

3.8. It is more than 15 years since WHO published its last AQGs (2006). Over that period there has been a large increase in the evidence of health effects of air pollution. New epidemiological studies have shown adverse effects at much lower levels than had previously been studied.

3.9. The WHO guidelines are not currently in Regulations and there is no legal requirement for local authorities to meet them. The Environment Act 2021 puts a duty on the Secretary of State to lay before Parliament an annual mean target for $PM_{2.5}$ in ambient air before November 2022. It is unknown at this stage whether it would align with the WHO guidelines.

Table 2: WHO Guidelines

Pollutant	Time Period	Interim Target				AQG Level
		1	2	3	4	
Nitrogen Dioxide (NO_2)	1-hour Mean	-	-	-	-	200 µg/m³
	24-hour Mean	120	50	-	-	25 µg/m³
	Annual Mean	40	30	20	-	10 µg/m³
Fine Particles (PM_{10})	24-hour Mean	150	100	75	50	45 µg/m³
	Annual Mean	70	50	30	20	15 µg/m³
Fine Particles ($PM_{2.5}$)	24-hour Mean	75	50	37.5	25	15 µg/m³
	Annual Mean	35	25	15	10	5 µg/m³
Table notes:						

Health Effects

3.10. Air pollution has a significant effect on public health. Long-term exposure (over years) reduces life expectancy, mainly due to cardiovascular and respiratory diseases and lung cancer. Recent evidence suggests that it can also adversely affect cognitive ability, and is associated with dementia, diabetes, obesity, and low birth weight (Royal College of Physicians, 2016).

3.11. Short-term exposure (over hours or days) to elevated levels of air pollution can also cause a range of health effects, including on lung function and exacerbation of asthma, resulting in respiratory and cardiovascular hospital admissions and mortality.

3.12. It has been estimated that exposure to man-made air pollution in the UK gives rise to 28,000 to 36,000 deaths a year (Public Health England, 2018).

3.13. There is no evidence of a safe level of exposure to PM below which there is no risk of adverse health effects. UK Health Security Agency (UKHSA) formerly Public Health England (PHE) believe that reductions of both PM and NO_2 concentrations below the current standards is likely to bring health benefits.

Relevant exposure

AQO Receptors

3.14. The annual mean AQO applies at locations where members of the public might be regularly exposed, such as building façades of residential properties, schools, hospitals, and care homes.

3.15. The 24-hour mean AQO applies at the annual mean locations of exposure as well as at hotels and residential gardens.

3.16. The 1-hour mean AQO applies at the annual mean locations of exposure and at hotels, residential gardens, and any outdoor location where members of the public might reasonably be expected to spend one hour or longer, such as busy pavements, outdoor bus stations and locations with outdoor seating.

3.17. Places of work like factories or offices are not considered places where members of the public might be regularly exposed and therefore the AQOs do not apply at these locations.

Limit Value Receptors

3.18. In accordance with Article 2(1), Annex III, Part A, paragraph 2 of Directive 2008/50/EC details locations where compliance with the Limit Values does not need to be assessed:

"Compliance with the Limit Values directed at the protection of human health shall not be assessed at the following locations:

a) Any locations situated within areas where members of the public do not have access and there is no fixed habitation;

b) In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and

c) On the carriageway of roads; and on the central reservation of roads except where there is normally pedestrian access to the central reservation."

3.19. The government models compliance with the Directive at locations 4 m from the kerbside, 2 m high, more than 25 m from major road junctions and adjacent to at least 100 m of road length where the limit value applies.

WHO Receptors

3.20. The WHO criteria apply whenever there is relevant exposure in relation to each time period, for each pollutant. These are considered the same as those set out above for AQO receptors.

Assessment Approach

3.21. Standard practice is to assess the impacts of a proposed development on local air quality using the IAQM guidance documents.

Locations of human health exposure

3.22. The EPUK and IAQM guidance on Land-Use Planning & Development Control: Planning For Air Quality (EPUK/IAQM, 2017) provides a staged approach to considering air quality assessments:

- Stage1) Initial screening
- Stage2) Detailed screening
- Stage3) Simple or Detailed assessment

3.23. The approach includes elements of professional judgement, and the experience of the consultants preparing this report is set out in Appendix A3.

3.24. Details of this approach is set out in Appendix A4.

Significance

3.25. The approach developed by EPUK and IAQM (2017) has been used. The guidance is that the assessment of significance should be of professional judgement, with overall air quality impact of the development described as either 'significant' or 'not significant'.

3.26. In drawing the determination of significance, 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;
- the judgement on significance relates to the consequences of the impacts; i.e. 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;
- the extent to which an AQO or limit value is exceeded;
- compliance with the Limit Values; and
- considerations of the WHO guidelines.

3.27. The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the users of any new development where the air quality is such that an air quality objective is not met will be judged as significant.

4. The Proposed Development

4.1. The Proposed Development will involve the construction of four residential-led mixed-use buildings of two to six storeys, including retail, café/restaurant and employment uses. There will also be public realm improvements, landscaping and a pedestrian square. The existing use of the site comprises retail units and associated car parking. The Proposed Development is shown in Figure 2.

Figure 2: The Proposed Development

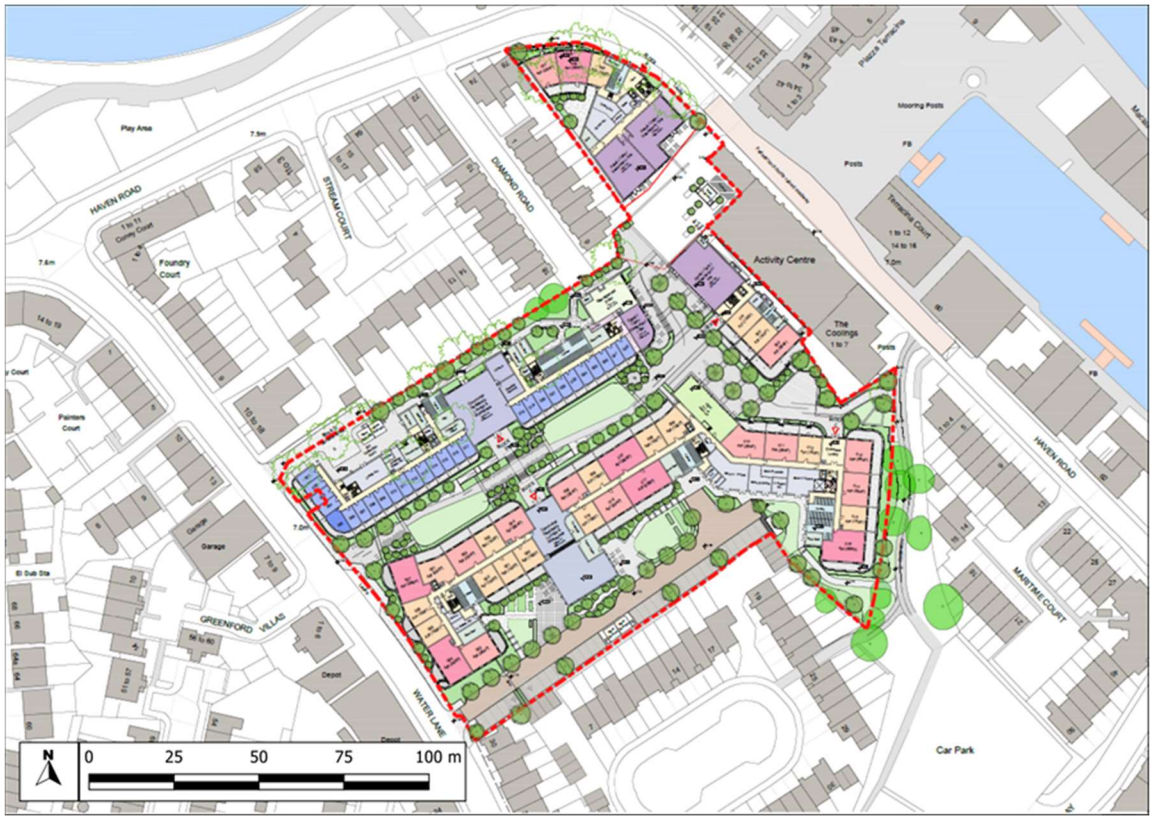

Figure notes: Drawing provided by Piper Whitlock Architecture Ltd.

Mitigation Included by Design

4.2. The EPUK and IAQM guidance (2017) is clear that it is important that proposed developments should incorporate good design and best practice measures to ensure any impacts are minimalised as far as practicable, even where the pollutant are predicted below the AQOs/Limit Values. The Proposed Development includes the following good design and best practice measures by design:

- the Proposed Development will not include a centralised energy plant for provision of power, hot water or heating. These services will be provided electrically, including using air source heat pumps, helping to minimise local emissions;
- between ten and fifteen electric charging points will be provided in the car park of the Proposed Development, to encourage future users to switch to electric vehicles potentially lowering traffic emissions in the local area;

- the Proposed Development is located adjacent to bus stops with one bus route as well as being within 220 m of bus stops with a number of other routes. Exeter St Thomas Railway Station is also within 450 m of the Proposed Development. This enables users to easily access the Proposed Development via public transport; and
- The Proposed Development will provide cycle parking spaces to reduce reliance on car use by future users.
- A travel plan is being produced for the Proposed Development, which is a long-term management strategy for integrating proposals for sustainable travel.

Traffic Generation

4.3. The Proposed Development will include 32 car parking spaces, a significant reduction on the existing use which includes 140 car parking spaces. RGP, the traffic consultants for the project, have calculated that there will be a net reduction in traffic generation for the Proposed Development of 1,183 Annual Average Daily Traffic (AADT) movements, comprising are Light-duty vehicles (LDVs) and Heavy-duty vehicles (HDVs). This reduction includes delivery and servicing vehicles. The net change in HDV movements is an increase of 12 AADT, while the net change in LDV movements is a decrease of 1,195 AADT.

5. Methodology

5.1. The following section details the methodology of the assessment. The process consists of:

1. Defining baseline conditions.
2. Considering the impact of the emissions related to and on the development.
3. Evaluating the significance of any impacts in relation of both AQO receptors, using EPUK & IAQM and Environment Agency (EA) guidance, and the compliance receptors.

Existing Conditions

5.2. Consideration of the baseline conditions within the area of the Proposed Development have made based on the following:

- Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority and where available other monitoring networks. This covers both the proposed site and the surrounding area, the latter being used to provide context to the assessment.
- Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been defined using the national pollution maps published by Defra (2022b). These cover the whole of the country on a 1x1 km grid of average concentrations.
- Predicted roadside concentrations of NO_2 in the study area have been identified using the maps of roadside concentrations published by Defra (2022c) as part of its 2017 Air Quality Plan for the baseline year 2015 and for the future years 2017 to 2030. These maps are used by the UK Government, to report exceedances of the limit value to the EU. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2022a), which are available for the years 2009 to 2015, show no exceedances of the Limit Values anywhere in the UK in 2015.
- Industrial and waste management sources that may affect the area have been identified using the UK Pollutant Release and Transfer Register (PRTR) (Defra, 2020). Local sources have also been identified through examination of maps and the Council's Air Quality Review and Assessment reports.

Construction and Demolition Dust

5.3. The assessment method follows the approach provided by the IAQM guidance document (2016) which supersedes the 2014 GLA SPG: The Control of Dust and Emissions During Construction and Demolition. This approach follows a sequence of steps:

- Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required.
- Step 2 is to assess the risk of dust impacts.

- Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site.
- Step 2b defines the sensitivity of the area to any dust that may be raised.
- Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation.

- Step 3 uses this information to determine the appropriate level of site-specific mitigation required to ensure that there should be no significant impacts.
- Step 4 is to examine the residual effects and to determine whether or not these are significant.

5.4. The approach developed by IAQM (2016), divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

Impacts of Emissions Sources upon Sensitive Locations within the Proposed Development

5.5. Consideration of air quality for sensitive locations within the Proposed Development have been made with regards to existing conditions within the local area.

5.6. The existing conditions are based on various sources of information available as set out in Paragraph 5.2. Air quality has been improving over the last decade, largely due to improvements in vehicle engines, and is expected to continue to improve into the future, as old vehicles are replaced by low emission alternatives. Concentrations in the future are thus expected to decline.

6. Baseline Conditions

AQMAs

6.1. ECC has investigated air quality within the city as part of its responsibilities under the LAQM regime. The Council have declared an AQMA in 2005 and amended it in 2007 and 2011, declared for exceedances of the annual mean and 1-hour mean NO_2 AQO. The AQMA is approximately 170 m west of the Proposed Development.

Baseline Concentrations

LAQM Monitoring

6.2. ECC operate two automatic monitoring stations, the closest of which is CM2 located approximately 200 m from the Proposed Development, which measures PM_{10} and $PM_{2.5}$. CM1 is located approximately 870 m away from the Proposed Development and measures NO_2, PM_{10} and $PM_{2.5}$.

6.3. ECC also operate a large number of passive monitoring stations (diffusion tubes). The closest monitoring locations to the road network are shown in Figure 3. Data for 2016 to 2020 have been obtained from ECC's latest Air Quality Annual Status Report (ASR) (2021).

6.4. Data from 2020 are not considered representative of typical conditions at the monitoring stations due to restrictions associated with the Covid-19 pandemic. The ASR presenting data from 2021 was not available at the point this report was written.

Figure 3: Site Location and Relevant Monitoring Sites

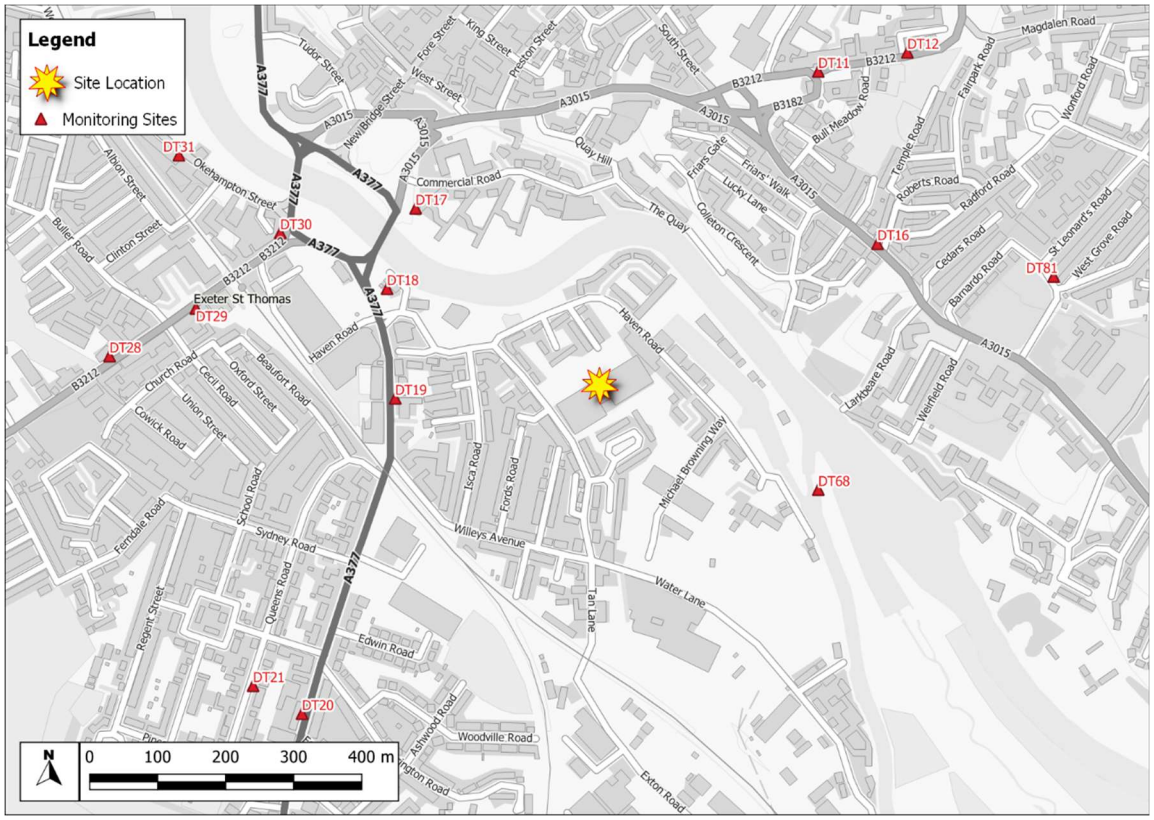

Figure notes: Contains OS data © Crown copyright and database right (2022).

Annual Mean NO_2

6.5. Annual mean NO_2 concentrations for the years of 2016 to 2020 are presented in Table 3. All measured concentrations across all locations between 2016 – 2020 were below the AQO apart from DT19 in 2016 to 2019 and DT29 in 2018. These exceedances were measured adjacent to busy roads. The Proposed Development is located well away from busy roads, where concentrations are likely to be lower.

6.6. In 2019, measured concentrations at 11 of 15 monitors were below WHO Interim Target 2 (30 µg/m^3) and 14 of 15 monitors were below WHO Interim Target 1 (40 µg/m^3).

Table 3: Measured NO_2 Annual Mean Concentrations (µg/m^3) [a]

Site ID – Name (Type)	2016	2017	2018	2019	2020 [c]
CM1 – Exeter Roadside (Kerbside)	30.5	27.7	29.1	29.0	18.8
DT11 – Magdalen Street (Kerbside)	28.1	29.2	29.4	28.9	19.5
DT12 – Magdalen Street façade (Kerbside)	30.1	31.8	31.1	29.3	20.0
DT16 – Holloway Street (Kerbside)	33.4	31.3	34.2	29.3	21.3
DT17 – Carder's Court, Shilhay (Roadside)	22.4	22.0	22.4	21.4	15.5
DT18 – Rear of Gervase Avenue (Roadside)	23.4	23.4	22.3	22.7	15.8
DT19 – Alphington Street (Kerbside)	**40.3**	**40.8**	**47.0**	**42.0**	28.5
DT20 – Alphington Road inbound (Roadside)	32.9	33.9	33.6	31.3	22.4
DT21 – Queen's Road (Urban Background)	14.2	13.7	15.3	12.7	9.1
DT28 – Cowick Street (inbound) (Roadside)	23.0	20.7	23.9	21.1	15.6
DT29 – Cowick Street (outbound) (Roadside)	33.6	33.6	**43.4**	34.4	24.3
DT30 – Cowick Street (Exe Bridges) (Roadside)	31.7	32.0	33.2	30.1	22.1
DT31 – Okehampton Street (Roadside)	24.3	24.6	25.2	24.3	17.3
DT68 – Riverside Valley Park (Urban Background)	-[d]	-[d]	13.7	13.8	9.4
DT81 – St. Leonards Road (Roadside)	-[d]	-[d]	-[d]	15.6	11.2
AQO / Limit Value	**40**				
WHO AQG Level (Interim Targets) [b]	**10 (40, 30, 20)**				

Table notes:

a. Exceedances of the AQO are presented in bold.

b. Not required to be achieved within UK legislation.

c. Air quality monitoring carried out in 2020 includes periods of national travel restrictions due to the Covid-19 pandemic; measured concentrations are therefore not likely to be representative of typical conditions.

d. No data available.

1-hour Mean NO_2

6.7. The number of 1-hour mean NO_2 concentrations above 200 µg/m^3 measured by the automatic monitor, CM1, are presented in Table 4. No exceedances of the 1-hour mean NO_2 AQO have been measured between 2016 - 2020.

Table 4: Measured Number of NO_2 1-hour Concentrations above 200 (µg/m^3) [a]

Site ID - Name (type)	2016	2017	2018	2019	2020 [c]
CM1 – Exeter Roadside (Kerbside)	0	0	0	0	0
AQO / Limit Value	**18**				
WHO AQG Level (Interim Targets) [b]	**0**				

Table notes:

a. Exceedances of the AQO are presented in bold.

b. Not required to be achieved within UK legislation. The guideline is 200 µg/m^3 thus no exceedance of this level is permitted.

c. Air quality monitoring carried out in 2020 includes periods of national travel restrictions due to the Covid-19 pandemic; measured concentrations are therefore not likely to be representative of typical conditions.

Annual Mean PM_{10}

6.8. Measured annual mean PM_{10} concentrations at CM1 and CM2 are presented in Table 5. Measured PM_{10} concentrations were below the annual mean AQO (40 µg/m^3) between 2016 and 2020. Measured concentrations were also below WHO Interim Target 4 (20 µg/m^3).

Table 5: Measured PM_{10} Annual Mean Concentrations (µg/m^3) [a]

Site ID - Name	2016	2017	2018	2019	2020 [c]
CM1- Exeter Roadside (Kerbside)	15.0	18.0	17.7	15.8	14.1
CM2 – Alphington Street (Roadside)	15.0	19.0	16.7	15.1	11.5
AQO / Limit Value	**40**				
WHO AQG Level (Interim Targets) [b]	**15 (70, 50, 30, 20)**				

Table notes:

a. Exceedances of the AQO are presented in bold.

b. Not required to be achieved within UK legislation.

c. Air quality monitoring carried out in 2020 includes periods of national travel restrictions due to the Covid-19 pandemic; measured concentrations are therefore not likely to be representative of typical conditions.

24-hour Mean PM_{10}

6.9. The measured number of 24-hour mean PM_{10} concentrations above 50 µg/m^3 at CM1 and CM2 are presented in Table 6. There were no exceedances of the 24-hour mean PM_{10} AQO in any year presented. A comparison of 24-hour mean PM_{10} WHO AQG levels cannot be made, as the method of reporting is materially different.

Table 6: Number of Measured PM_{10} 24-Hour Mean Concentrations above 50 (µg/m^3) [a]

Site ID – Name	2016	2017	2018	2019	2020 [d]
CM1- Exeter Roadside (Kerbside)	0	1	0	0	1
CM2 – Alphington Street (Roadside)	0	2	1	4	0
AQO / Limit Value	**35 (50) [b]**				
WHO AQG Level (Interim Targets) [c]	**45 (150, 100, 75, 50)**				

Table notes:

a. Exceedances of the AQO are presented in bold.

b. Where data was low the 90.4th percentile of 24-hour mean concentration has been provided in parenthesis.

c. Not required to be achieved within UK legislation.

d. Air quality monitoring carried out in 2020 includes periods of national travel restrictions due to the Covid-19 pandemic; measured concentrations are therefore not likely to be representative of typical conditions.

Annual Mean $PM_{2.5}$

6.10. Measured annual mean $PM_{2.5}$ concentrations at CM1 and CM2 are presented in Table 7. Measured $PM_{2.5}$ concentrations were below the annual mean AQO between 2016 and 2020. Measured concentrations were below or met WHO Interim Target 4 (15 µg/m^3) in all years.

Table 7: Measured $PM_{2.5}$ Annual Mean Concentrations ($\mu g/m^3$) [a]

Site ID – Name	2016	2017	2018	2019	2020 [c]
CM1 - Exeter Roadside (Kerbside)	-[d]	-[d]	-[d]	10.0	8.6
CM2 – Alphington Street (Roadside)	-[d]	-[d]	9.0	9.5	6.8
AQO / Limit Value	**25 / 20**				
WHO AQG Level (Interim Targets) [b]	**5 (35, 25, 15, 10)**				

Table notes:

a. Exceedances of the AQO are presented in bold.

b. Not required to be achieved within UK legislation.

c. Air quality monitoring carried out in 2020 includes periods of national travel restrictions due to the Covid-19 pandemic; measured concentrations are therefore not likely to be representative of typical conditions.

d. No data available.

AURN Monitoring

6.11. National Government measures concentrations of NO_2, PM_{10} and $PM_{2.5}$ at monitoring sites across the UK, as part of the Automatic Urban and Rural Network (AURN) regime. There is one Defra AURN monitoring site (Exeter Roadside UKA00263) located within 2 km of the Proposed Development. This monitor, however, is the same monitor as ECC's CM1, the results of which are presented above.

Predicted background concentrations

6.12. Ambient background concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been defined using the national pollution maps published by Defra (Defra, 2022b). These cover the whole of the country on a 1x1 km grid for each year from 2018 until 2030. These concentrations have been calibrated to match locally measured background concentrations (see Appendix A5). Concentrations for 2019 (most relevant existing year) and 2024 (first year of operation) have been extracted for the grid cells that surround the Proposed Development. The predicted background values are presented in Table 8. These concentrations have been bilinearly interpolated to give specific background concentrations at the Proposed Development. In addition, background concentrations are also presented for the earliest year that construction is likely to occur (2022).

6.13. All predicted background concentrations are below the AQOs and Limit Values for both 2019, 2022 and 2024. With respect to the WHO Interim Targets, the levels are below Interim Target 3 (20 $\mu g/m^3$) for NO_2 in 2019 and below the WHO AQG (10 $\mu g/m^3$) for NO_2 in 2024, below the WHO AQG (15 $\mu g/m^3$) for PM_{10} in both years and below Interim Target 4 (10 $\mu g/m^3$) for $PM_{2.5}$ in both years.

Table 8: Mapped Background Concentrations (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2019	14.8	11.4	7.7
2022	-[b]	11.6	-[b]
2024	12.4	10.9	7.2
AQO / Limit Value	**40**	**40**	**25 [a] / 20**
WHO AQG Level (Interim Targets) [a]	**10 (40, 30, 20)**	**15 (70, 50, 30, 20)**	**5 (35, 25, 15, 10)**

Table notes:

a. Not in Regulations and there is no legal requirement for local authorities to meet it.

b. In the construction phase year (2022) only the PM_{10} concentration was considered (in the construction dust risk assessment).

Predicted roadside concentrations

6.14. Defra has predicted roadside concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the main roads in the UK (Defra, 2022c) for the years 2017 to 2030 as part of Defra's commitment to report exceedances of the Limit Values. The roads near to the Proposed Development with PCM predicted roadside concentrations are identified in Figure 4 and concentrations presented in Table 9.

6.15. For 2019, the nearest roads (A377 and A3015) with predictions from Defra are not predicted to exceed the Limit Values. There remains no exceedances in 2024, when the Proposed Development may first be operational.

6.16. It should also be noted that it is widely accepted that in many locations in the UK Defra's modelling has underpredicted roadside concentrations when compared with local monitoring and these Defra roadside estimates should be treated with caution.

Table 9: Defra Predicted Roadside Concentrations (µg/m^3)

Road (Census ID)	NO_2		PM_{10}		$PM_{2.5}$	
	2019	2024	2019	2024	2019	2024
A377 (16972)	22.6	17.1	13.8	13.3	8.8	8.3
A377 (16971)	18.4	14.0	13.6	13.1	9.0	8.5
A3015 (99845)	26.1	19.5	15.4	14.9	9.3	8.8

Limit Value	40	40	20
Table notes:			

Figure 4: PCM modelled NO_2 concentrations for 2024 and Application Site Location

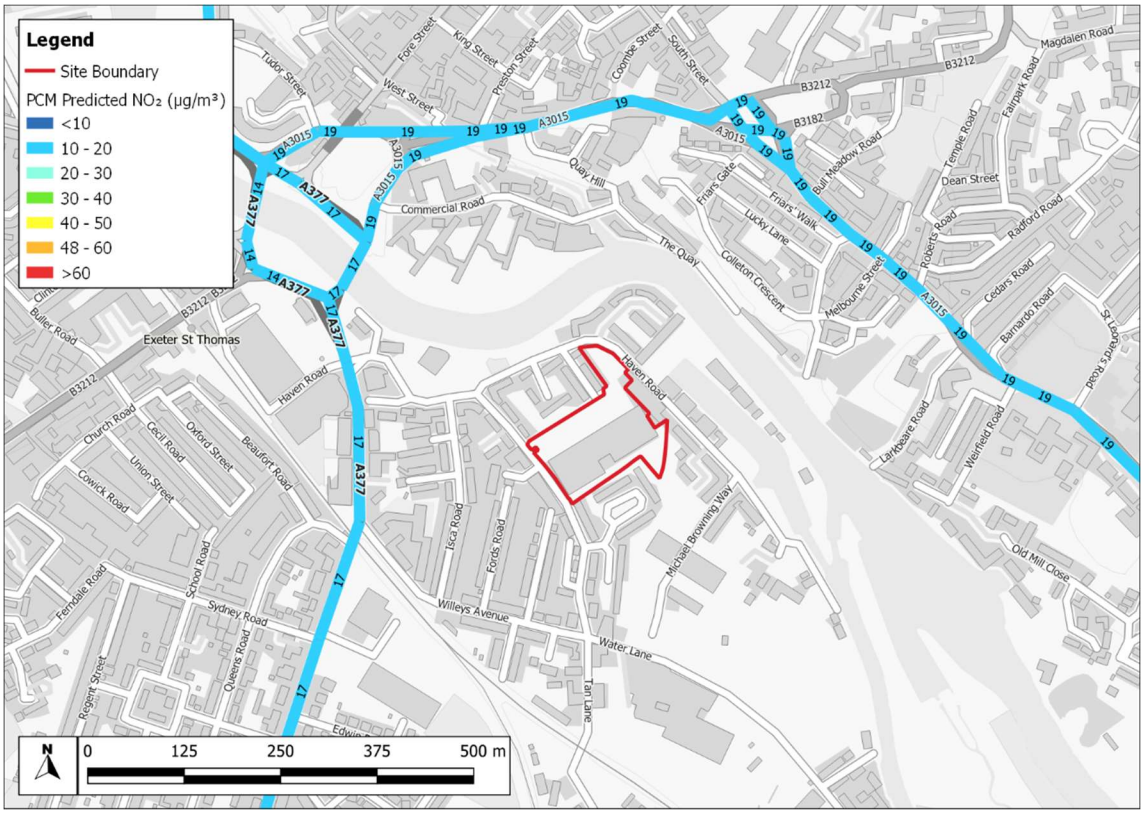

Figure notes: Contains OS data © Crown copyright and database right (2022).

Other Sources of Air Pollution

Permitted Facilities

6.17. Defra and the Devolved Administrations maintain a database of sites which are at risk of contributing significantly to pollutant concentrations, called the UK Pollutant Release and Transfer Register (PRTR). A search of the 2020 database has not identified any regulated facilities within 1 km of the Proposed Development.

Overall Baseline Conditions

Air Quality Objectives

6.18. When considering the baseline year of 2019, most of the monitoring sites near the application site have measured concentrations below the AQOs near the application site. Several monitoring sites have measured exceedances of the NO_2 annual mean AQO, but these sites are located close to busy roads, which is not representative of conditions at the application site. By 2024, concentrations are estimated to be lower.

Limit Value Compliance

6.19. There are no predicted or reported exceedances of the Limit Values within the local area.

World Health Organization Guidelines

6.20. Based upon the most relevant baseline information, baseline concentrations in the local area are likely to be just above Interim Target 1 (40 µg/m^3) for annual mean NO_2 close to busy roads, and below this away from busy roads. For PM_{10}, annual mean concentrations are likely to be below Interim Target 4 for (20 µg/m^3) and for $PM_{2.5}$ concentrations are likely to be below Interim Target 4 (10 µg/m^3).

Health Effects

6.21. The Public Health Outcomes Framework (PHE, 2021) provides information on the fraction of mortality attributable to particulate matter ($PM_{2.5}$) air pollution (indicator D01). For Exeter 4.2% of deaths were attributed to $PM_{2.5}$, which is slightly above the average for South West England of 4.1% and lower than the average for England of 5.1%. The long-term trend in proportion of deaths associated with exposure to $PM_{2.5}$ is shown in Figure 5.

Figure 5: Public Health Framework D01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution

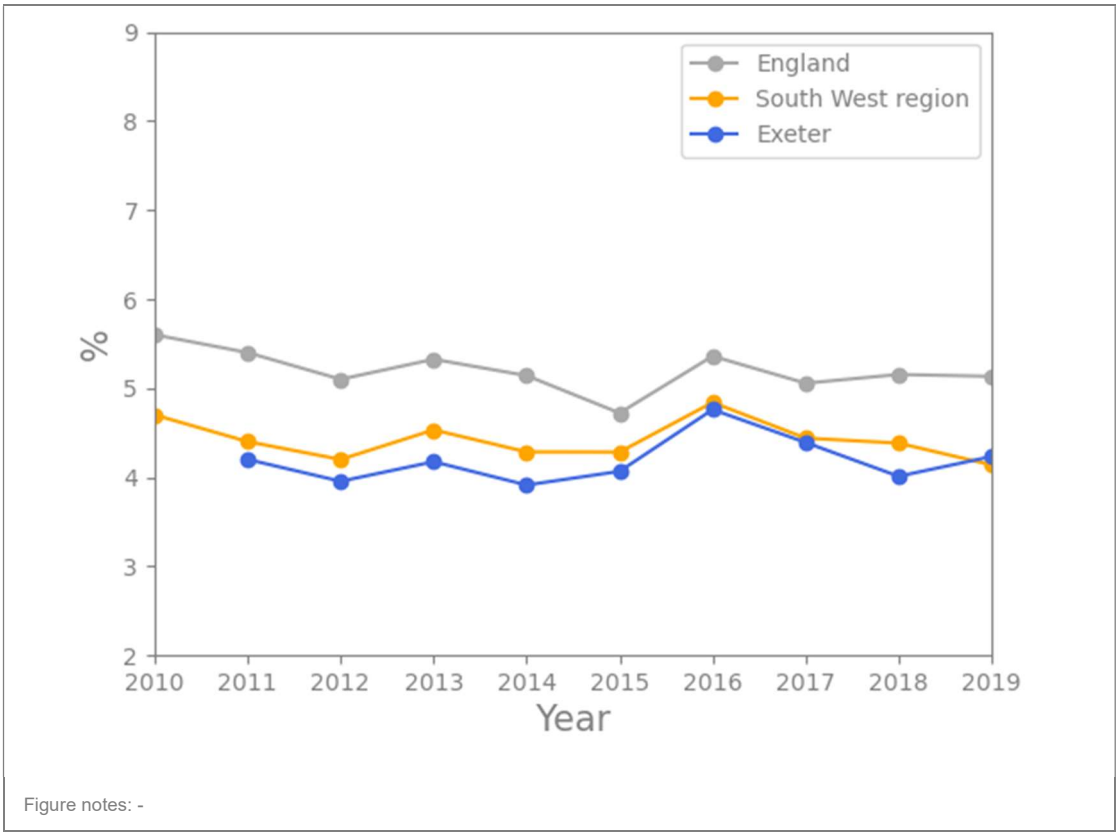

Figure notes: -

7. Construction Phase Impact Assessment

Traffic

7.1. The first step in considering the construction related road traffic impacts on human health due to the Proposed Development has been to screen the traffic generated against the EPUK and IAQM criteria (2017). The screening criteria set out in the EPUK and IAQM guidance states that the impacts specifically due to road traffic emissions are likely to be negligible where the change in LDV AADT flow is less than 100 inside an AQMA and the change in HDV AADT flow is fewer than 25 inside an AQMA. Outside an AQMA, the screening criteria are less stringent. Where the screening criteria is exceeded, a further detailed assessment is required on the impacts on human health receptors at the Proposed Development and local area.

7.2. The likely significant effects from construction traffic emissions have been determined following the approach recommended in EPUK & IAQM guidance (2017). The overall significance of the air quality effects is determined using professional judgement, giving consideration to various factors including the magnitude of the predicted impacts; the presence of any AQO exceedances and duration of the works. The exact number of HGVs movements associated with the construction of the Proposed Development is unknown. However, given the scale of the Proposed Development it is expected to be below the relevant screening threshold of 25 HDVs inside an AQMA and therefore the impacts are likely to be Negligible.

NRMM

7.3. Consideration has also been given to the potential impacts of emissions from NRMM used during the construction phase. Emissions from Non-Road Mobile Machinery (NRMM) utilised during the demolition and construction stages have been assessed qualitatively based on the IAQM guidance (2014). The IAQM guidance suggest exhaust emissions from on-site plant (NRMM) would be unlikely to lead to a significant impact on air quality. Consideration is recommended to be given to the number of NRMM plant, operating hours and locations to assess the significance of the impact.

7.4. Guidance from the IAQM (2014) states that *"experience from assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) […] suggests that they are unlikely to make a significant impact on local air quality and in the vast majority of cases they will not need to be quantitatively assessed"*. On this basis, significant effects as a result of NRMM emissions can thus be discounted since baseline PM concentrations are likely to be below the AQOs during the construction phase. The emissions from NRMM at the Proposed Development and local area will be negligible impact, hence the effects will not be significant. However, suitable mitigation measures for construction site plant are set out in Section 0, based on advice presented in the IAQM (2014) guidance document to reduce construction phase impacts.

Dust

7.5. The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway.

Step 1

7.6. Step 1 of the assessment procedure is to screen the need for a detailed assessment. The guidance provides distance-based criterion in Box 1 of the guidance which states:

An assessment will normally be required where there is:

- *a 'human receptor' within:*

  - 350 m of the boundary of the site; or

  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

- *an 'ecological receptor' within:*

  - 50 m of the boundary of the site; or

  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

7.7. There are human receptors within the distances set out in the guidance, thus an assessment is required for human receptors. There are no ecological receptors within the screening distances and therefore effects on ecological receptors can be discounted as not significant.

Step 2

7.8. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

7.9. The guidance explains that the dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large. The guidance provides examples of the magnitude classification for each of the potential stages.

Potential Dust Emission Magnitude Demolition

7.10. There will be a requirement to demolish an existing building, the total volume of which is estimated to be approximately 45,500 m^3. Existing buildings are constructed of metal and brick, brick is a moderately dusty material. The demolition activities will be below 10 m as the building is below this height. Based on the illustrative criteria in the IAQM guidance, the dust emission class for demolition is considered to be *Medium.*

Potential Dust Emission Magnitude Earthworks

7.11. The dust generated by the earthworks depends on the nature of the earth and soil at the application site. The characteristics of the soil at the application site have been defined using British Geological Survey's UK Soil Observatory website (British Geological Survey, 2021) and are set out in Table 10. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 10: Soils Characteristics at the Site

Category	Record
Soil layer thickness	Deep
Soil texture	All types
Subsoil grain size	Argrilliic Arenaceous (layered clay, silt and sand)
European Soil Bureau Description	Riverine clay and floodplain sands and gravel

7.12. It is assumed that there will be a need for some earthworks in order to create foundations and landscaping for the Proposed Development. It has therefore been assumed that earthworks may cover the entire application site (16,900 m^2). Dust will arise mainly from the handling and transport of dusty materials (such as dry soil). Based on the illustrative criteria in the IAQM guidance document, the dust emission class for earthworks is considered *large*.

Potential Dust Emission Magnitude Construction

7.13. The Proposed Development includes the construction of four buildings with a total volume estimated to be about 600,000 m^3. One of the main materials used in the construction will be concrete and concentrate batching may be carried out on-site. Sandblasting will not occur on-site. Based on the illustrative criteria in the IAQM, the dust emission class for earthworks is considered *large.*

Potential Dust Emission Magnitude Trackout

7.14. The number of Heavy-Duty Vehicles leaving the site on a single day is unknown. Given the scale of the Proposed Development, it is considered likely that there will be between ten and fifty HDVs leaving the site per day. There will not be any paved road within the site. Based on the size and layout of the site it is estimated that the longest unpaved road length within the site that construction HDVs will drive along could be 110 m, although it is likely to be less than this. As discussed in Table 10 the soil is a mix of clay, silt and sand and is therefore a moderately dusty soil type. Based on the illustrative criteria in the IAQM, the dust emission class for trackout is considered *medium*.

Summary of Potential Dust Emission Magnitude

7.15. Table 11 summarises the dust emission magnitude for the Proposed Development.

Table 11: Summary of Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Medium
Earthworks	Large
Construction	Large
Trackout	Medium

Sensitivity of the Study Area

7.16. The guidance explains that the sensitivity of the area should take account of a number of factors including:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local baseline concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

7.17. The IAQM guidance document provides examples of high, medium and low sensitive receptors for each of the potential effects. These are provided in Box 6 to Box 8 of the guidance and consideration should be given to the additional factors presented in Box 9 of the guidance. The guidance has also, helpfully, provided a series of matrices (Table 2, Table 3 and Table 4 of the guidance document) to determine the sensitivity of the area based on the receptor sensitivity, number of receptors, the proximity to the dust emission activity and baseline PM_{10} concentration.

7.18. Residential properties are considered to be high sensitivity receptors to dust soiling and elevated levels of PM_{10}, while commercial properties are medium sensitivity receptors. Some commercial properties, such as retail shops with windows, would be considered high sensitivity receptors to dust soiling.

7.19. Figure 6 shows the site location with several bands representing 20 m, 50 m and 100 m distances from the site boundary. There are between 10 to 100 high sensitivity receptors within 20 m of the site boundary and there are over 100 high sensitivity receptors within 50 m of the site boundary. Based on Table 2 of the IAQM guidance document, the sensitivity of the area to dust soiling impact will be *High*.

7.20. Annual mean PM_{10} concentrations in the vicinity of the Proposed Development are predicted to be a maximum of 11.6 µg/m^3 (which have been derived from the backgrounds concentrations shown in paragraph 6.12. There are between 10 to 100 high sensitivity receptors within 20 m of the site boundary and over 100 high sensitivity receptors within 50 m of the site boundary that are likely to be exposed to these concentrations. Based on Table 3 of the IAQM guidance, the sensitivity of the area to human health impacts due to elevated levels of PM_{10} during the demolition, earthworks and construction stages will be *Low*.

Figure 6: Distance Buffers from Site Boundary

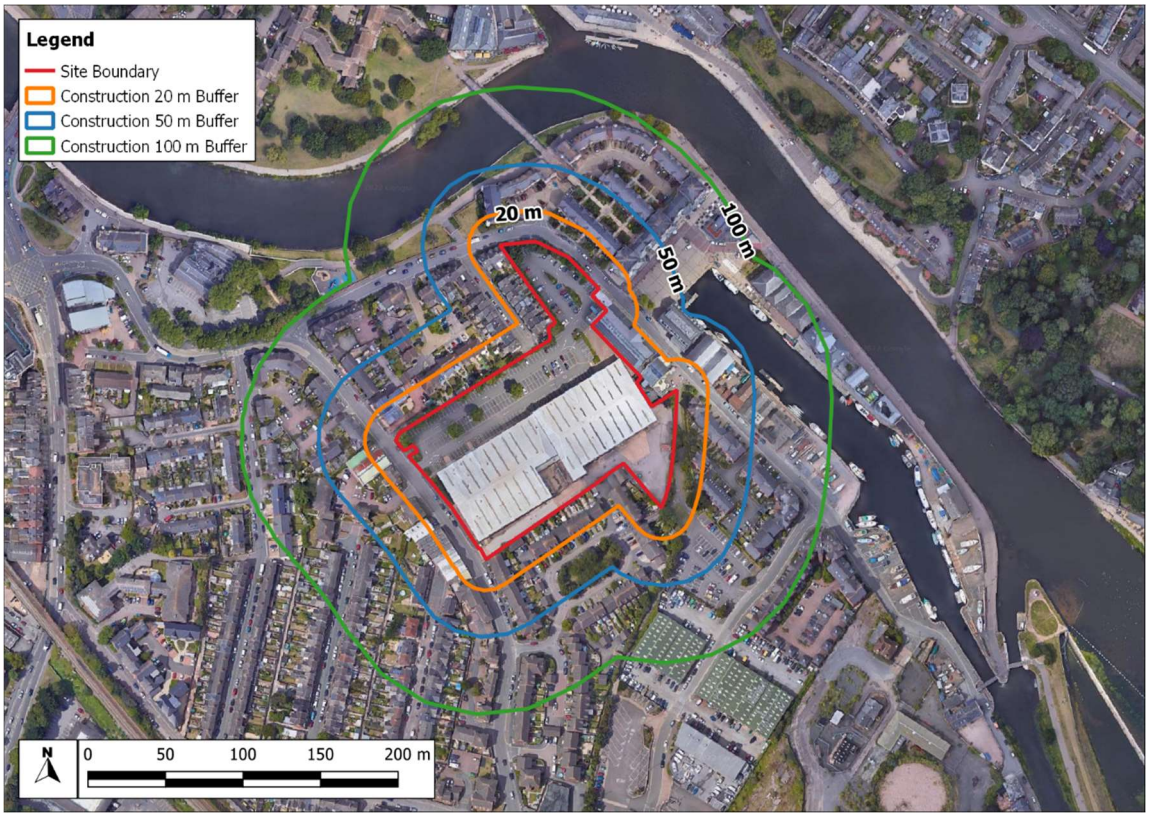

Figure notes: Imagery © 2021 Google, Map data © 2022

7.21. Footnote C of Table 2 of the guidance explains that where there is a medium dust emission magnitude for trackout there is a risk of material being tracked up to 200 m from the application site. There are more than 100 high sensitivity receptors within 20 m of the roads along which material could be tracked, and thus the area is considered to be of *High* sensitivity to dust soiling impacts due to trackout (see Figure 7). Accounting for the local PM_{10} concentrations, the area is considered to be of *Medium* sensitivity to human health impacts.

Figure 7: Distance Buffers from Road Lanes where Dirt may be Tracked out from the Site

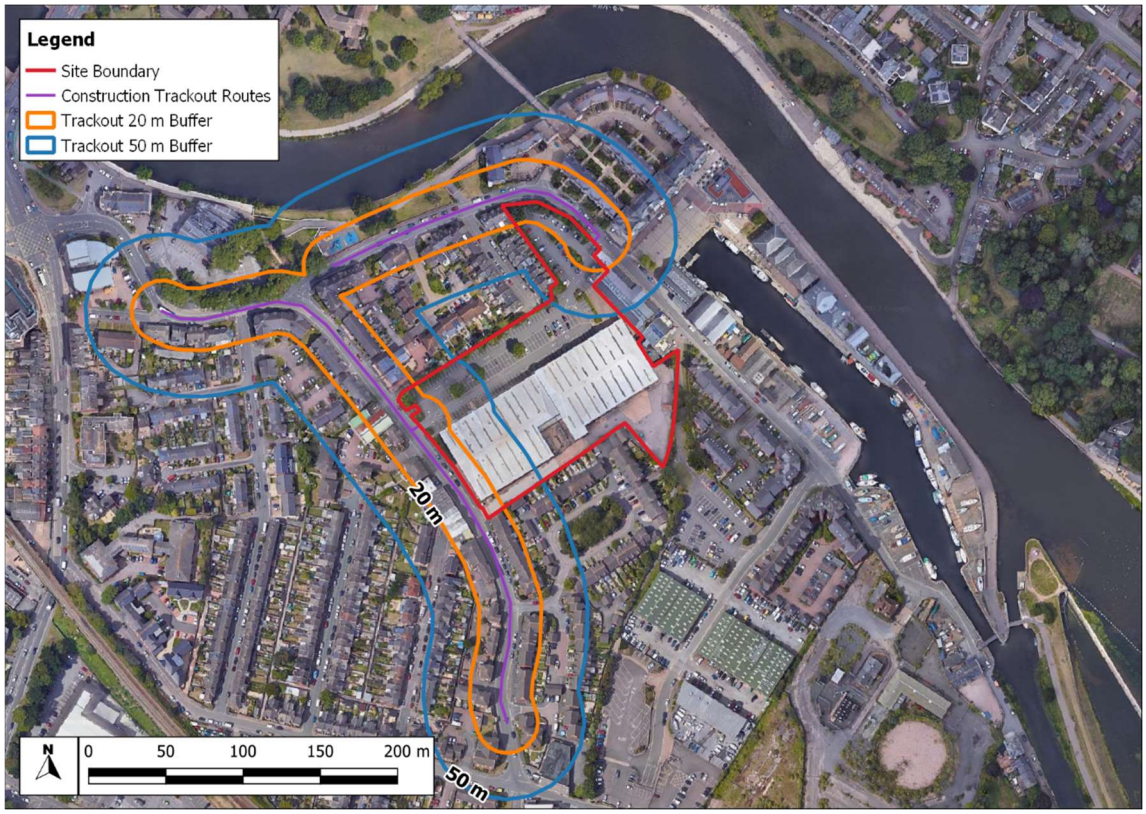

Figure notes: Imagery © 2021 Google, Map data © 2022

7.22. Table 12 summarises the sensitivity of the area around the proposed construction works based on the highest level of sensitivity determined for each stage.

Table 12: Summary of Sensitivity of the Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Medium

Risk of Dust Effect

7.23. The guidance has, helpfully, provided a series of matrices (Table 2, Table 3 and Table 4 of the guidance document) to determine the potential impact at receptors based on the receptor sensitivity, number of receptors and the proximity to the dust emission activity.

7.24. The dust emission magnitudes in Table 11 have been combined with the sensitivities of the area in Table 12 using the matrices in the guidance (Table 6, Table 7 and Table 8 of the guidance), in order to assign a risk category to each activity. The resulting risk categories for the three construction activities, without mitigation, are set out in Table 13.

Table 13: Summary of Dust Risk for each Stage

Potential Impact	Risk			
	Demolition [a]	Earthworks [b]	Construction [c]	Trackout [d]
Dust Soiling	Medium Risk	High Risk	High Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk	Low Risk

Table notes:

a. Based on Table 6 of the IAQM guidance document.

b. Based on Table 7 of the IAQM guidance document.

c. Based on Table 8 of the IAQM guidance document.

d. Based on Table 9 of the IAQM guidance document.

Significance of effects

7.25. The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined.

Step 3

7.26. The risk categories set out in Table 13 have been used to determine the appropriate level of mitigation as set out in appendix A5 of this report (step 3 of the assessment procedure).

8. Operational Air Quality Impacts

Impacts on the Proposed Development

Air Quality Objectives

8.1. The Proposed Development is located within an urban area where ambient background pollution and pollutant emissions from vehicles using local roads may impact on future users of the Proposed Development.

8.2. The Proposed Development is not anticipated to be occupied prior to 2024. However, to account for future uncertainty in road traffic related emissions and to take a conservative approach, pollutant concentrations from 2019 have been assessed.

8.3. The closest busy road to the Proposed Development is the A377, with an AADT flow of 20,929 in 2019 according to the Department for Transport. This road is 210 m away from the Proposed Development.

8.4. Pollutant concentrations are well known to reduce rapidly with distance away from road sources, as the emissions are dispersed in the atmosphere. Defra have released a tool to calculate the fall off with distance from the kerbside of pollutant concentrations originating from a road. Within the tool, Defra states that it should not be used at distances greater than 50 m from the kerbside, this is because the reduction in concentration beyond this distance is insignificant and there will be a significant degree of uncertainty. At a distance of 210 m from the nearest busy road, the pollutant contributions from road traffic emissions will be insignificant.

8.5. The Proposed Development is located near to two minor roads, Haven Road and Water Lane. There is no publicly available traffic data for these roads. Based on the layout of the road network and professional judgement, it is highly unlikely that these roads would contribute more than 2 $\mu g/m^3$.

8.6. As there are no other significant sources of pollutant emissions identified near to the Proposed Development, concentrations at the Proposed Development will be similar to ambient background levels. As discussed in paragraphs 6.12 and 6.13, the background concentrations at the Proposed Development in 2019 are 14.8 $\mu g/m^3$ for NO_2, 11.4 $\mu g/m^3$ for PM_{10} and 7.7 $\mu g/m^3$ for $PM_{2.5}$. The concentrations at the Proposed Development are therefore likely to be well below the AQOs.

8.7. As set out in paragraph A4.16, exceedances of the 1-hour mean NO_2 and 24-hour mean PM_{10} AQOs are unlikely to occur where annual mean concentrations are below 60 $\mu g/m^3$ and 32 $\mu g/m^3$ (Defra, 2021), respectively. As the concentrations are below these criteria, it is thus considered unlikely that the short-term AQOs will be exceeded.

Limit Values

8.8. Defra has not identified any exceedances of the Limit Values in the local area. As such, Limit Values are unlikely to be exceeded at the Proposed Development.

WHO Guidelines

8.9. The annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations are likely to be below WHO Interim target 3 (20 µg/m^3) for NO_2, below Interim target 4 (20 µg/m^3) for PM_{10}, and below Interim target 4 (10 µg/m^3) for $PM_{2.5}$ throughout the Proposed Development.

Health Effects

8.10. As set out in paragraph 6.21, the number of deaths attributed to the $PM_{2.5}$ exposure in ECC is slightly above the average for South West England and is below the average for England (PHE, 2021). It is therefore important to minimise exposure to $PM_{2.5}$ concentrations at the Proposed Development.

Significance of Operational Air Quality Effects

8.11. The operational air quality effects without mitigation are judged to be *'not significant'*. This professional judgement is made in accordance with the methodology and assessment criteria set out earlier in this report.

8.12. The judgement that the operational air quality effects will be 'not significant' without mitigation takes account of the assessment that:

- the impacts of changes in pollutant concentrations at relevant existing locations of exposure will be negligible and all values will be below the AQOs;
- the Proposed Development is unlikely to delay compliance with the Limit Values at existing sensitive locations;
- the Proposed Development is unlikely to delay compliance with the WHO guidelines in the local area;
- predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the Proposed Development are likely to be below the AQOs and Limit Values; and
- predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the Proposed Development are likely to be below WHO Interim target 3 (20 µg/m^3) for NO_2, below Interim target 4 (20 µg/m^3) for PM_{10}, and below Interim target 4 (10 µg/m^3) for $PM_{2.5}$ throughout the Proposed Development.

9. Mitigation

Mitigation Included by Design

9.1. Mitigation measured included by design are set out in Section 4.

Recommended Mitigation

Operation

9.2. The assessment has demonstrated that there will not be any exceedance of the AQOs or Limit Values at the Proposed Development and that traffic associated with the Proposed Development will not cause any exceedances in the local area. The overall effect of the Proposed Development will be 'not significant'. It is, therefore, not considered necessary to propose further mitigation measures.

9.3. 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 was transposed into UK law). Furthermore, the government and the local authority are working on improving air quality under the relevant air quality Strategies and LAQM regime.

Optional Further Mitigation

9.4. This report assesses the effects of ambient air quality. The health of future occupants may also be affected by indoor air quality. An indoor air quality strategy may thus be beneficial. This will identify the key indoor pollutants of concern, the sources of pollution, relevant policies and regulations and the exposure risks, and set out recommendations on mitigating and minimising the exposure to indoor air pollution.

10. Summary and Conclusions

10.1. The air quality impacts of the Proposed Development at Haven Road, Exeter have been considered.

10.2. Consideration has been given to the potential air quality impacts of the Proposed Development upon the local area. All impacts have been screened out as negligible following relevant guidance. The Proposed Development is unlikely to delay compliance with the limit values or WHO guidelines in Exeter.

10.3. Air quality for future users of the Proposed Development has also been considered. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been estimated at the Proposed Development. The assessment has demonstrated all concentrations to be below the AQOs and Limit Values. It is therefore not necessary to include any further mitigation measures.

10.4. Overall, the air quality effects of the Proposed Development will be 'not significant'.

10.5. Although not required, it would be beneficial to produce an indoor air quality strategy to ensure the best possible indoor air pollution for future users of the Proposed Development.

11. Glossary, References and Appendices

Glossary

APS	Air Pollution Services
AQG	Air Quality Guideline
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Standard
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
EA	Environment Agency
ECC	Exeter City Council
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle (which comprise of heavy goods vehicles, buses, and coaches)
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle (which comprise of motorcycles, cars, taxis, and light goods vehicles)
NPPF	National Planning Policy Framework
NRMM	Non-road Mobile Machinery
NO_2	Nitrogen Dioxide
$\mu g/m^3$	Microgrammes per cubic metre
PHE	Public Health England
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles, more specifically particulate matter less than 2.5 micrometres in aerodynamic diameter
PRTR	Pollution Release and Transfer Register
UK	United Kingdom
UKSHA	United Kingdom Health Security Agency
WHO	World Health Organization

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A1. Screening & Scoping

Impacts on Human Health Related Air Quality Objectives

A1.1. The Proposed Development has the potential to impact upon locations of human-health exposure in the local area due to emissions from changes in local road traffic.

A1.2. The screening criteria set out in the EPUK and IAQM guidance states that the impacts will be negligible where the change in LDV AADT flow is less than 100 inside an AQMA, or 500 AADT elsewhere, and the change in HDV AADT flow is less than 25 inside an AQMA, or 100 AADT elsewhere.

A1.3. As stated in Section 4.3, the Proposed Development will lead to a reduction of 1,195 LDV movements per day and an increase of 12 HDV movements per day.

A1.4. This will thus be less than the relevant EPUK/IAQM criterions for LDV and HDV vehicle movements inside of an AQMA and the impacts will therefore be negligible.

Impacts on Human Health Related Limit Value Compliance

A1.5. Without the Proposed Development, existing levels of air pollution are predicted by Defra to not exceed the annual mean NO_2 limit value in 2024 along roads close to the Proposed Development. The Proposed Development will result in a decrease in traffic on local roads and will therefore not delay compliance with the limit values.

Impacts on Ecological Sites

A1.6. With regards to ecological sites, the first step in considering the road traffic impacts of the Proposed Development has been to screen the Proposed Development and its traffic generation against the criteria set out in the IAQM habitats guidance (2019). The IAQM have produced this guidance to assist in the assessment of the air quality impacts of development on designated nature conservation sites. The guidance focuses on air quality assessments in support of Habitats Regulations Assessments (HRA), but also considers the approach for assessing the air quality impact on national or local designated nature conservation sites. Where impacts can be screened out there is no need to progress to a more detailed assessment.

A1.7. The location of the Proposed Development in relation to nearby designated ecological habitats is shown in Figure A1 Habitats fall into the following categories:

- Locally designated sites: local wildlife sites (LWS), Local Nature Reserves (LNR) and Antient Woodlands (AW).
- Nationally designated sites: Sites of Specific Scientific Interest (SSSI), National Nature Reserves (NNR).
- National Network designated sites: Special Protection Area (SPA), Special Areas of Conservation (SAC).

A1.8. There is one National Network Site within 5 km of the Proposed Development and one locally designated site within 2 km of the Proposed Development.

A1.9. According to IAQM guidance, the need for a detailed assessment of impacts on nationally and National Site Network designated ecological sites can be screened out if a development, in isolation and in-combination with other plans and projects, will lead to an increase in traffic generation of less than 1,000 AADT on a road within 200 m of a sensitive ecological site. As set out in section 4.3 the Proposed Development's traffic generation is expected to result in significantly less than this screening threshold. Therefore, the impact of emissions related to the Proposed Development upon the ecological sites are considered to likely be insignificant.

Figure A1: Designated Ecological Habitats and the Proposed Development Location

Figure notes: Contains OS data © Crown copyright and database right (2022).

Impacts of On-site Combustion Plant on the Local Area

A1.10. The Proposed Development will have its heating and hot water provided electrically including with air source heat pumps; there will therefore be no on-site emissions associated with combustion plant, besides life safety plant, and the impacts will likely be negligible.

A2. Legislation, Policy and Guidance

A2.1. There are a large number of policy, guidance and strategy documents published regarding air quality at a national, regional and local level. The documents all provide useful context, information and justification in support of the approaches in this assessment. Details of relevant documents are provided below.

National

National Planning Policy Framework

A2.2. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2021) sets out planning policy for England. It includes advice on when air quality should be a material consideration in development control decisions. The following paragraphs have been considered:

Paragraph 104: "Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:…d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; …".

Paragraph 105: "Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health".

Paragraph 174: "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 and water quality".

Paragraph 185: "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".

Paragraph 186: "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".

Paragraph 188: "The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities".

Paragraph 55: "Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition".

Planning Practice Guidance

A2.3. The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019b). The PPG on air quality published in November 2019 states:

Paragraph: 001 Reference ID: 32-001-20191101

"The Department for Environment, Food and Rural Affairs 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 in planning 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".

Paragraph: 002 Reference ID: 32-002-20191101

"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".

Paragraph: 005 Reference ID: 32-005-20191101

"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.

Where air quality is a relevant consideration the local planning authority may need to establish:

- *the 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
- *whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*

- *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality".*

Paragraph: 007 Reference ID: 32-007-20191101

"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".

Paragraph: 008 Reference ID: 32-008-20191101

"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".

Clean Air Strategy

A2.4. Defra published the Clean Air Strategy in January 2019 (Defra, 2019a). The strategy focuses on exposure to toxic pollutants like nitrogen oxides, ammonia, particulate matter, non-methane volatile organic compounds and sulphur dioxide. The strategy aims to reduce emissions of pollutants including the aim to reduce particulate matter emissions by 30% by 2020, and by 46% by 2030.

A2.5. This strategy sets out the aim for new enforcement powers at a national and local level, across all sectors of society and sets out the comprehensive action that is required from government and society to meet these targets. The strategy includes actions to reduce emissions from transport (including road, maritime, rail, aviation and NRMM), homes, farming and industry.

A2.6. The strategy states that:

"New legislation will create a stronger and more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem".

The Industrial Strategy

A2.7. The Government has published a white paper that sets out a long-term 'Industrial Strategy' for the UK (HM Government, 2017). It includes a key policy to *"support electric vehicles through a £400m charging infrastructure investment and an extra £100m to extend the plug-in car grant*" and states "*the UK's road and rail network could dramatically reduce carbon emissions and other pollutants*". Unlike their fossil fuel counterparts, electric vehicles do not release NOx emissions; if the strategy is fulfilled then NOx emissions will reduce significantly over the coming decades.

The Clean Growth Strategy

A2.8. An ambitious blueprint for Britain's low carbon future was set out by the Government in a Policy paper (HM Government, 2018) in April 2018. Although this strategy focuses on reducing the UK's carbon footprint, it contains several policies and proposals that relate to air quality, including:

22. *"End the sale of new conventional petrol and diesel cars and vans by 2040*

23. *Spend £1 billion supporting the take-up of ultra low emission vehicles (ULEV), including helping consumers to overcome the upfront cost of an electric car*

24. *Develop one of the best electric vehicle charging networks in the world by:*

    - *Investing an additional £80 million, alongside £15 million from Highways England, to support charging infrastructure deployment*
    - *Taking new powers under the Automated and Electric Vehicles Bill, allowing the Government to set requirements for the provision of charging points*

25. *Accelerate the uptake of low emission taxis and buses by:*

    - *Providing £50 million for the Plug-in Taxi programme, which gives taxi drivers up to £7,500 off the purchase price of a new ULEV taxi, alongside £14 million to support 10 local areas to deliver dedicated charge points for taxis*
    - *Providing £100 million for a national programme of support for retrofitting and new low emission buses in England and Wales*

26. *Work with industry as they develop an Automotive Sector Deal to accelerate the transition to zero emission vehicles*

27. *Announce plans for the public sector to lead the way in transitioning to zero emissions vehicles*

28. *Invest £1.2 billion to make cycling and walking the natural choice for shorter journeys*

29. *Work to enable cost-effective options for shifting more freight from road to rail, including using low emission rail freight for deliveries into urban areas, with zero emission last mile deliveries*

30. *Position the UK at the forefront of research, development and demonstration of Connected and Autonomous Vehicle technologies, including through the establishment of the Centre for Connected and Autonomous Vehicles and investment of over £250 million, matched by industry The Clean Growth Strategy 15*

31. *Innovation: Invest around £841 million of public funds in innovation in low carbon transport technology and fuels including:*

    - *Ensuring the UK builds on its strengths and leads the world in the design, development and manufacture of electric batteries through investment of up to £246 million in the Faraday Challenge*
    - *Delivering trials of Heavy Goods Vehicle (HGV) platoons, which could deliver significant fuel and emissions savings".*

The 25 Year Environment Plan

A2.9. The Government has published a Policy paper called the '25 Year Environment Plan' (HM Government, 2019) which set out what the government will do to improve the environment within a generation. This includes the first goal 'Clean air' where the government states *"we will achieve clean air by:*

- *Meeting legally binding targets to reduce emissions of five damaging air pollutants. This should halve the effects of air pollution on health by 2030.*
- *Ending the sale of new conventional petrol and diesel cars and vans by 2040.*
- *Maintaining the continuous improvement in industrial emissions by building on existing good practice and the successful regulatory framework".*

Road to Zero

A2.10. 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.

A2.11. This paper confirms 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 2040, 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.

A2.12. 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. If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades.

Transport Decarbonisation Plan

A2.13. More recently, the DfT published a Transport Decarbonisation Plan (2021), which states *"new diesel and petrol cars and vans would no longer be sold from 2030, and that all new cars and vans must be fully zero emission at the tailpipe from 2035",* bringing the dates significantly forward from the DfT Policy Paper.

The Ten Point Plan

A2.14. The Ten Point Plan for a Green Industrial Revolution (HM Government, 2020) sets out how the UK intends to achieve its vision for a cleaner, healthier, net zero carbon future. The focus is on the following ten points:

"Point 1 Advancing Offshore Wind

Point 2 Driving the Growth of Low Carbon Hydrogen

Point 3 Delivering New and Advanced Nuclear Power

Point 4 Accelerating the Shift to Zero Emission Vehicles

Point 5 Green Public Transport, Cycling and Walking

Point 6 Jet Zero and Green Ships

Point 7 Greener Buildings

Point 8 Investing in Carbon Capture, Usage and Storage

Point 9 Protecting Our Natural Environment

Point 10 Green Finance and Innovation".

Hydrogen Strategy

A2.15. The UK Hydrogen Strategy (HM Government, 2021) sets out details of how growth in low carbon hydrogen will be driven in the UK, as per the Government's Ten Point Plan (HM Government, 2020). The strategy states:

"Hydrogen is one of a handful of new, low carbon solutions that will be critical for the UK's transition to net zero. As part of a deeply decarbonised, deeply renewable energy system, low carbon hydrogen could be a versatile replacement for high-carbon fuels used today – helping to bring down emissions in vital UK industrial sectors and providing flexible energy for power, heat and transport".

Air Quality Plan

A2.16. Defra has produced an Air Quality Plan to tackle roadside NO_2 concentrations in the UK (Defra, 2017). Alongside a package of national measures, the Plan requires those English Local Authorities that are predicted to have exceedances of the Limit Values beyond 2020 to produce local plans by December 2018. These plans are undertaken in stages and must have measures to achieve the statutory Limit Values within the shortest possible time, which may include the implementation of a charging Clean Air Zone (CAZ).

A3. Professional Experience

Dr Austin Cogan, MPhys (Hons) PhD CEnv MIEnvSc MIAQM

Dr Cogan is a Director and cofounder of Air Pollution Services, is a Chartered Environmentalist and has nearly 15 years' experience in environmental sciences. He has extensive experience of air quality, dust, and odour assessments, having been involved in hundreds of projects including residential and commercial developments, road schemes, airports, waste management processes, industrial processes, power generating facilities and agricultural facilities. This has included provision of expert witness services at several public inquiries and hearings. Austin has also supported many local authorities with Clean Air Zone studies (such as Bath, Bristol, Newcastle, Gateshead, North Tyneside and South Gloucestershire), Borough Plan modelling, microsimulation modelling and developing AQMAs and AQAPs. He has also contributed to multiple guidance documents, including DMRB and GLA evidence bases, and most recently IAQM's guidance on indoor air quality. Furthermore, Austin led the development of AirChecker, a bespoke air quality conveyancing search report, providing useful information on air quality to home and commercial property buyers and renters. Austin is also an international expert in the field of climate change, having monitored greenhouse gases globally. Austin gained two years' experience in scientific instrument design and spent four years' pioneering research in satellite observations of greenhouse gases and aerosols at the Space Research Centre, Leicester. Austin has worked with many international bodies, including NASA, JAXA, CNES and ESA, and published numerous scientific papers and presented at conferences both nationally and internationally. Additionally, he led the development of officially licensed quality assured observational meteorological data at APS, which is used regularly by most of the air quality and odour industry in the UK.

Thomas Wescott, BSc (Hons) AMIEnvSc AMIAQM

Mr Wescott is an Assistant Consultant at APS, with over two years' air quality, dust, and odour consultancy experience, having previously worked at ACCON UK and as a freelancer. He has significant experience working on assessment to support planning applications as well as working on some infrastructure projects. He has used a range of dispersion models, including ADMS Roads, ADMS 5, Breeze AERMOD and Breeze Roads. Thomas completed a BSc in Chemistry from Plymouth University. He is currently gaining further experience at APS of air quality and odour assessments for planning as well as learning to complete air quality assessments for environmental permitting and indoor air quality.

A4. Assessment Approach

A4.1. Due to the assessment methodologies and criteria for different time periods (e.g. 1-hour, 24-mean and annual mean) and AQOs, Limit Values and WHO guidelines, a different approach has been adopted to determine the level of effect for AQOs compared to short-term effects and the consideration against Limit Values and WHO guidelines. The approaches for each are outlined below.

A4.2. Standard practice is to assess the impacts of a proposed development on air quality at locations of human health exposure using the EPUK and IAQM guidance *on Land-Use Planning & Development Control: Planning For Air Quality*.

A4.3. The EPUK and IAQM guidance provides a staged approach to considering air quality assessments:

Stage 1) Initial screening

Stage 2) Detailed screening

Stage 3) Simple or Detailed assessment

A4.4. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A3.

Stage 1

Impacts of the Development on the Local Area

A4.5. Table 6.1 of the EPUK and IAQM guidance provides the Stage 1 screening criteria. The approach 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 Stage 2 and in general there is no need to consider the impacts of the development on the local area.

Impacts of Emissions Sources on the Development

A4.6. The EUPK and IAQM guidance explains that 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".*

Stage 2 Screening Criteria

A4.7. The EPUK and IAQM guidance provides example criteria and states the following in relation to the criteria:

"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".

A4.8. The guidance notes that consideration should still be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Road Traffic Assessments

A4.9. The second stage of the EPUK and IAQM guidance 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".*

A4.10. The criteria relating to road traffic are:

- A change of Light Duty Vehicle (LDV) flows of:
  - more than 100 AADT within or adjacent to an AQMA
  - more than 500 AADT elsewhere.
- A change of Heavy Duty Vehicle (HDV) flows of:
  - more than 25 AADT within or adjacent to an AQMA
  - more than 100 AADT elsewhere.
- Where roads are realigned near to sensitive receptors and the change in alignment is 5 m or more and the road is within an AQMA.
- Applies to junctions that cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights, or roundabouts.
- Where bus flows will change by:
  - more than 25 AADT within or adjacent to an AQMA

- more than 100 AADT elsewhere.

Simple or Detailed Assessments

A4.11. Where an air quality assessment is identified as being required, then this may take the form of either a Simple Assessment or a Detailed Assessment. It is not uncommon for assessments to utilise detailed dispersion models to predict pollutant concentrations and impacts on local air quality (Detailed Assessment), however, it should be noted that exceeding a screening criterion in Table 6.2 of the guidance does not automatically lead to the requirement for a Detailed Assessment and the use of professional judgement and sufficient evidence can be considered appropriate at times (Simple Assessment).

A4.12. The EPUK and IAQM 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.

Long-term (Annual Mean) Impacts on Locations of Human Health Exposure - AQOs

A4.13. The approach set out in the EPUK and IAQM guidance provides a method for describing the impacts on local air quality arising from development. This approach is used in relation to the AQOs.

A4.14. Impact descriptors for individual receptors are used which expresses the magnitude of incremental change as a proportion of a relevant assessment level and then examining this change in the context of the new total concentration and its relationship with the assessment criterion. Table A1 sets out the matrix for determining the impact descriptor for annual mean concentrations at individual receptors, based on Table 6.3 in the EPUK and IAQM guidance document.

A4.15. Where the impacts are negligible the overall significance is judged to be 'not significant'.

Table A1: Annual Mean Impacts Descriptors for Individual Receptors

Annual Mean Concentration with Proposed Development (µg/m³)	% Change in Concentration relative to the AQO (µg/m³)			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109% of AQO	Moderate	Moderate	Substantial	Substantial
75% or less of AQO	Moderate	Substantial	Substantial	Substantial
Table notes: -				

Short-term Impacts on Locations of Human Health Exposure

A4.16. The short-term (1-hour mean NO_2 and 24-hour mean PM_{10} AQOs) are assessed in relation to the risk of a breach in number of period (1-hour or 24-hour) exceedances.

A4.17. Previous research carried out on behalf of Defra and the devolved administrations identified that exceedances of the 1-hour mean NO_2 AQO are unlikely to occur where the annual mean is below 60 µg/m^3 (Defra, 2021). Similarly, exceedances of the 24-hour mean PM_{10} AQO are unlikely to occur where the annual mean is below 32 µg/m^3. Where annual mean concentrations are below these levels the short-term impacts are considered negligible.

Limit Values

A4.18. Good practice in relation to the limit value assessment is to consider whether a development delays compliance with or causes a breach of the Limit Values. The level of effect is based on whether any location which would be used for compliance reporting is impacted. A breach as a result of the development is considered to be an adverse impact. The level of effect associated with a delay is compliance is dependent on various factors include duration and magnitude of the breach. If there is no breach of the Limit Values or delay in compliance, the level of impact is considered negligible.

WHO

A4.19. Although the WHO have published air quality guidelines, these relate to effects on human health. This assessment focuses on the effects on air quality. While the two are linked and consideration of the ambient concentration is important, an effect on receptors in the local area cannot be attributed directly in relation to the WHO guidelines. However, where a development results in delay with achieving a WHO AQG Level or Interim Target, which is achieved without the development, the level impact of the development will be based on various factors, including duration and magnitude of the breach. Where there is no delay in achieving an Interim Target due to the development in the relevant assessment year, consideration based on professional experience may be given to the potential for delay for achieving the AQG in future years.

A4.20. If no exceedance of the WHO AQG Level or Interim Target or delay in achieving these is identified, the impact is considered negligible.

Significance

A4.21. The approach developed by EPUK and IAQM (2017) has been used in relation to air quality at locations of human health exposure. 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”.

A4.22. If none of the criteria in Stage 1 and 2 are met, then there should be no requirement to carry out an air quality assessment for the impact of the development on the local area, and the impacts can be considered as having a not significant effect.

A4.23. Where a Simple or Detailed assessment is carried out, in drawing the determination of significance, the following factors should be taken account of:

- 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; i.e. 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;
- the extent to which an AQO or limit value is exceeded;
- compliance with the Limit Values; and
- considerations of the WHO guidelines.

A4.24. The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the users of any new development where the air quality is such that an air quality objective is not met will be judged as significant.

A5. Background Calibration

A5.1. The Defra NO_2 background concentrations were calibrated by bilinearly interpolating them to locations of urban background monitor locations. Only the closest monitors that were good examples of background locations were used in the calibration. The difference between the interpolated Defra background NO_2 concentrations and the monitored NO_2 concentrations at these locations were used to produce a factor to alter the Defra background concentrations. The details relevant to the production of this background calibration factor are shown in Table A2. There were no background monitors that measured PM_{10} and $PM_{2.5}$ within the city so it was not possible to calibrate Defra background concentrations of PM_{10} or $PM_{2.5}$.

Table A2: Background Calibration

Urban Background Monitor	Monitor distance from Proposed Development (m)	Monitored NO_2 Background Concentration (µg/m³)	Defra NO_2 Background Concentration (µg/m³)	Factor
DT68	260	13.8	11.6	1.19
DT69	1000	11.2	9.8	1.15
DT70	910	16.1	10.6	1.52
Average				**1.29**

Table notes: -

A6. Construction Phase Mitigation Measures

Table A3: Communication

Measure	Recommendation
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	Highly Recommended
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	Highly Recommended
Display the head or regional office contact information.	Highly Recommended
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.	Highly Recommended
Table notes: -	

Table A4: Dust Management

Measure	Recommendation
Site Management	
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Highly Recommended
Make the complaints log available to the local authority when asked.	Highly Recommended
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	Highly Recommended
Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	Highly Recommended
Monitoring	
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	Highly Recommended
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	Highly Recommended
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Highly Recommended
Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	Highly Recommended

Preparing and maintaining the site	
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Highly Recommended
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Highly Recommended
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	Highly Recommended
Avoid site runoff of water or mud.	Highly Recommended
Keep site fencing, barriers and scaffolding clean using wet methods.	Highly Recommended
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	Highly Recommended
Cover, seed or fence stockpiles to prevent wind whipping.	Highly Recommended
Operating Vehicle/Machinery and Sustainable Travel	
Ensure all vehicles switch off engines when stationary - no idling vehicles.	Highly Recommended
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	Highly Recommended
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Highly Recommended
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Highly Recommended
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	Highly Recommended
Operations	
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	
Use enclosed chutes and conveyors and covered skips.	
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	
Waste management	
Avoid bonfires and burning of waste materials.	
Table notes: -	

Table A5: Measures Specific to Demolition

Measure	Recommendation
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	Desirable
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Highly Recommended
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly Recommended
Bag and remove any biological debris or damp down such material before demolition.	Highly Recommended
Table notes: -	

Table A6: : Measures Specific to Earthworks

Measure	Recommendation
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Highly Recommended
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	Highly Recommended
Only remove the cover in small areas during work and not all at once.	Highly Recommended
Table notes: -	

Table A7: Measures Specific to Construction

Measure	Recommendation
Avoid scabbling (roughening of concrete surfaces) if possible.	Highly Recommended
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	Highly Recommended
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Highly Recommended
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	Desirable
Table notes: -	

Table A8: Measures Specific to Trackout

Measure	Recommendation
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	Highly Recommended
Avoid dry sweeping of large areas.	Highly Recommended
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Highly Recommended

Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Highly Recommended
Record all inspections of haul routes and any subsequent action in a site log book.	Highly Recommended
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	Highly Recommended
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Highly Recommended
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	Highly Recommended
Access gates to be located at least 10 m from receptors where possible.	Highly Recommended
Table notes: -	

AIR POLLUTION
SERVICES

Experts in Air Quality, Odour and Climate Change

- Air Quality Assessments for Planning Applications
- Air Quality Neutral
- Pre-application Feasibility

- LAQM Support
- Feasibility Studies
- Local Plan Modelling

- Construction Dust
- Mineral Dust
- Dust Management

- Odour Risks
- Odour Modelling
- Odour Management

- Transport Schemes
- Industrial and Energy
- Agriculture and Waste

- EIA Air Quality Chapters
- Greenhouse Gas Assessments
- Climate Vulnerability

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