Air Quality Assessment:
Mansfield Bowling Club, Camden

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Experts in air quality management & assessment

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Executive Summary

The air quality impacts associated with the proposed care home development at Mansfield Bowling Club, in Camden have been assessed. The proposals involve the provision of a 78-bed specialist care home, with communal facilities and associated car parking.

During the construction works, a range of best practice mitigation measures will be implemented to reduce dust emissions and the overall effect will be 'not significant'; appropriate measures have been set out in this report, to be included in the Dust Management Plan for the works.

The assessment has demonstrated that future residents of the proposed development will experience acceptable air quality, with pollutant concentrations below the air quality objectives. The proposed development will not generate a significant number of additional vehicle movements, and heat and hot water will be provided by Ground-Source Heat Pumps and Photovoltaic Panels. The proposed development will not, therefore, generate any significant emissions.

Overall, the construction and operational air quality effects of the proposed development are judged to be 'not significant'.

The air quality neutrality of the development has also been assessed.

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1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed care home development at Mansfield Bowling Club, in Camden. The proposed development will comprise a 78-bed specialist care home, with communal facilities and associated car parking.

1.2 The proposed development lies within a borough-wide Air Quality Management Area (AQMA) declared by the London Borough of Camden (LBC) for exceedances of the annual mean nitrogen dioxide (NO_2) and 24-hour mean particulate matter (PM_{10}) objective. It is also located approximately 730 m to the southwest of the Greater London Area's (GLA's) *'A1 Holloway Road from Highbury to Archway'* air quality Focus Area; these are locations with high levels of human exposure where the annual mean limit value for nitrogen dioxide is exceeded.

1.3 The proposed development will introduce new residential exposure into this area of potentially poor air quality; thus, an assessment is required to determine the air quality conditions that future residents will experience. It will also generate additional traffic on local roads, which may impact on air quality at existing residential properties along the affected road network. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.4 The location and setting of the proposed development are shown in Figure 1, along with the relevant nearby Focus Area and monitoring sites.

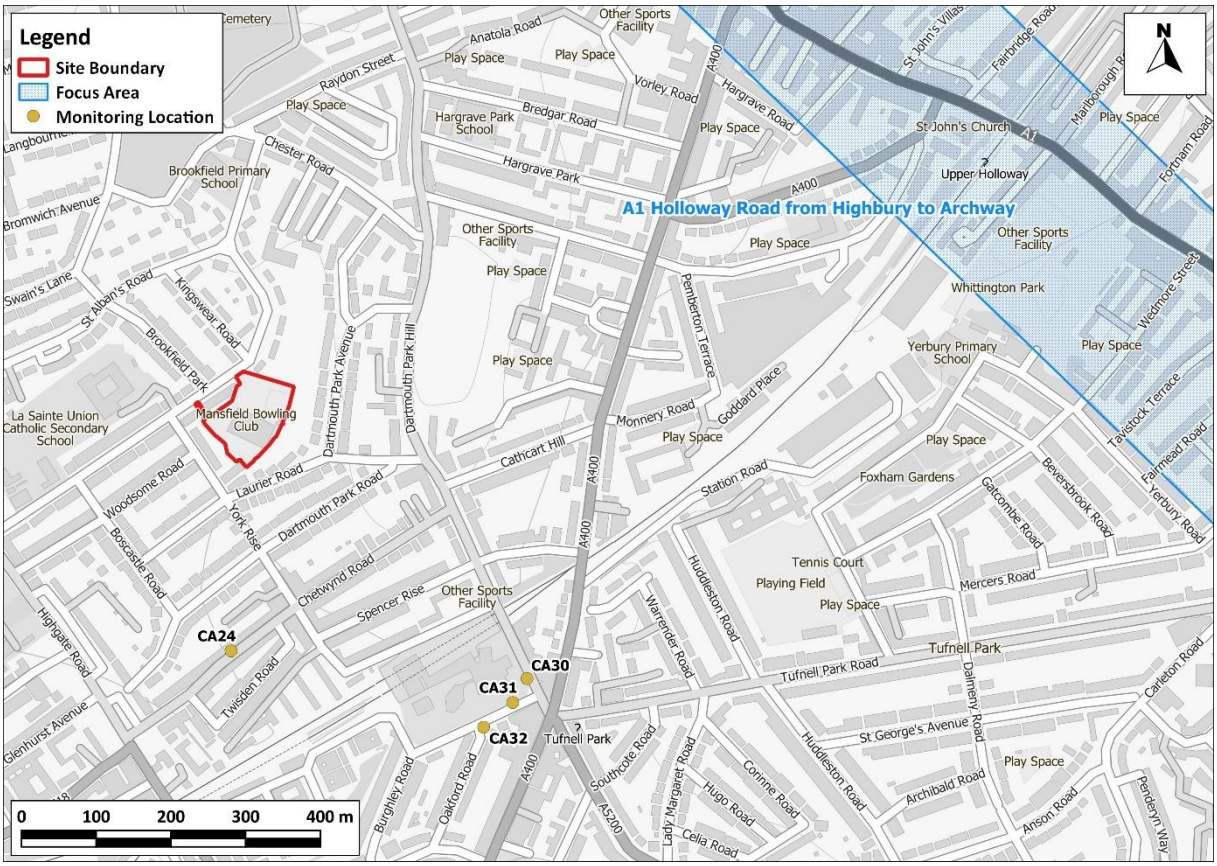

Figure 1: Proposed Development Setting in the Context of Air Quality

1.5 The proposed development will be provided with heat and hot water by electric Ground-Source Heat Pumps (GSHPs), as well as Photovoltaic Panels (PVs); as such, there will be no centralised energy plant and thus no significant point sources of emissions within the proposed development.

1.6 The Greater London Authority's (GLA's) London Plan (GLA, 2021a) requires new developments to be air quality neutral. The air quality neutrality of the proposed development has been assessed following the methodology provided in the latest GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2021), which is currently in consultation stage.)

1.7 The GLA has also released Supplementary Planning Guidance on the Control of Dust and Emissions from Construction and Demolition (GLA, 2014b). The SPG outlines a risk assessment approach for construction dust assessment and helps determine the mitigation measures that will need to be applied. A construction dust assessment has been undertaken and the appropriate mitigation has been set out.

1.8 This report describes existing local air quality conditions in the vicinity of the proposed development (base year 2019[1]) and considers air quality conditions at the proposed development in 2023, which is the anticipated first year of occupation. The assessment of construction dust impacts focuses on the anticipated duration of the works.

1.9 This report has been prepared taking into account all relevant local and national guidance and regulations.

[1] 2020 monitoring data were not used due to the impact of the COVID-19 pandemic on recorded concentrations, discussed further in Paragraph 4.3.

2 Policy Context

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

Air Quality Strategy

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

Clean Air Strategy 2019

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

Reducing Emissions from Road Transport: Road to Zero Strategy

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

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

Environment Act 2021

2.6 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental Protection (OEP), responsible for holding the government to account and ensuring compliance with these targets.

2.7 The Act requires the Government to set at least one long-term target (spanning a minimum of 15 years), supported by interim targets set in a five year cycle, in each of four identified areas: Air Quality, Biodiversity, Water and Resource Efficiency and Waste Reduction. An additional target for mean levels of $PM_{2.5}$ is also required. These must be set before November 2022. As the targets have not yet been either finalised or adopted by the Government, they cannot impact on current planning policy.

Planning Policy

National Policies

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

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

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

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

2.10 Paragraph 185 states:

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

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

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

2.12 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified".

2.13 Regarding plan-making, the PPG states:

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

2.14 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan "*identifies measures that will be introduced in pursuit of the objectives and can have implications for planning*". In addition, the PPG makes clear that *"…dust can also be a planning concern, for example, because of the effect on local amenity"*.

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

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air

quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity".

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

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

2.17 The PPG also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented".

London-Specific Policies

2.18 The key London-specific policies are summarised below, with more detail provided, where required, in Appendix A1.

The London Plan

2.19 The London Plan (GLA, 2021a) sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The key policy relating to air quality is Policy SI1 on *Improving air quality*, Part B1 of which sets out three key requirements for developments:

"Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits

c) create unacceptable risk of high levels of exposure to poor air quality".

2.20 The Policy then details how developments should meet these requirements, stating:

"In order to meet the requirements in Part 1, as a minimum:

a) development proposals must be at least Air Quality Neutral

b) *development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures*

c) *major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1*

d) *development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure".*

2.21 Part C of the Policy introduces the concept of Air Quality Positive for large-scale development, stating:

"Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

1) *how proposals have considered ways to maximise benefits to local air quality, and*

2) *what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this."*

2.22 The proposed development is not large-scale development, thus an Air Quality Positive statement is not required.

2.23 Regarding construction and demolition impacts, Part D of Policy SI1 of the London Plan states:

"In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance".

2.24 Part E of Policy SI1 states the following regarding mitigation and offsetting of emissions:

"Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development".

2.25 The explanatory text around Policy SI1 of the London Plan states the following with regard to assessment criteria:

"The Mayor is committed to making air quality in London the best of any major world city, which means not only achieving compliance with legal limits for Nitrogen Dioxide as soon as possible and maintaining compliance where it is already achieved, but also achieving World Health Organisation targets for other pollutants such as Particulate Matter.

The aim of this policy is to ensure that new developments are designed and built, as far as is possible, to improve local air quality and reduce the extent to which the public are exposed to poor air quality. This means that new developments, as a minimum, must not cause new exceedances of legal air quality standards, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits. Where limit values are already met, or are predicted to be met at the time of completion, new developments must endeavour to maintain the best ambient air quality compatible with sustainable development principles.

Where this policy refers to 'existing poor air quality' this should be taken to include areas where legal limits for any pollutant, or World Health Organisation targets for Particulate Matter, are already exceeded and areas where current pollution levels are within 5 per cent of these limits".

2.26 The London Plan includes a number of other relevant policies, which are detailed in Appendix A1.

London Environment Strategy

2.27 The London Environment Strategy was published in May 2018 (GLA, 2018a). The strategy considers air quality in Chapter 4; the Mayor's main objective is to create a *"zero emission London by 2050".* Policy 4.2.1 aims to *"reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport".* The strategy sets out the aim of achieving the World Health Organisation guideline for $PM_{2.5}$ London-wide by 2030. An implementation plan for the strategy has also been published which sets out what the Mayor will do between 2018 and 2023 to help achieve the ambitions in the strategy.

Mayor's Transport Strategy

2.28 The Mayor's Transport Strategy (GLA, 2018b) sets out the Mayor's policies and proposals to reshape transport in London over the next two decades. The Strategy focuses on reducing car dependency and increasing active sustainable travel, with the aim of improving air quality and creating healthier streets. It notes that development proposals should *"be designed so that walking and cycling are the most appealing choices for getting around locally".*

GLA SPG: Sustainable Design and Construction

2.29 The GLA's SPG on Sustainable Design and Construction (GLA, 2014a) was revoked upon publication of the new London Plan, but it is understood that GLA still expects the emission standards set within it for gas-fired boilers, Combined Heat and Power (CHP) and biomass plant to be met. It

is also currently the only published document that sets out guidance on how an 'air quality neutral' assessment should be undertaken.

GLA SPG: The Control of Dust and Emissions During Construction and Demolition

2.30 The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014b) outlines a risk assessment based approach to considering the potential for dust generation from a construction site, and sets out what mitigation measures should be implemented to minimise the risk of construction dust impacts, dependent on the outcomes of the risk assessment. This guidance is largely based on the Institute of Air Quality Management's (IAQM's) guidance (IAQM, 2016), and it states that "*the latest version of the IAQM Guidance should be used*".

Air Quality Focus Areas

2.31 The GLA has identified 187 air quality Focus Areas in London. These are locations that not only exceed the annual mean limit value for nitrogen dioxide, but also have high levels of human exposure. They do not represent an exhaustive list of London's air quality hotspot locations, but locations where the GLA believes the problem to be most acute. They are also areas where the GLA considers there to be the most potential for air quality improvements and are, therefore, where the GLA and Transport for London (TfL) will focus actions to improve air quality. The proposed development is located approximately 730 m to southwest the *"A1 Holloway Road from Highbury to Archway'* air quality Focus Area.

Local Transport Plan

2.32 LBC's Transport Strategy (London Borough of Camden, 2019a) sets out the Council's vision and objectives for transport in the borough, in order to respond to changing challenges, opportunities and policy contexts, and identifies measures by which the Council will meet its transport goals. The Strategy contains one relevant objective on air quality; Objective 5 *'To reduce and mitigate the impact of transport-based emissions…'*. The Objective is supported by the following policies:

"Policy 5b: Work towards the World Health Organisation (WHO) limits for Particulate Matter and Nitrogen Dioxide by 2030.

Policy 5c: Use air quality indicators (PM_{10} and NOx emissions levels) as key factors in prioritising locations for LIP-funding through our Area-wide Healthy Streets Projects.

Policy 5h: Where feasible and appropriate, we will monitor the impact of our highways/streetscape schemes using air quality monitoring, including (for example) the use of diffusion tubes to monitor Nitrogen Dioxide levels pre- and post-implementation."

2.33 Other actions within the supporting policies include:

- Continuing to develop a comprehensive network of electric vehicle charging points;

- Incentivising the update of electric vehicles; and
- Establishing the highest standards for the Council's own vehicle fleet.

Local Policies

2.34 The Camden Council Local Plan (London Borough of Camden, 2017) was adopted in 2017. The Plan sets out the Council's planning policies, covering the period from 2016-2031, and replaces the Core Strategy and Development Policies planning documents (adopted in 2010).

2.35 Policy A1 on managing the impact of development states that *"The Council will seek to protect the quality of life of occupiers and neighbours"* and will *"seek to ensure that the amenity of communities, occupiers and neighbours is protected […] and require mitigation measures where necessary".* Factors that will be considered include odour, fumes and dust.

2.36 Policy CC4 on Air Quality states that:

"The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQA) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant permissions unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact. Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emission impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan."

2.37 LBC published a 'Camden Planning Guidance' Supplementary Planning Document (SPD) (London Borough of Camden, 2021a) in January 2021, specifically pertaining to air quality. It provides information on air quality in the borough and supports Local Plan Policy CC4 Air Quality.

Building Standards

2.38 Part F of the Building Regulations (Ministry of Housing, Communities & Local Government, 2020) sets legal requirements related to ventilation for buildings. It identifies performance criteria for ventilation systems for dwellings and offices, stating that nitrogen dioxide concentrations of 288 µg/m^3 as a 1-hour average and 40 µg/m^3 as a long-term average should not be exceeded. While

these are building control requirements rather than planning requirements, they highlight that where ambient (outdoor) air exceeds the annual mean nitrogen dioxide objective, it is expected that an appropriate ventilation system will be installed to ensure that indoor concentrations are below the performance criterion.

Air Quality Action Plans

National Air Quality Plan

2.39 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a CAZ. There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed development. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

2.40 LBC's Clean Air Action Plan (London Borough of Camden, 2019b) sets out a series of measures by which the Council will seek to achieve the air quality objectives in the borough. The Plan sets out seven key priorities around which a number of actions have been developed in order to improve local air quality. The priorities most relevant to the proposed development are:

- *"building emissions – enforcing Air Quality Neutral and Air Quality Positive policies for new developments; and*
- *construction emissions – ensuring all major sites have a demolition management plan (DMP) and a construction management plan (CMP), also ensuring all medium and high-risk sites have real time PM monitoring on site".*

3 Assessment Criteria

3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).

3.2 The UK-wide objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively and continue to apply in all future years thereafter. The $PM_{2.5}$ objective was to be achieved by 2020. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m^3 (Defra, 2021a). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM_{10} objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m^3 (Defra, 2021a).

3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. The GLA explains where these objectives will apply in London (GLA, 2019a). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals and care homes etc., the gardens of residential properties, school playgrounds and the grounds of hospitals and care homes. The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

3.4 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010). The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

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

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [a]
$PM_{2.5}$ [b]	Annual Mean	25 µg/m^3

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

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

GLA $PM_{2.5}$ Target

3.6 As explained in Paragraph 2.27, the GLA has set a target to achieve an annual mean PM2.5 concentration of 10 µg/m^3 by 2030. This target was derived from an air quality guideline set by WHO in 2005. In 2021, WHO updated its guidelines, but the London Environment Strategy (GLA, 2018a) considers the 2005 guideline of 10 µg/m3. While there is no explicit requirement to assess against the GLA target of 10 µg/m^3, it has nevertheless been included within this assessment.

Construction Dust Criteria

3.7 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by IAQM (2016) has been used (the GLA's SPG (GLA, 2014b) recommends that the assessment be based on the latest version of the IAQM guidance). Full details of this approach are provided in Appendix A2.

Screening Criteria for Road Traffic Assessments

3.8 Environmental Protection UK (EPUK) and IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A3, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.

3.9 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A3) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500

light duty vehicles. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

4 Assessment Approach

Study Area

4.1 The study area for the assessment has been identified using professional judgement, focussing on Croftdown Road, the application site itself and local monitoring locations within 500 m from the site. Figure 1 in Section 1 of this report effectively shows the study area.

4.2 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles within 500 m of the site. The specific areas considered are detailed in Section 6.

Existing Conditions

4.3 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2021c);
- local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained by collating the results of monitoring carried out by LBC. The assessment has been based on measurements made during 2019, and pre-pandemic activity and emissions forecasts, to ensure a worst-case assessment that does not take into account temporary reductions in pollutant concentrations as a result of reduced activity levels during the COVID-19 pandemic;
- background concentrations have been defined using Defra's 2018-based background maps (Defra, 2021b). These cover the whole of the UK on a 1x1 km grid. Defra's background maps tend to overpredict concentrations within Inner London and as such, an adjustment factor has not been applied; this is considered to be a worst-case approach; and
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra (2020; 2021d). These are the maps used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards, to identify and report exceedances of the limit value. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2021d), which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

Construction Impacts

4.4 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles. The assessment methodology follows the GLA's SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014b), which is based on that provided by IAQM (2016). This 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 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 mitigation required to ensure that there should be no significant impacts. Appendix A2 explains the approach in more detail.

Road Traffic Impacts

4.5 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 3.8 and detailed further in Appendix A3. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Impact of Existing Sources on Future Residents of the Development

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

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

Assessment of Significance

Construction Dust Significance

4.8 Guidance from IAQM (2016) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. This is the latest version of the guidance upon which the assessment methodology set out in the GLA guidance (GLA, 2014b) is based (the GLA guidance advises that the latest version of the IAQM guidance should always be used). The assessment thus focuses on

determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational Significance

4.9 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement; the experience of the consultants preparing the report is set out in Appendix A4. Full details of the EPUK/IAQM approach are provided in Appendix A3.

'Air Quality Neutral'

4.10 The GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2021b) sets out guidance on how an 'air quality neutral' assessment should be undertaken. It also provides a methodology for calculating an offsetting payment if a development is not 'air quality neutral' and it is not possible to identify or agree appropriate and adequate mitigation. The document is currently in consultation draft.

4.11 Appendix A6 sets out the emissions benchmarks proposed in the consultation draft of the guidance. The approach has been to calculate the emissions from the development and to compare them with these benchmarks.

5 Baseline Conditions

Relevant Features

5.1 The application site is currently unoccupied, comprising of unused land, and is located in a predominantly residential area. The site is bounded by Croftdown Road to the north and residential properties to the west, south and east.

5.2 As discussed in Paragraph 1.2, the proposed development is located within an AQMA and is situated approximately 730 m to the southwest of the *'A1 Holloway Road from Highbury to Archway'* air quality Focus Area, as highlighted in Figure 1.

Industrial sources

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

Local Air Quality Monitoring

5.4 LBC operates four automatic monitoring stations within its area, the nearest of which (ID:CD1) is located approximately 2.7 km to the southwest of the application site. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Grakdo (using the 50% TEA in acetone method), with four diffusion tube monitoring sites located within 500 m of the proposed development.

5.5 Annual mean results for the years 2014 to 2020 are summarised in Table 2. Exceedances of the objectives are shown in bold. The monitoring locations are shown in Figure 2. The monitoring data have been taken from LBC's 2021 Annual Status Report (London Borough of Camden, 2021b).

Table 2: Summary of Annual Mean NO_2 Monitoring (2014-2019) (µg/m^3) [a]

Site ID	Site Type	Location	2014	2015	2016	2017	2018	2019	2020
CA24	Roadside	Chetwynd Road	**44.8**	**46.5**	**42.0**	**50.5**	38.7	35.2	29.3
CA30	Roadside	Dartmouth Park Hill	-	-	-	-	**42.5**	37.0	27.9
CA31	Roadside	Acland Burghley School (Burghley Road)	-	-	-	-	27.1	27.4	20.0
CA32	Roadside	Oakford Road	-	-	-	-	30.5	29.2	22.6
Objective			**40**						

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

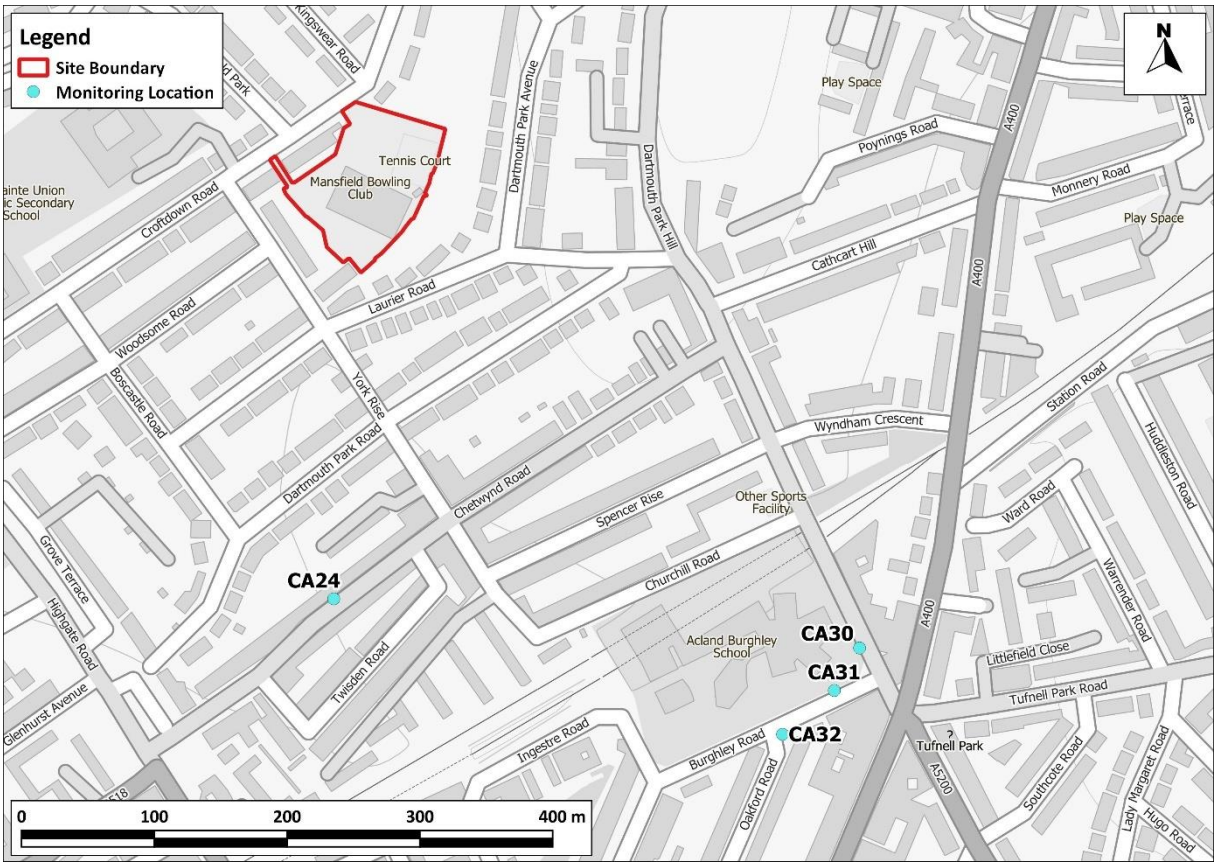

Figure 2: Monitoring Locations and the Application Site Boundary

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5.6 As seen in Table 2, exceedances of the annual mean nitrogen dioxide objective have been measured at the roadside monitor 'CA24' between 2014 and 2017, and at roadside monitor 'CA30' in 2018; concentrations elsewhere have remained below the objective in all years for which data are presented. The data show an overall downward trend in measured concentrations at the 'CA24' long-term monitoring site. Data for 2020 should, however, be treated with caution due to the impact of the COVID-19 pandemic on measured concentrations, as a result of reduced activity and traffic volumes. Furthermore, the roadside monitoring sites 'CA24' and 'CA30' are located adjacent to roads with Annual Average Daily Traffic (AADT) flows in 2016 of 10,598 and 8,551 respectively, according to the London Atmospheric Emissions Inventory (LAEI). In contrast, sites 'CA31' and 'CA32', as well as the proposed development are located adjacent to roads considered sufficiently minor to be excluded from the LAEI model. As such, conditions at monitoring sites 'CA31' and 'CA32' are considered to be most representative of conditions found at the application site.

5.7 The CD1 kerbside automatic monitoring station, located on Finchley Road, approximately 2.7 km to the southwest of the proposed development, is the closest station which measures PM_{10} and $PM_{2.5}$

concentrations. Annual mean results for the years 2014 to 2020 are summarised in Table 3, while results relating to the daily mean objective are summarised in Table 4.

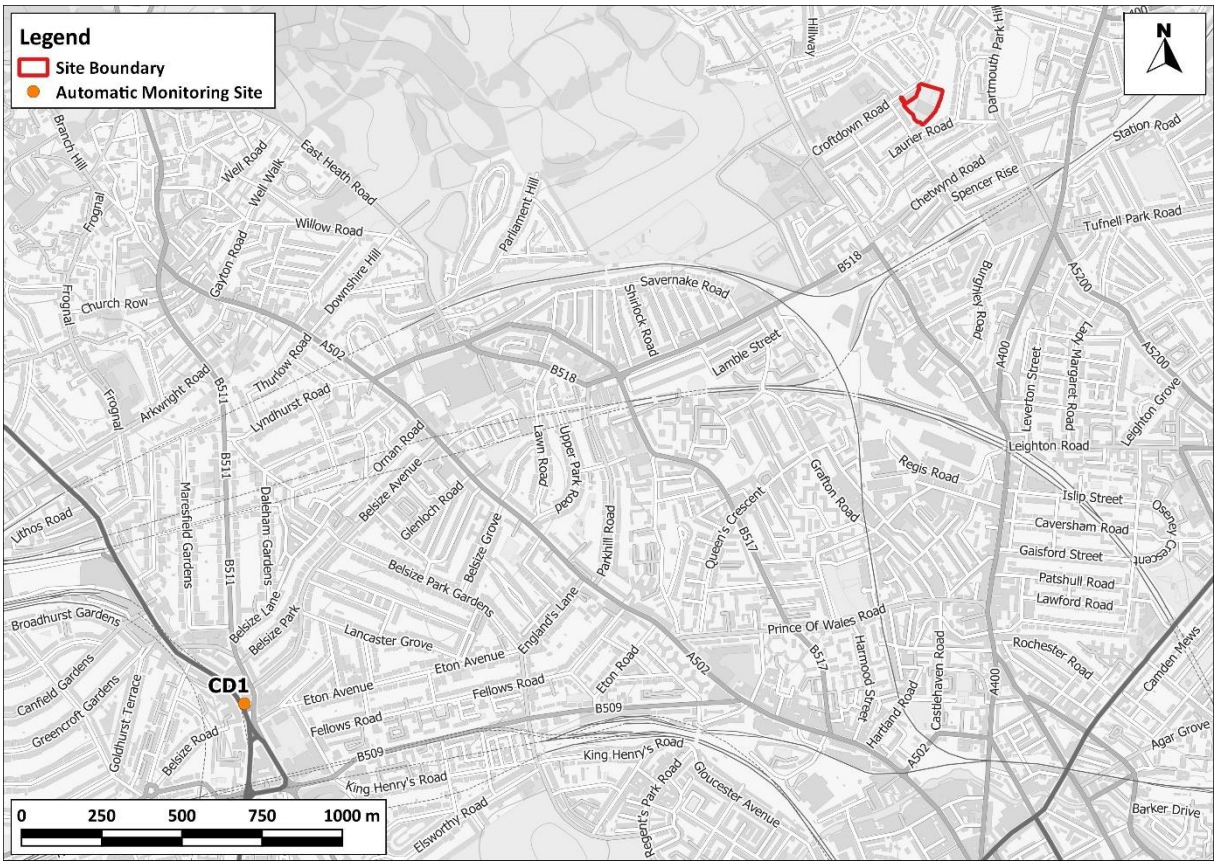

Figure 3: CD1 Automatic Monitor Location and the Application Site Boundary

Table 3: Summary of Annual Mean PM_{10} and $PM_{2.5}$ Monitoring (2014-2020) (µg/m³)

Site ID	Site Type	Location	2014	2015	2016	2017	2018	2019	2020
PM_{10}									
CD1	Kerbside	Swiss Cottage (Finchley Road)	22	20	21	20	21	19	16
Objective			**40**						
$PM_{2.5}$									
CD1	Kerbside	Swiss Cottage (Finchley Road)	-	12	15	16	11	11	10
Objective/ GLA target			**25 / 10 [a]**						

[a] The 25 µg/m³ $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. 10 µg/m³ is the GLA target for annual mean $PM_{2.5}$; again, there is no requirement for local authorities to meet this.

Table 4: Number of Days With PM_{10} Concentrations Above 50 µg/m³

Site ID	Site Type	Location	2014	2015	2016	2017	2018	2019	2020
CD1	Kerbside	Swiss Cottage (Finchley Road)	12	8	7	8	4	8	3
Objective			**35 (50) [a]**						

5.8 As shown in Table 3 and Table 4, the air quality objectives for PM_{10} and $PM_{2.5}$ were met in all years between 2019 and 2020. The 'CD1' kerbside automatic monitoring site is located on Finchley Road (A41), which experienced an approximate flow of 40,000 AADT in 2016; as such, concentrations at this site are expected to be significantly higher than those at the application site.

5.9 The measured $PM_{2.5}$ concentration, in 2019, at 'CD1' exceeded the GLA target value of 10 µg/m³; this, however, is common throughout Greater London.

Exceedances of Limit Value

5.10 There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedances of the annual mean nitrogen dioxide limit value (Defra, 2021e). Furthermore, Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2021d), which are used to identify and report exceedances of the limit value, identify exceedances of this limit value in 2019 along many roads in London, including the A1 830 m northeast of the proposed development. The Greater London Urban Area has thus been reported as exceeding the limit value for annual mean nitrogen dioxide concentrations. Defra's predicted concentrations for 2023 (Defra, 2020) do not identify any exceedances within 1 km of the application site. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

5.11 Defra's Air Quality Plan requires the GLA to prepare an action plan that will *"deliver compliance in the shortest time possible"*, and the 2015 Plan assumed that a CAZ was required. The GLA has

already implemented an LEZ and a ULEZ, thus the authority has effectively already implemented the required CAZ. These have been implemented as part of a package of measures including 12 Low Emission Bus Zones, Low Emission Neighbourhoods, the phasing out of diesel buses and taxis and other measures within the Mayor's Transport Strategy.

Background Concentrations

5.12 Estimated background concentrations at the proposed development are set out in Table 5 and are all well below the objectives.

Table 5: Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2023 (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2019	23.4	17.2	11.3
2023	20.4	16.1	10.6
Objective / GLA target	**40**	**40**	**25/10** [a]

[a] The 25 µg/m^3 $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. 10 µg/m^3 is the GLA target for annual mean $PM_{2.5}$; again, there is no requirement for local authorities to meet this.

6 Construction Phase Impact Assessment

Construction Traffic

6.1 Owing to the small size of the site, it is anticipated that no more than ten Heavy Duty Vehicles (HDVs) will access the site on any given day, thus the additional heavy vehicle movements on local roads will be well below the 25 AADT screening criterion recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase using modelling. It can be concluded that the proposed development will not have a significant impact on local roadside air quality as a result of emissions from construction vehicles.

On-Site Exhaust Emissions

6.2 The IAQM guidance (IAQM, 2016) states:

"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic 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. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur".

6.3 The proposed siting and numbers of any NRMM is not currently known, however, where possible the distance between any areas where NRMM and site traffic will typically operate and sensitive receptors will be maximised, and plant and machinery will be turned off when not in use.

Construction Dust and Particulate Matter Emissions

6.4 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 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A2), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

6.5 There is no requirement for demolition on site.

Earthworks

6.6 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2021), as set out in Table 6. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 6: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Argillaceous [a]
European Soil Bureau Description	Prequaternary Marine / Estuarine Sand and Silt
Soil Group	Medium to Light (Silty) to Heavy
Soil Texture	Clayey Loam [b] to Silty Loam

[a] grain size < 0.06 mm.

[b] a loam is composed mostly of sand and silt.

6.7 The site covers some 9,000 m^2 and most of this will be subject to earthworks, involving breaking up of a paved area. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for earthworks is considered to be *medium*.

Construction

6.8 Construction will involve the erection of a five-storey building to house 78 residential units, with a total building volume of around 28,000 m^3. Dust will arise from vehicles travelling over unpaved ground and the handling and storage of dusty materials. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for construction is considered to be *medium*.

Trackout

6.9 The number of heavy vehicles accessing the site, which may track out dust and dirt, is currently unknown, but given the size of the site it is likely that there will be a maximum of under 10 outward heavy vehicle movements per day. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for trackout is considered to be *small*.

6.10 Table 7 summarises the dust emission magnitude for the proposed development.

Table 7: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Earthworks	Medium
Construction	Medium
Trackout	Small

Sensitivity of the Area

6.11 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

6.12 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling (Table A2.2 in Appendix A2). Residential properties, as well as schools, are also classified as being of 'high' sensitivity to human health effects. There are approximately 34 residential properties and York Rise Nursery within 20 m of the site (see Figure 4).

Figure 4: 20 m Distance Band around the Application Site Boundary

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6.13 Table 7 shows that the dust emission magnitude for trackout is *small* and Table A2.3 in Appendix A2 thus explains that there is a risk of material being tracked 50 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are approximately 33 residential properties within 20 m of the roads along which material could be tracked (see Figure 5).

Figure 5: 20 m Distance Bands around Roads Used by Construction Traffic Within 50 m of the Site Exit

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Sensitivity of the Area to Effects from Dust Soiling

6.14 Using the information set out in Paragraph 6.12 and Figure 4 alongside the matrix set out in Table A2.3 in Appendix A2, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in Paragraph 6.13 and Figure 5 alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

6.15 The matrix in Table A2.4 in Appendix A2 requires information on the baseline annual mean PM_{10} concentration in the area. The properties nearest the site are well away from major road and the existing annual mean PM_{10} concentration is best described by the background concentration from Table 5 (17.2 µg/m^3). Using the information set out in Paragraphs 6.12 and Figure 4 alongside the matrix in Table A2.4 in Appendix A2, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 6.13 and Figure 5 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

6.16 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

6.17 Table 8 summarises the sensitivity of the area around the proposed construction works.

Table 8: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Low Sensitivity	Low Sensitivity

Risk and Significance

6.18 The dust emission magnitudes in Table 7 have been combined with the sensitivities of the area in Table 8 using the matrix in Table A2.6 in Appendix A2, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 9. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 9 (step 3 of the assessment procedure).

Table 9: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Earthworks	Medium Risk	Low Risk
Construction	Medium Risk	Low Risk
Trackout	Low Risk	Negligible

6.19 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. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be ‘not significant’ (IAQM, 2016).

7 Operational Phase Impact Assessment

Impacts at Existing Receptors

7.1 Caneparo Associates, the appointed transport consultants for this scheme, confirmed that the proposed development is expected to generate a total of 72 daily Light Duty Vehicles (LDVs) on the local road network; this daily trip rate is below the screening threshold of 100 LDVs recommended for use inside an AQMA in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Paragraph 3.9). The proposed development will generate only two operational heavy vehicle trips.

7.2 As such, it is judged that the relevant screening thresholds will not be exceeded and there is no requirement for a detailed assessment of road traffic impacts at existing receptors; it can be concluded that the proposed development will not have a significant impact on local roadside air quality.

Impacts of Existing Sources on Future Residents of the Development

7.3 As discussed in Paragraph 5.6, measured concentrations at the 'CA31' and 'CA32' diffusion tube monitoring sites are considered to be most representative of concentrations found at the proposed development site. As seen in Table 2, both sites had measured concentrations well below the annual mean nitrogen dioxide objective since 2018.

7.4 With regard to concentrations of PM_{10} and $PM_{2.5}$, the 'CD1' automatic monitoring station, located on Harben Parade (A41), carrying a flow of 40,000 vehicles daily, has not recorded an exceedance of the objectives in any year since 2014; it is, therefore, reasonable to assume that future particulate matter concentrations will also be acceptable at the site.

7.5 The proposed development is located approximately 150 m from the nearest major road (Dartmouth Park Hill). Defra's Technical Guidance (TG16) (2021a) states that *"concentrations fall-off rapidly on moving away from the source"* and defines urban background locations as those that are distances 50 m from major sources of pollution. As such, it is anticipated that pollutant concentrations at the proposed development will be close to background levels, which have been shown to be well below the respective air quality objectives (see Table 5). With respect to the GLA target for $PM_{2.5}$, the predicted background concentrations at the proposed development marginally exceed the threshold of 10 µg/m^3; this is common throughout Greater London.

7.6 On the basis of the above, it can be, therefore, concluded that future residents of the proposed development will experience acceptable air quality.

Significance of Operational Air Quality Effects

7.7 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A3, and takes account of the assessment that:

- pollutant concentrations within the proposed development will all be below the objectives in the opening year, thus future residents will experience acceptable air quality; and
- the additional vehicles generated by the proposed development will be below recognised screening criteria, and thus any associated impacts can be screened as insignificant.

8 'Air Quality Neutral'

8.1 The purpose of the London Plan's requirement that development proposals be 'air quality neutral' is to prevent the gradual deterioration of air quality throughout Greater London. The 'air quality neutrality' of a proposed development, as assessed in this section, does not directly indicate the potential of the proposed development to have significant impacts on human health (this has been assessed separately in the previous section). The air quality assessment has been undertaken using the latest GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2021b), which is currently in consultation stage.

Building Emissions

8.2 As discussed in Paragraph 1.5, the proposed development will be provided with heat and hot water via an electric GSHP system, as well as PV panels; thus, there will be no associated pollutant emissions and no direct building emissions. The proposed development will, therefore, be better than air quality neutral in terms of building emissions.

Road Transport Emissions

8.3 Caneparo Associates have advised that the proposed development is expected to generate a total of 18,250 car trips per year (50 per day). These values are set out in Table 10. Appendix A6 provides the Benchmark Trip Rates for each land use category based on the Gross Internal Area (GIA) of different land uses. The GIAs have been provided by Wolff Architects. Table 10 shows calculation of the TEB for this development.

8.4 The total development trip rate is greater than the TEB. The proposed development is thus not air quality neutral in terms of transport emissions.

Table 10: Calculation of Transport Benchmarks for the Development [a]

Use Class	GIA (m^2)	Benchmark		Annual Trips from Development
		trips/m^2/yr	Trips/yr	
Care Homes and Hospital	**5,652**	**1.1**	**6,217**	18,250

[a] Each trip is 1-way (i.e., a return journey would be two trips). Considers car trips only.

Summary

8.5 While the proposed development will be better than air quality in terms of building emissions, its car trip generation exceeds the air quality neutral benchmark derived for an average development in Inner London. Mitigation will be required to account for the excess transport emissions above the air quality neutral benchmark; this is discussed in the next Section.

9 Mitigation

Good Design and Best Practice

9.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The proposed development incorporates the following good design and best practice measures, which have been accounted for in the assessment as far as is possible:

- setting back of the development buildings from roads by at least 35 m;
- use of GSHPs and PVs to avoid the need for on-site combustion;
- provision of pedestrian and cycle access to the new development, including cycle parking;
- provision of two active electric vehicle charging points, with the remaining spaces provided with passive provision; and
- provision of a detailed Travel Plan setting out measures to encourage sustainable means of transport (public, cycling and walking), which will aim to reduce private car travel by 10%.

Recommended Mitigation

Construction Impacts

9.2 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.

9.3 The site has been identified as a *Medium* Risk site during earthworks and construction, and *Low* Risk for trackout, as set out in Table 9. The GLA's SPG on *The Control of Dust and Emissions During Construction and Demolition* (GLA, 2014b) describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on what monitoring should be undertaken during the construction phase. This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A7.

9.4 The mitigation measures should be written into a dust management plan (DMP). The DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan and may require monitoring. The GLA's guidance suggests that, for a Medium Risk site, automatic monitoring of particulate matter (as PM_{10}) will be required. It also states that, on certain sites, it may be appropriate to determine the existing (baseline) pollution levels before work begins. However, the guidance is clear that the Local Authority should advise as to the appropriate air quality monitoring procedure and timescale on a case-by-case basis.

9.5 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Road Traffic Impacts

9.6 The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

9.7 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). The local air quality action plan that the GLA is required to produce in order to address limit value exceedances in its area will also help to improve air quality.

9.8 Policy T6.1 of the London Plan (GLA, 2021a) requires at least 20 per cent of all car parking spaces within residential developments to have active electric vehicle charging facilities, with passive provision for all remaining spaces.

Air Quality Neutral

9.9 While the development itself has no adverse impact on local air quality, the transport emissions predicted in the air quality neutral assessment exceed the benchmark derived for an average development of this nature in Inner London.

9.10 Appropriate mitigation measures will need to be agreed with the Council during determination of the planning application.

9.11 In cases where it is not possible to identify or agree suitable mitigation, it may be possible, at the discretion of the local planning authority, to agree an offsetting payment instead (GLA, 2021b).

10 Conclusions

10.1 The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction and emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future residents will experience and whether or not the proposed development is air quality neutral (as required by the London Plan). The assessment has been based on measurements made during 2019, and pre-pandemic activity and emissions forecasts, to ensure a worst-case assessment that does not take into account temporary reductions in pollutant concentrations as a result of reduced activity levels during the Covid-19 pandemic.

Construction Impacts

10.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.

Operational Impacts

10.3 Based on the siting of the proposed development and nearby monitoring data, the assessment has determined that pollutant concentrations at the site will be below the relevant air quality objectives. Future nitrogen dioxide concentrations will also be below the long-term performance criterion in the Building Regulations. On this basis, future residents will experience acceptable air quality.

10.4 The additional traffic generated by the proposed development will be below published screening thresholds and heating and hot water demand will be provided via GSHPs and PV panels. Therefore, the operational effects of the proposed development on existing sensitive receptors will be insignificant.

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

Air Quality Neutral

10.6 The development will have no adverse effects on local air quality conditions and does not introduce new exposure within an area of poor air quality, thus no additional mitigation has been proposed for the operational impacts. However, the road traffic generation of the proposed development exceeds the air quality neutral benchmark derived for an average development in Inner London, so mitigation will be required to account for the excess transport emissions above the air quality neutral benchmark. Mitigation measures to offset the excess transport emissions will need to be agreed with the Council.

Policy Implications

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

11 References

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12 Glossary

AADT	Annual Average Daily Traffic
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
BEB	Building Emissions Benchmark
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
Focus Area	Location that not only exceeds the annual mean limit value for NO_2 but also has a high level of human exposure
GIA	Gross Internal Floor Area
GLA	Greater London Authority
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LBC	London Borough of Camden
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
µg/m^3	Microgrammes per cubic metre

NO_2	Nitrogen dioxide
NPPF	National Planning Policy Framework
NRMM	Non-road Mobile Machinery
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PHV	Private Hire Vehicle
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide
TEB	Transport Emissions Benchmark
TfL	Transport for London
TRAVL	Trip Rate Assessment Valid for London
ULEZ	Ultra-Low Emission Zone
ZEC	Zero Emission Capable

13 Appendices

A1 London-Specific Policies and Measures

London Plan

Development Plans

A1.1 Policy SI1 of the London Plan (GLA, 2021a) states the following regarding strategic development plans:

Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

Electric Vehicle Charging

A1.2 To support the uptake of zero tailpipe emission vehicles, Policy T6.1 of the London Plan states:

"All residential car parking spaces must provide infrastructure for electric or Ultra-Low Emission vehicles. At least 20 per cent of spaces should have active charging facilities, with passive provision for all remaining spaces".

London Environment Strategy

A1.3 The air quality chapter of the London Environment Strategy sets out three main objectives, each of which is supported by sub-policies and proposals. The Objectives and their sub-policies are set out below:

"Objective 4.1: Support and empower London and its communities, particularly the most disadvantaged and those in priority locations, to reduce their exposure to poor air quality.

- *Policy 4.1.1 Make sure that London and its communities, particularly the most disadvantaged and those in priority locations, are empowered to reduce their exposure to poor air quality*
- *Policy 4.1.2 Improve the understanding of air quality health impacts to better target policies and action*

Objective 4.2: Achieve legal compliance with UK and EU limits as soon as possible, including by mobilising action from London Boroughs, government and other partners

- *Policy 4.2.1 Reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport*
- *Policy 4.2.2 Reduce emissions from non-road transport sources, including by phasing out fossil fuels*

- *Policy 4.2.3 Reduce emissions from non-transport sources, including by phasing out fossil fuels*
- *Policy 4.2.4 The Mayor will work with the government, the London boroughs and other partners to accelerate the achievement of legal limits in Greater London and improve air quality*
- *Policy 4.2.5 The Mayor will work with other cities (here and internationally), global city and industry networks to share best practice, lead action and support evidence based steps to improve air quality*

Objective 4.3: Establish and achieve new, tighter air quality targets for a cleaner London by transitioning to a zero emission London by 2050, meeting world health organization health-based guidelines for air quality

- *Policy 4.3.1 The Mayor will establish new targets for $PM_{2.5}$ and other pollutants where needed. The Mayor will seek to meet these targets as soon as possible, working with government and other partners*
- *Policy 4.3.2 The Mayor will encourage the take up of ultra low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines*
- *Policy 4.3.3 Phase out the use of fossil fuels to heat, cool and maintain London's buildings, homes and urban spaces, and reduce the impact of building emissions on air quality*
- *Policy 4.3.4 Work to reduce exposure to indoor air pollutants in the home, schools, workplace and other enclosed spaces"*

A1.4 While the policies targeting transport sources are significant, there are less obvious ones that will also require significant change. In particular, the aim to phase out fossil-fuels from building heating and cooling and from NRMM will demand a dramatic transition.

Low Emission Zone (LEZ)

A1.5 The LEZ was implemented as a key measure to improve air quality in Greater London. It entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects diesel-engined lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived from lorries and vans. Since 1 March 2021, a standard of Euro VI has applied for HGVs, buses and coaches, while a standard of Euro 3 has applied for large vans, minibuses and other specialist diesel vehicles since 2012.

Ultra Low Emission Zone (ULEZ)

A1.6 London's ULEZ was introduced on 8 April 2019. The ULEZ currently operates 24 hours a day, 7 days a week in the same area as the current Congestion Charging zone. All cars, motorcycles, vans and minibuses are required to meet exhaust emission standards (ULEZ standards) or pay an additional daily charge to travel within the zone. The ULEZ standards are Euro 3 for motorcycles, Euro 4 for petrol cars, vans and minibuses and Euro 6 for diesel cars, vans and minibuses. The ULEZ does not include any requirements relating to heavy vehicle (HGV, coach and bus) emissions, as these are addressed by the amendments to the LEZ described in Paragraph A1.5.

A1.7 From 25 October 2021, the ULEZ will cover the entire area within the North and South Circular roads, applying the emissions standards set out in Paragraph A1.6.

Other Measures

A1.8 Since 2018, all taxis presented for licencing for the first time had to be zero emission capable (ZEC). This means they must be able to travel a certain distance in a mode which produces no air pollutants, and all private hire vehicles (PHVs) presented for licensing for the first time had to meet Euro 6 emissions standards. Since January 2020, all newly manufactured PHVs presented for licensing for the first time had to be ZEC (with a minimum zero emission range of 10 miles). The Mayor's aim is that the entire taxi and PHV fleet will be made up of ZEC vehicles by 2033.

A1.9 The Mayor has also proposed to make sure that TfL leads by example by cleaning up its bus fleet, implementing the following measures:

- TfL will procure only hybrid or zero emission double-decker buses from 2018;
- a commitment to providing 3,100 double decker hybrid buses by 2019 and 300 zero emission single-deck buses in central London by 2020;
- introducing 12 Low Emission Bus Zones by 2020;
- investing £50m in Bus Priority Schemes across London to reduce engine idling; and
- retrofitting older buses to reduce emissions (selective catalytic reduction (SCR) technology has already been fitted to 1,800 buses, cutting their NOx emissions by around 88%).

A2 Construction Dust Assessment Procedure

A2.1 The criteria developed by IAQM (2016), upon which the GLA's guidance is based, divide the activities on construction sites into four types to reflect their different potential impacts. These are:

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

A2.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A2.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A2.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A2.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A2.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A2.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A2.1.

Table A2.1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes
Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A2.8 The sensitivity of the area is defined taking account of a number of factors:

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

A2.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table A2.2. These receptor sensitivities are then used in the matrices set out in Table A2.3, Table A2.4 and Table A2.5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A2.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A2.6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A2.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix A7.

STEP 4: Determine Significant Effects

A2.12 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. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

A2.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A2.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A2.3: Sensitivity of the Area to Dust Soiling Effects on People and Property [2]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

[2] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a *large* dust emission magnitude for trackout, 200 m from sites with a *medium* dust emission magnitude and 50 m from sites with a *small* dust emission magnitude, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table A2.4: Sensitivity of the Area to Human Health Effects [2]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A2.5: Sensitivity of the Area to Ecological Effects [2]

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table A2.6: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

A3 EPUK & IAQM Planning for Air Quality Guidance

A3.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

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

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

Recommended Best Practice

A3.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

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

A3.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

A3.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;

- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
    - Spark ignition engine: 250 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A3.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

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

A3.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

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

Screening

Impacts of the Local Area on the Development

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

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

Impacts of the Development on the Local Area

A3.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

A3.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A3.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

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

A3.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A3.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

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

A3.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

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

A3.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

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

A3.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A3.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

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

A3.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A3.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A3.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A4.

A4 Professional Experience

Chris Whall, BSc (Hons) MSc CEnv MIEnvSc MIAQM

Mr Whall is Managing Director of Air Quality Consultants. He has over 20 years' experience in environmental consulting with multi-sector EIA experience and technical expertise in air quality and emissions management, emissions quantification, ambient air quality monitoring and impact assessment. Mr Whall's work has included the provision of air quality advice and the delivery of impact assessments for UK and international developments including airports, road, rail, power stations, energy from waste, mining and other major regeneration schemes. He has contributed to the air quality components of major Environmental Statements for airports including Heathrow, Gatwick and Stansted in the UK and has provided strategic air quality advice to the European Investment Bank in relation to international airport expansion. Mr Whall also provided overall technical direction to the air quality team delivering the Environmental Statements for the Hinkley Point C nuclear power station Development Consent Order (DCO), on behalf of EDF Energy. Recently Mr Whall led the air quality assessment to support the ending of the Cranford Agreement at Heathrow Airport to introduce full runway alternation during easterly operation; he appeared as an Expert Witness on behalf of Heathrow Airport Limited at the Public Inquiry in 2015. For several years Mr Whall has been working with Heathrow Airport Limited in the development of its masterplan for a third runway and he led Heathrow's air quality submissions to the Airports Commission.

Dr Imogen Heard, BSc (Hons) MSc PhD MInstPhys

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

George Chousos, BSc MSc AMIEnvSc AMIAQM

Mr Chousos is an Assistant Consultant with AQC, having joined in May 2019. Prior to joining AQC, he completed an MSc in Air Pollution Management and Control at the University of Birmingham, specialising in air pollution control technologies and management, and data processing using R. He also holds a degree in Environmental Geoscience from the University of Cardiff, where he undertook

a year in industry working in the field of photo-catalytic technology. He is now gaining experience in the field of air quality monitoring and assessment.

A5 London Vehicle Fleet Projections

A5.1 TfL has published an Integrated Impact Assessment (Jacobs, 2017) setting out the impacts of the changes to the LEZ and ULEZ described in Paragraphs A1.5 and A1.7. The assessment predicts that the changes will reduce overall NOx emissions from vehicles in London by 28% in 2021 (32% in Inner London and 27% in Outer London) and by 21% in 2025 (24% in Inner London and 21% in Outer London). The percentage reduction reduces with time due to the natural turnover of the fleet that would have occurred regardless of the introduction of the proposed changes. The proposed changes will not significantly affect emissions in Central London, where the ULEZ will already be implemented, but concentrations here will still reduce due to the lower emissions in surrounding areas.

A5.2 The report projects that the changes will reduce exposure to exceedances of the annual mean nitrogen dioxide objective by 40% and 21% in Central London in 2021 and 2025, respectively; by 4% and 0% in Inner London in 2021 and 2025, respectively; and by 23% and 27% in Outer London in 2021 and 2025, respectively, when compared to the baseline scenario.

A5.3 The changes are not projected to have a significant effect on PM_{10} and $PM_{2.5}$ concentrations, although a small reduction is predicted.

A5.4 AQC's report on the performance of Defra's EFT (AQC, 2020) also highlighted that the EFT's assumptions regarding future fleet composition in London and across the UK may be over-pessimistic in terms of NOx emissions (and no changes to the fleet mix within London were made between versions 9 and 10 of the EFT). The future fleet projection derived from the EFT for Outer London, for example, shows a very small reduction in the proportion of diesel cars between 2016 and 2030, and a very limited uptake of electric cars. The AQC report highlights that this contrasts with the expectations of many observers, as well as the most recent trends publicised by the media. When considered alongside the future requirements of the LEZ and ULEZ, these future fleet projections seem all the more unrealistic (i.e., worst-case in terms of emissions), as the changes to the LEZ and ULEZ would reasonably be expected to significantly increase the uptake of lower emissions vehicles in London.

A5.5 The changes to the LEZ and ULEZ announced by the Mayor of London in June 2018 are not reflected in Defra's latest EFT and thus have not been considered in this assessment. The potentially over-pessimistic fleet projections built in to the EFT have not been addressed in this report either. Paragraphs A5.1 and A5.2 highlight that the changes to the LEZ and ULEZ will result in significant reductions in vehicle nitrogen oxides emissions and resultant nitrogen dioxide concentrations. The changes might reasonably also be expected to expedite the uptake of cleaner vehicles well beyond that projected in the EFT's fleet projections for London. As such, while the results presented in this report represent a reasonably conservative reflection of likely concentrations and impacts in the absence of the changes to the LEZ and ULEZ, they almost certainly represent an unrealistically

worst-case assessment of likely concentrations and impacts bearing in mind the implementation of these changes.

A6 'Air Quality Neutral'

A6.1 The GLA's consultation draft of London Plan Guidance; Air Quality Neutral (GLA, 2021b) provides an approach to assessing whether a development is air quality neutral. The approach is to compare the expected emissions from the building's energy use and vehicle trips against defined benchmarks for buildings and transport in London.

A6.2 The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table A6.1, while the 'Transport Emissions Benchmarks' ('TEBs') are set out in Table A6.2.

A6.3 The average trip length and average emission per vehicle are required if there is a need to calculate offset payments. The values given by GLA are set out in Table A6.3 and Table A6.4 respectively.

Table A6.1: Building Emissions Benchmark NO_x Emission Rates ($gNO_x/m^2/annum$) [a]

Land Use [b]	Individual Gas Boilers	Gas Boiler Network	CHP + Gas Boiler Network	Heat Pumps + Gas Boiler Network
Residential (including student accommodation and large-scale purpose-built shared living development)	3.5	5.7	7.8	5.7
Retail	0.53	0.97	4.31	0.97
Restaurants and bars	1.76	3.23	14.34	3.23
Offices	1.43	2.62	11.68	2.62
Industrial	1.07	1.95	8.73	1.95
Storage and distribution	0.55	1.01	4.5	1.01
Hotel	9.47	15.42	38.16	15.42
Care homes and hospitals	9.15	14.9	36.86	14.9
Schools, nurseries, doctors' surgeries, other non-residential institutions	0.9	1.66	7.39	1.66
Assembly and leisure	2.62	4.84	21.53	4.84

[a] Solid and liquid biomass appliances also emit fine particulate matter in addition to NO_x. The benchmark emission rate for particulate matter is zero.

[b] Separate use classes for commercial uses, including retail and offices, have now been replaced by use class E. If these separate uses are specified in the development proposal, they should be used for this assessment. Where the intended use is not specified, or where use class E has been specified, the benchmark for retail should be used.

Table A6.2: Benchmark Trip Rates

Land Use	Annual trips per	Benchmark Trip Rates		
		Central Activities Zone (CAZ)	Inner London (excluding CAZ)	Outer London
Residential (including student accommodation and large-scale purpose-built shared living development)	dwelling	68	114	447
Office / Light Industrial	m^2 (GIA)	2	1	16
Retail (Superstore)	m^2 (GIA)	39	73	216
Retail (Convenience)	m^2 (GIA)	18	139	274
Restaurant / Café	m^2 (GIA)	64	137	170
Drinking establishments	m^2 (GIA)	0.8	8	N/A
Hot food takeaway	m^2 (GIA)	N/A	32.4	590
Industrial	m^2 (GIA)	N/A	3.9	16.3
Storage and distribution	m^2 (GIA)	N/A	1.4	5.8
Hotels	m^2 (GIA)	1	1.4	6.9
Care homes and hospitals	m^2 (GIA)	N/A	1.1	19.5
Schools, nurseries, doctors' surgeries, other non-residential institutions	m^2 (GIA)	0.1	30.3	44.4
Assembly and leisure	m^2 (GIA)	3.6	10.5	47.2

Table A6.3: Emission factors per vehicle-km

Pollutant	Emission factors (g/veh-km)		
	Central Activities Zone (CAZ)	Inner London [a] (excluding CAZ)	Outer London [a]
NOx	0.48	0.39	0.35
$PM_{2.5}$	0.036	0.032	0.028

[a] Inner London and Outer London as defined in the LAEI (GLA, 2019b).

Table A6.4: Average Distance Travelled by Car per Trip

Land use	Distance (km)		
	Central Activity Zone	Inner	Outer
Residential	4.2	3.4	11.4
Office	3.0	7.2	10.8
Retail	9.2	5.5	5.4

A7 Construction Mitigation

A7.1 Table A7.1 presents a set of best-practice measures from the GLA guidance (GLA, 2014b) that should be incorporated into the specification for the works. These measures should be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Table A7.1: Best-Practice Mitigation Measures Recommended for the Works

Measure	Desirable	Highly Recommended
Site Management		
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site		✓
Develop a Dust Management Plan (DMP)		✓
Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary		✓
Display the head or regional office contact information		✓
Record and respond to all dust and air quality pollutant emissions complaints		✓
Make a complaints log available to the local authority when asked		✓
Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the Local Authority when asked		✓
Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions are being carried out and during prolonged dry or windy conditions		✓
Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and ensure that the action taken to resolve the situation is recorded in the log book		✓
Preparing and Maintaining the Site		
Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible		✓
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site		✓
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period		✓
Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution	✓	
Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods		✓

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		✓
Cover, seed, or fence stockpiles to prevent wind whipping		✓
Carry out regular dust soiling checks of buildings within 100 m of site boundary and provide cleaning if necessary	✓	
Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly		✓
Agree monitoring locations with the Local Authority		✓
Where possible, commence baseline monitoring at least three months before work begins		✓
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all on-road vehicles comply with the requirements of the London LEZ (and ULEZ)		✓
Ensure all Non-road Mobile Machinery (NRMM) comply with London's NRMM emission standards. Currently, NRMM used on any site within Greater London are required to meet Stage IIIB of EU Directive 97/68/EC (The European Parliament and the Council of the European Union, 1997) and its subsequent amendments as a minimum, while NRMM used on any site within the Central Activity Zone, Canary Wharf or one of London's Opportunity Areas are required to meet Stage IV of the Directive as a minimum. The proposed development is not within an area where this stricter requirement applies. From January 2025, NRMM used anywhere in London will be required to meet stage IV, while from January 2030 the stage V standard will apply. From January 2040 only zero emission machinery will be allowed.		✓
Ensure all vehicles switch off engines when stationary – no idling vehicles		✓
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable		✓
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced 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)	✓	
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
Implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing)		✓
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, 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		
Reuse and recycle waste to reduce dust from waste materials		✓
Avoid bonfires and burning of waste materials		✓
Measures Specific to Earthworks		
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable	✓	
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	✓	
Only remove the cover from small areas during work, not all at once	✓	
Measures Specific to Construction		
Avoid scabbling (roughening of concrete surfaces), if possible	✓	
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		✓
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	✓	
For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust	✓	
Measures Specific to Trackout		
Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site	✓	
Avoid dry sweeping of large areas	✓	
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport	✓	
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable)	✓	