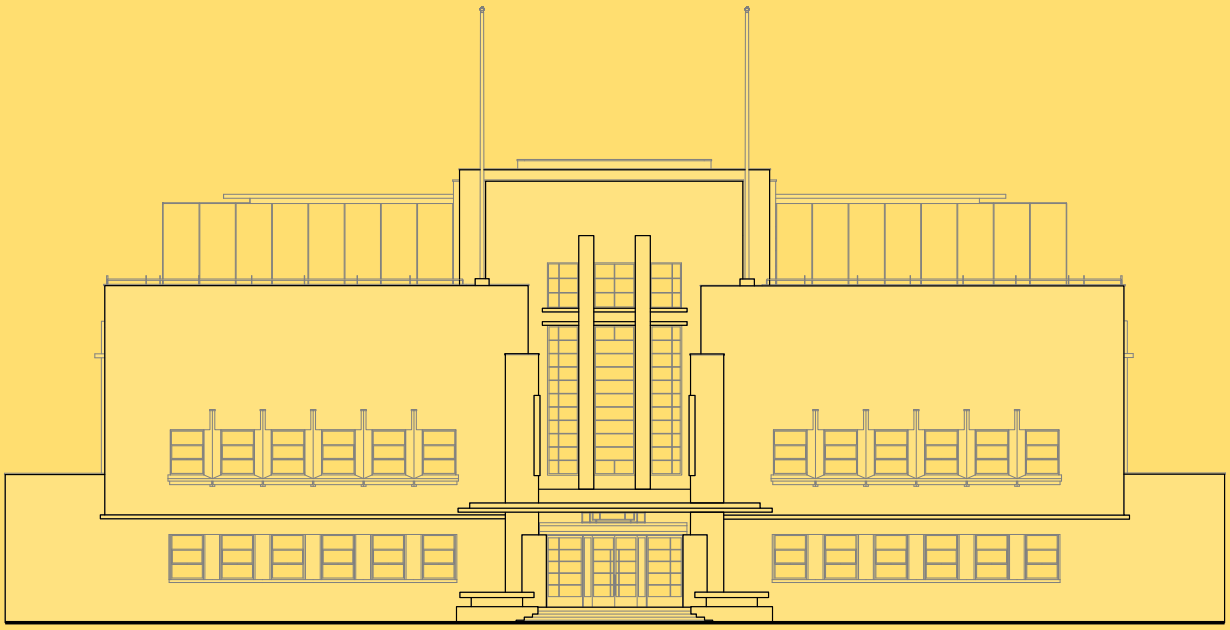

RAVENSCOURT PARK

FORMER ROYAL MASONIC HOSPITAL

LOGIKA GROUP

AIR QUALITY ASSESSMENT

J30/13691A/10/2/F1 November 2023

Logika GROUP

Ravenscourt Park Hospital, Hammersmith

Air Quality Assessment

For TT Group

27 October 2023

Document Control

Client:	TT Group
Principal Contact:	Nick Greenwood
Project Number:	J30/13691A/10
Prepared By:	Denise Evans and Frances Marshall
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Date:	27 October 2023
Reviewed by:	Chris Whall (Director)

Registered Office: 23 Coldharbour Road, Bristol BS6 7JT Tel: 0117 974 1086

24 Greville Street, Farringdon, London, EC1N 8SS Tel: 020 3873 4780

First Floor, Patten House, Moulders Lane, Warrington WA1 2BA Tel: 01925 937 195

Contents

1 Introduction

This report describes the potential air quality impacts associated with the proposed redevelopment of Ravenscourt Park Hospital, in the London Borough of Hammersmith and Fulham. The location of the proposed development is shown in Figure 1-1.

The proposed development is described as *"Part demolition, part extension and alteration of the existing buildings and structures, change of use of the existing buildings and the erection of a new building including provision of a basement, to provide residential units (Use Class C3) and associated ancillary communal floorspace, a Care Home (Use Class C2) and flexible non-residential floorspace (Classes E, F1 and F2), together with associated roof top installations and structures, private and communal amenity space, landscaping, access, refuse storage, parking and associated works".*

The proposed development is located within a borough-wide Air Quality Management Area (AQMA) declared by the London Borough of Hammersmith and Fulham (LBHF) for exceedances of the annual mean nitrogen dioxide (NO_2) and 24-hour mean PM_{10} objectives. The proposed development does not, however, lie within any of the Greater London Authority's (GLA's) air quality Focus Areas[1].

The proposed development will introduce new residential exposure into an AQMA, 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 NO_2 and fine particulate matter (PM_{10} and $PM_{2.5}$).

The proposed development will be provided with heat and hot water by and all-electric system including ground source heat pumps; there will be no centralised combustion plant and thus no point sources of emissions within the proposed development for the routine provision of energy. Diesel generators will be installed to provide power in emergencies. The main air pollutants of concern related to generator emissions are NO_2, PM_{10} and $PM_{2.5}$.

The GLA's London Plan[2] 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)[3].

The GLA has also released Supplementary Planning Guidance on the Control of Dust and Emissions from Construction and Demolition[4]. 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] These are locations with high levels of human exposure where the annual mean limit value for NO_2 is exceeded.

[2] GLA (2021) The London Plan: The Spatial Development Strategy for London.

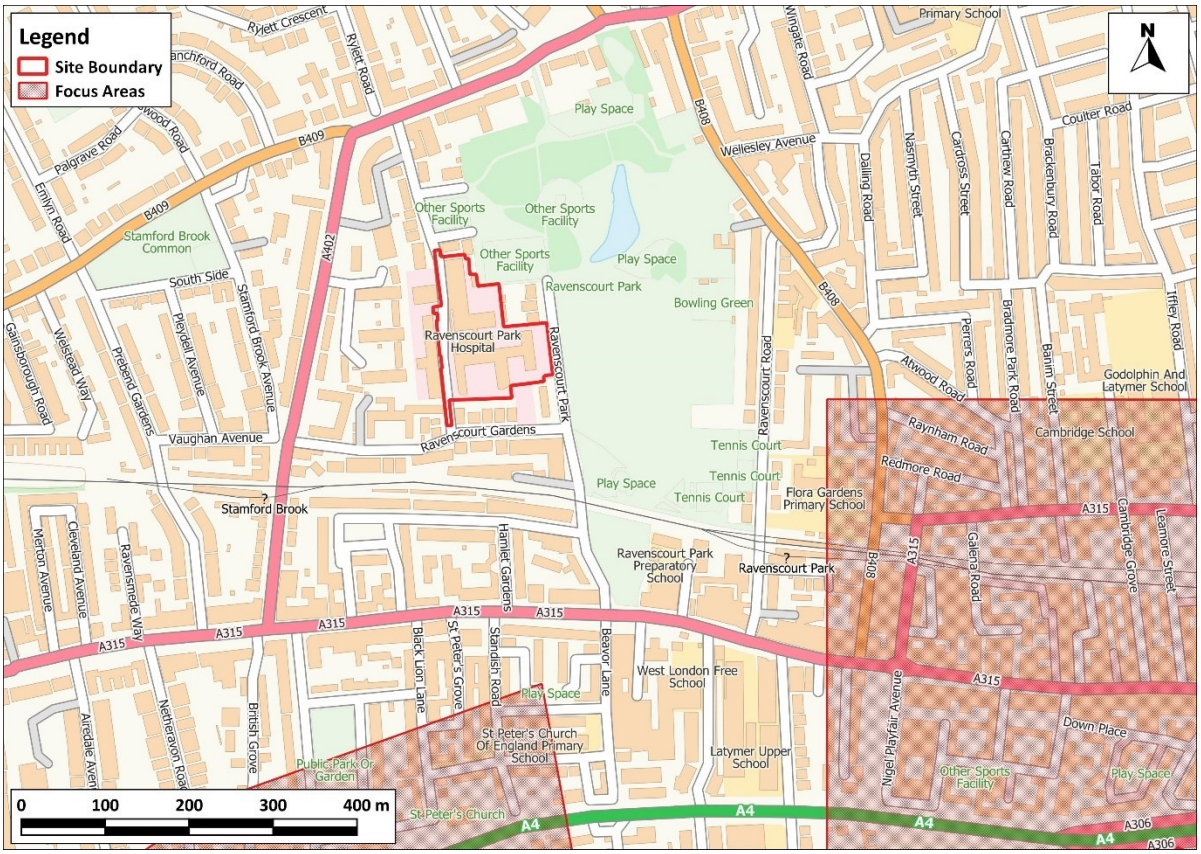
[3] GLA (2023) London Plan Guidance - Air Quality Neutral.

[4] GLA (2014) The Control of Dust and Emissions from Construction and Demolition SPG.

This report describes existing local air quality conditions and considers impacts in the year of first occupation (2027). The assessment of construction dust impacts focuses on the anticipated duration of the works.

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

Figure 1-1 Location of Proposed Development



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2 Policy Context

All European legislation referred to in this report is written into UK law and remains in place.

2.1 Air Quality Strategy 2007

The Air Quality Strategy[5] 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 AQMA, and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

2.2 Air Quality Strategy 2023

The Air Quality Strategy: Framework for Local Authority Delivery 2023[6] sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the government expects them to take. It does not replace other air quality guidance documents relevant to local authorities.

2.3 The Environmental Permitting (England and Wales) (Amendment) Regulations 2018

The Medium Combustion Plant Directive (MCPD)[7] regulates pollutant emissions from combustion plant with a rated input between 1 and 50 megawatts (MWth) and was transposed into UK law in January 2018 through an amendment to the Environmental Permitting Regulations[8]. The legislation sets emission limits to be applied from December 2018 for new plant and from 2025 or 2030 for existing plant (depending on the rated input). In addition to addressing emissions from plant with a rated input of 1 to 50 MWth, as required by the MCPD, the amendment also introduces emission limits on generator plant, regardless of their rated input. Generators whose sole purpose is

[5] Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

[6] Defra (2023) Air Quality Strategy: Framework for Local Authority Delivery.

[7] The European Parliament and the Council of the European Union (2015) Directive 2015/2193/EU of the European Parliament and of the Council.

[8] (2018) The Environmental Permitting (England and Wales) (Amendment) Regulations 2018 Statutory Instrument 110

maintaining power supply at a site during an on-site emergency, that are operated for the purpose of testing/maintenance for no more than 50 hours per year, will be exempt from the emission limits.

2.4 Clean Air Act 1993 & Environmental Protection Act

Small combustion plant of less than 20 MW net rated thermal input are controlled under the Clean Air Act 1993. This requires the local authority to approve the chimney height. Plant which are smaller than 366 kW have no such requirement. The local authority's approval will, therefore, be required for the plant to be installed in the proposed development.

Measures to ensure adequate dispersion of emissions from discharging stacks and vents are included in Technical Guidance Note D1 (Dispersion)[9], issued in support of the Environmental Protection Act.

2.5 Clean Air Strategy 2019

The Clean Air Strategy[10] 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.

2.6 Reducing Emissions from Road Transport: Road to Zero Strategy

The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper[11] 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.

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 recently announced that 80% of new cars and 70% of new vans sold in Great Britain must be zero emission by 2030, increasing to 100% by 2035. If these ambitions are realised, then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades.

[9] (1993) Technical Guidance Note D1 (Dispersion).

[10] Defra (2019) Clean Air Strategy 2019.

[11] DfT (2018) The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy.

2.7 Environment Act 2021

The UK's new legal framework for protection of the natural environment, the Environment Act[12] 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.

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (Statutory Instruments 2023 No. 96)[13] sets two new targets for future concentrations of $PM_{2.5}$. These targets are described in Section 3.

2.8 Environmental Improvement Plan 2023

Defra published its 25 Year Environment Plan in 2018[14]. The Environment Act[6] requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023[15] is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.

The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of $PM_{2.5}$. These targets, which are described in more detail in Section 3, include the long-term targets in the Statutory Instrument, and interim targets to be achieved by 2028.

The 2023 Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It also outlines the respective roles of industry, agricultural sectors, and the Department for Transport (DfT) in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

2.9 Planning Policy

2.9.1 National Policies

The National Planning Policy Framework (NPPF)[16] 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:

[12] (2021) Environment Act, Available: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted.

[13] (2023) Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (Statutory Instruments 2023 No. 96).

[14] Defra (2018) A Green Future: Our 25 Year Plan to Improve the Environment, Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf.

[15] Defra (2023) Environmental Improvement Plan 2023, Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133967/environmental-improvement-plan-2023.pdf.

[16] Ministry of Housing, Communities & Local Government (2023) National Planning Policy Framework, Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1182995/NPPF_Sept_23.pdf.

"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".

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".

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".

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".

The NPPF is supported by Planning Practice Guidance (PPG)[17], 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".

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".

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*

[17] Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance.

objectives and can have implications for planning". In addition, the PPG makes clear that *"Odour and dust can also be a planning concern, for example, because of the effect on local amenity"*.

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".

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".

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".

2.9.2 London-Specific Policies

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

The London Plan

The London Plan[18] 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 SI 1 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".

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

[18] GLA (2021) The London Plan: The Spatial Development Strategy for London.

"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".

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."

The proposed development is not a large-scale development subject to an Environmental Impact Assessment, thus an Air Quality Positive statement is not required.

Regarding construction and demolition impacts, Part D of Policy SI 1 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".

Part E of Policy SI 1 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".

The explanatory text around Policy SI 1 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"[19].

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

London Environment Strategy

The London Environment Strategy was published in May 2018[20]. 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 a target to achieve, by 2030, the guideline value for $PM_{2.5}$ which was set by the World Health Organisation (WHO) in 2005. 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

The Mayor's Transport Strategy[21] 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: The Control of Dust and Emissions During Construction and Demolition

The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition[22] 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

[19] The London Plan was developed based on a WHO guideline for $PM_{2.5}$ of 10 µg/m^3.

[20] GLA (2018) London Environment Strategy.

[21] GLA (2018) Mayor's Transport Strategy.

[22] GLA (2014) The Control of Dust and Emissions from Construction and Demolition SPG.

largely based on the Institute of Air Quality Management's (IAQM's) guidance[23], and it states that "*the latest version of the IAQM Guidance should be used*".

GLA LPG: Air Quality Neutral

The GLA's Air Quality Neutral LPG outlines the assessment approach for determining whether a development is Air Quality Neutral[3]. The guidance sets out benchmarks for the maximum allowable emissions of NOx and particulate matter based on the size and use class of the proposed development. To determine whether the development is Air Quality Neutral, the building and transport emissions from the proposed development are compared to these benchmarks.

Air Quality Focus Areas

The GLA has identified 160 air quality Focus Areas in London. These are locations that not only exceed the annual mean limit value for NO_2 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 over 350 m from both the Hammersmith Town Centre and Chiswick (A4) Cedars Road / Hogarth Lane air quality Focus Areas.

2.9.3 Local Policies

London Borough of Hammersmith and Fulham

The Local Plan for the LBHF was adopted in 2018[24], replacing the 2011 Core Strategy and the 2013 Development Management Local Plan documents as the basis for planning decisions and future development in the borough. 'Policy CC10' specifically focuses on air quality, and states that:

"The council will seek to reduce the potential adverse air quality impacts of new developments by:

a. *requiring all developments which may be impacted by local sources of poor air quality or may adversely contribute to local air quality to provide an air quality assessment that considers the potential impacts of pollution from the development on the site and on neighbouring areas and also considers the potential for exposure to pollution levels above the Government's air quality objective concentration targets. The assessment should include separate consideration of the impacts of (i) the construction/demolition phase of development and (ii) the operational phase of development with appropriate mitigation measures highlighted for each phase;*

b. *requiring mitigation measures to be implemented to reduce emissions, particularly of nitrogen oxides and small particles, where assessments show that developments could cause a significant worsening of local air quality or contribute to the exceedances of the Government's air quality objectives;*

[23] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1. The IAQM issued revised guidance in August 2023, however the guidance includes a number of errors and inconsistencies. Based on discussions with the IAQM, a corrected version of the guidance is anticipated shortly. To avoid being subject to these errors, this assessment has been based on the 2016 version.

[24] LBHF (2018) Hammersmith and Fulham Local Plan

c. *requiring mitigation measures that reduce exposure to acceptable levels where developments are proposed that could result in the occupants being particularly affected by poor air quality;*

d. *requiring developments to be 'air quality neutral' and resist development proposals which would materially increase exceedances of local air pollutants and have an unacceptable impact on amenity or health unless the development mitigates this impact through physical measures and/or financial contributions to implement proposals in the Council's Local Air Quality Management Plan; and.*

e. *requiring all decentralised energy schemes to demonstrate that they can be used without having an unacceptable impact on air quality. Where this is not possible, CHP systems will not be prioritised over other air quality neutral technologies."*

'Policy CC2 – Ensuring Sustainable Design and Construction' requires:

"...the implementation of sustainable design and construction measures in all major developments…" and;

"The integration of sustainable design and construction measures will be encouraged in all other (i.e. non-major) developments, where feasible."

'Policy CC13 – Control of Potentially Polluting Sources' states that:

"All proposed developments (including new buildings, demolition of existing buildings, conversions and changes of use) will be required to show that there will be no undue detriment to the general amenities enjoyed by existing surrounding occupiers of their properties, particularly where commercial and service activities will be close to residential properties. In the case of mixed use developments, similar protection will also be afforded to the prospective residents and other users where there is potential for activities within the new development to impact on their immediate neighbours on the same site.

The council will, where appropriate, require mitigation measures if a nuisance, for example, from smoke, fumes, gases, dust, steam, light, vibration, smell, noise, spillage of gravel and building aggregates or other polluting emissions, would otherwise be likely to occur, to ensure that it will not."

Supplementary Planning Document

In addition, LBHF has produced a Supplementary Planning Document (SPD) [25] which provides information and guidance to supplement policies within the LBHF Local Plan 2018. It focuses on four key principles related to air quality, which effectively reiterate Policy CC10 of the Local Plan, as follows:

"*AQ1 Assessment of Air Quality Impacts of new Development*

Requiring all developments which may be impacted by local sources of poor air quality or may adversely contribute to local air quality to provide air quality assessments that considers the potential impacts of pollution from the development on the site and on neighbouring areas and also considers the potential for exposure to pollution levels above Government's air quality objective concentrations targets.

[25] LBHF (2018) Planning Guidance - Supplementary Planning Document.

The assessment should include separate consideration of the impacts of (i) the construction/demolition phase of the development (ii) the operational phase of the development with appropriate mitigation measures highlighted for each phase."

"*AQ2 Mitigation of Emissions from New Developments*

Requiring mitigation measures to be implemented to reduce emissions, particularly of Nitrogen Dioxides and small particles, where assessments show that developments could cause a significant worsening of local air quality or contribute to the exceedances of the Government's air quality objectives."

"*AQ3 Mitigation of exposure caused by new development*

Requiring mitigation measures that reduce exposure to acceptable levels where developments are proposed that could result in the occupants being particularly affected by poor air quality."

"*AQ4 Air quality neutral requirements*

Requiring developments to be 'air quality neutral' and resist development proposals which would materially increase exceedances of local air pollutants and have an unacceptable impact on amenity or health unless the development mitigates this impact through physical measures and/or financial contributions to implement proposals in the Council's Local Air Quality Management Plan."

2.10 Air Quality Action Plans

2.10.1 National Air Quality Plan

Defra has produced an Air Quality Plan[26] to tackle roadside NO_2 concentrations in the UK; a supplement to the 2017 Plan[27] 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 Clean Air Zone (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.

2.10.2 Local Air Quality Action Plan

The LBHF declared a borough-wide AQMA in November 2000 for exceedances of the annual mean nitrogen dioxide and 24-hour mean PM_{10} objectives. The council have since developed a Draft Air

[26] Defra (2017) Air quality plan for nitrogen dioxide (NO_2) in the UK.

[27] Defra (2018) Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations.

Quality Action Plan[28] that outlines actions to improve air quality in the Borough between 2018-2023. The plan sets out the following measures to improve air quality:

- *launching of electric vehicle hiring scheme – with a year's free membership for local people,*
- *encouraging people to use electric vehicles by extending our network of charging bays,*
- *fining drivers who leave their engines running unnecessarily,*
- *becoming the leading cycle-friendly borough in London with cycle quietways, cycle storage and cycle superhighways,*
- *encouraging more walking by tackling congestion, traffic speeds and by providing more greenery,*
- *reducing fossil-fuel boilers by replacing them with ultra-low nitrogen oxide boilers and ensuring energy plants are regulated through the planning process."*

[28] LBHF (2017) Hammersmith and Fulham Air Quality Action Plan

3 Assessment Criteria

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[29] and the Air Quality (England) (Amendment) Regulations[30]. The UK-wide objectives for NO_2 and PM_{10} were to have been achieved by 2005 and 2004 respectively and continue to apply in all future years thereafter.

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[31]. The annual mean objectives for NO_2 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 NO_2 applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

For $PM_{2.5}$, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the UK limit value, originally set at 25 µg/m^3 and currently set at 20 µg/m^3.

Defra has also recently set two new targets, and two new interim targets, for $PM_{2.5}$ concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean $PM_{2.5}$ concentration of 10 µg/m^3 by the end of 2040, with the interim target being a value of 12 µg/m^3 by the start of 2028[32]. The second set of targets relate to reducing overall population exposure to $PM_{2.5}$. By the end of 2040, overall population exposure to $PM_{2.5}$ should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028.

[29] HMSO (2000) The Air Quality (England) Regulations 2000 Statutory Instrument 928.

[30] HMSO (2002) The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043.

[31] GLA (2019) London Local Air Quality Management Technical Guidance 2019, Available: https://www.london.gov.uk/sites/default/files/llaqm_technical_guidance_2019.pdf.

[32] Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m^3 would not exceed the 10 µg/m^3 target.

Defra will assess compliance with the population exposure targets by averaging concentrations measured at its own background monitoring stations. This will not consider small changes over time to precisely where people are exposed (such as would relate to exposure introduced by a new development). Furthermore, all four new targets provide metrics against which central Government can assess its own progress. While local authorities have an important role delivering the required improvements, the actions required of local authorities, which will be clarified within a future Air Quality Strategy, relate to controlling emissions and not to directly assessing $PM_{2.5}$ concentrations against the targets.

In March 2023, the Department for Levelling Up, Housing and Communities[33] explained that the new $PM_{2.5}$ targets will:

"*need to be integrated into the planning system, and in setting out planning guidance for local authorities and businesses, we will consider the specific characteristics of $PM_{2.5}$. The guidance will be forthcoming in due course, until then we expect local authorities to continue to assess local air quality impacts in accordance with existing guidance*."

For the time being, therefore, no assessment is required, and indeed no robust assessment is possible, in relation to the new $PM_{2.5}$ targets and they are not considered further.

The GLA has set a target to achieve an annual mean $PM_{2.5}$ 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[34] considers the 2005 guideline of 10 µg/m^3. 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.

EU Directive 2008/50/EC[35] sets limit values for NO_2, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations[36,37]. The limit values for NO_2 and PM_{10} are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one and concentrations are reported to the nearest whole number. 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).

The relevant air quality criteria for this assessment are provided in Table 3-1.

[33] DLUHC (2023) Planning Newsletter. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1140170/03_Chief_Planners_Newsletter_March_2023.pdf

[34] GLA (2018) London Environment Strategy.

[35] The European Parliament and the Council of the European Union (2008) Directive 2008/50/EC of the European Parliament and of the Council.

[36] HMSO (2010) The Air Quality Standards Regulations 2010 Statutory Instrument 1001

[37] As amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

Table 3-1 Air Quality Criteria for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
NO_2	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
$PM_{2.5}$	Annual Mean	20 µg/m^3 [a]
	Annual Mean	10 µg/m^3 by 2030

[a] There is no numerical $PM_{2.5}$ objective for local authorities. Convention is to assess against the UK limit value which is currently 20 µg/m^3.

3.1 Construction Dust Criteria

There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM[38] has been used (the GLA's SPG[39] recommends that the assessment be based on the latest version of the IAQM guidance[40]). Full details of this approach are provided in Appendix A2.

3.2 Screening Criteria

3.2.1 Road Traffic

Environmental Protection UK (EPUK) and the IAQM recommend a two-stage screening approach[41] 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.

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 (HDVs) or 100 light duty vehicles (LDVs) per day; outside of an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the

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

[39] GLA (2014) The Control of Dust and Emissions from Construction and Demolition SPG

[40] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1.

[41] Moorcroft and Barrowcliffe et al (2017) Land-Use Planning & Development Control: Planning For Air Quality v1.2

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*".

3.2.2 Point Sources

EPUK and the IAQM[41] have developed an approach to determine whether emissions from point sources, such as energy plant, have the potential for significant air quality impacts. The first step of the approach, as described in Appendix A3, is to screen the emissions and the emissions parameters to determine whether an assessment is necessary:

"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.

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".

This screening approach requires professional judgement, and the experience of the consultants preparing the assessment is set out in Appendix A4.

If it is determined that an assessment of the point source emissions is required, then there is a further stage of screening that can be applied to the model outputs. The approach is that any change in concentration smaller than 0.5% of the long-term environmental standard will be negligible, regardless of the existing air quality conditions. Any change smaller than 1.5% of the long-term environmental standard will be negligible so long as the total concentration is less than 94% of the standard and any change smaller than 5.5% of the long-term environmental standard will be negligible so long as the total concentration is less than 75% of the standard. The guidance also explains that:

"Where peak short term concentrations (those averaged over periods of an hour or less) from an elevated source are in the range 11-20% of the relevant Air Quality Assessment Level (AQAL), then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. In most cases, the assessment of impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short-term impacts. The severity of the impact will be substantial when there is a risk that the relevant AQAL for short-term concentrations is approached through the presence of the new source, taking into account the contribution of other local sources".

As a first step, the assessment of the emissions from the generator plant within the proposed development has considered the predicted process contributions using the following criteria:

- is the long-term (annual mean) process contribution less than 0.5% of the long-term environmental standard?; and
- is the short-term (24-hour mean or shorter) process contribution less than 10% of the short-term environmental standard?

Where both of these criteria are met, then the impacts are negligible and thus 'not significant'. Where these criteria are breached then a more detailed assessment, considering total concentrations (incorporating local baseline conditions), has been provided.

In order to determine site suitability, the total concentrations (local baseline plus generator contributions) are compared with the relevant air quality objectives. Where the objectives are shown to be met, the impact on future residents is judged 'not significant'.

4 Assessment Approach

4.1 Existing Conditions

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[42] local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority;
- information on existing air quality has also been obtained through examination of the London Atmospheric Emissions Inventory (LAEI) database produced by the GLA[43]. These predicted concentrations cover the whole of the GLA area at 20 m grid resolution for 2019, 2025 and 2030; and
- whether or not there are any exceedances of the annual mean limit value for NO_2 in the study area has been identified using the maps of roadside concentrations published by Defra[44,45]. 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[45], which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

4.2 Construction Impacts

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[4], which is based on that provided by IAQM[23]. 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 explain the approach in more detail.

[42] Defra (2023) UK Pollutant Release and Transfer Register

[43] GLA (2023) London Atmospheric Emissions Inventory (LAEI) 2019, updated 2023

[44] Defra (2020) 2020 NO_2 projections data (2018 reference year).

[45] Defra (2023) UK Ambient Air Quality Interactive Map.

4.3 Road Traffic Impacts

The road traffic generation of the proposed development has been screened against the criteria set out in the EPUK/IAQM guidance[41], as described in Section 3.2 and detailed further in Appendix A3. Where impacts can be screened out there is no need to progress to a more detailed assessment.

4.4 Impacts of the Proposed Generator Plant

The proposed development will be provided with heat and hot water via an all electric system which has no on-site emissions, however diesel generators will be installed to provide back up power in emergencies. The assumed specifications for these plant, upon which the assessment is based, are set out in Appendix A5.

4.4.1 Screening

The first step in considering the energy plant impacts has been to screen the pollutant emissions against the criteria set out in the EPUK/IAQM guidance[41]. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of the plant emissions, which has been required for this project.

4.4.2 Emissions Data

The emissions data input into the model for the energy plant have been provided by Cudd Bentley Consulting, who are the mechanical and engineering consultants for the proposed development. Further details of the emissions data used in this assessment are provided in Appendix A5.

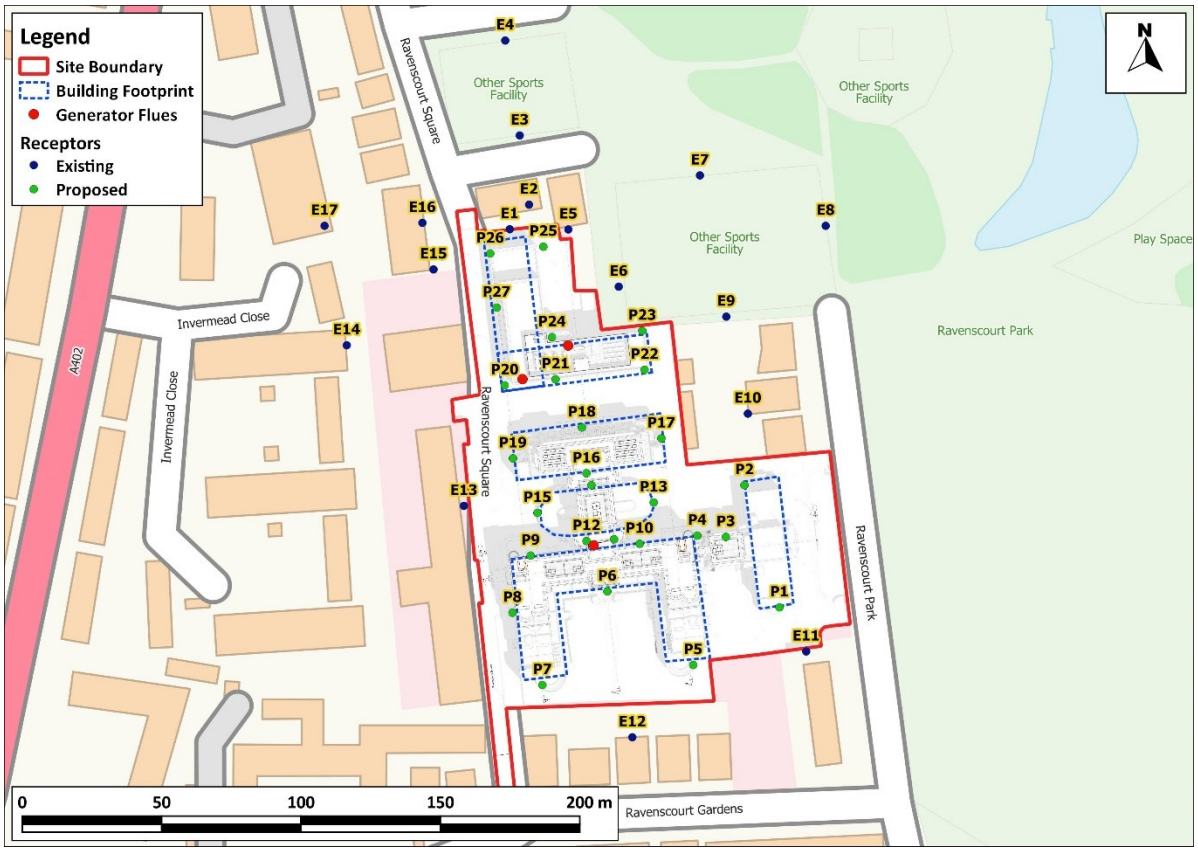
4.4.3 Modelling Methodology

The impacts of emissions from the proposed generator plant have been modelled using the ADMS-6 dispersion model. ADMS-6 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model input parameters are set out in Appendix A5. The air quality modelling has been carried out based on a number of necessary assumptions, described briefly below and in further detail in Appendix A5. Where possible a realistic worst-case approach has been adopted.

4.4.4 Receptors

The contribution of emissions generated during the routine testing of the emergency generator plant to concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations have been predicted at a number of locations both within, and close to, the proposed development. Receptors have been identified to represent worst-case locations (these being at the façades of the residential properties closest to the sources). Concentrations have been predicted at a range of heights (described in Appendix A5). The receptor locations are shown in Figure 4-1.

Figure 4-1 Receptor Locations



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4.4.5 Assessment Scenarios

The contribution of emissions generated during the routine testing of the emergency generator plant to concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations have been predicted for the year 2027 for the following scenarios:

- without buildings;
- with all nearby buildings; and
- with the urban canopy module.

This sensitivity testing is considered necessary because ADMS-6 takes a relatively simplistic approach to modelling building downwash effects, thus additional uncertainty is introduced when using the buildings module, but it would not be appropriate to ignore the potential effects of the entrainment of the plume in building downwash.

Each of the above scenarios has been run using three years of meteorological data (Heathrow Airport 2020 – 2022). The maximum predicted concentration from any of these nine scenarios has been used throughout this assessment.

4.4.6 Uncertainty

The point source dispersion model used in the assessment is dependent upon emission rates, flow rates, exhaust temperatures and other parameters for each source, all of which in reality are variable as the plant will operate at different loads at different times. The actual plant to be installed within the development will also not be confirmed until the detailed design stage, and thus could be different to that assumed for this assessment. The assessment has, however, addressed this by applying worst-case assumptions where necessary, and provided that the actual plant installed adheres to the restrictions set out in Appendix A5, the conclusions of this assessment will remain valid.

There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms. These uncertainties cannot be easily quantified and it is not possible to verify the point-source model outputs. Sensitivity tests have been undertaken to address specific uncertainties and to ensure a worst-case assessment.

4.4.7 Assumptions

The following assumptions have been made in carrying out the generator plant emissions modelling, with the assumptions generally seeking to reflect a realistic worst-case scenario:

- that the plant will be installed and fully operational in the year 2027;
- that the emergency diesel generators will be tested for 15 minutes every month at full load, which will over-state the emissions from the plant;
- that all PM_{10} emissions from the diesel generators are also within the $PM_{2.5}$ fraction, which will over-predict the contribution to $PM_{2.5}$ concentrations; and
- that the diesel generators described in Appendix A5 are to be installed, when in reality the final specifications of the generators is not known at this stage. This uncertainty has been addressed by providing a set of restrictions in Appendix A5 that should be adhered in order to ensure that the final design of the generators does not lead to impacts greater than those predicted.

4.5 Site Suitability

The impacts of nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations on new residents of the proposed development have been assessed taking account of local air quality monitoring data and the GLA's LAEI predicted concentrations, as well as the predicted contributions from the diesel generators.

4.6 Assessment of Significance

4.6.1 Construction Dust Significance

Guidance from the IAQM[23] (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[4] 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'.

4.6.2 Operational Significance

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 the IAQM[41] 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.

5 Baseline Conditions

5.1 Relevant Features

The proposed development site is located within a borough-wide Air Quality Management Area (AQMA) declared by LBHF for exceedances of the annual mean NO_2 and 24-hour mean PM_{10} objectives. The proposed development does not, however, lie within any of the GLA's air quality Focus Areas, as shown in Figure 1-1.

A search of the UK Pollutant Release and Transfer Register[42] website has not identified any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality.

5.2 Local Air Quality Monitoring

The LBHF operates two automatic monitoring stations within its area, however both are located over 1.1 km from the proposed development adjacent to major roads within air quality Focus Areas, and are not considered representative of conditions at the proposed development. The Council also operates a number of NO_2 monitoring sites using diffusion tubes prepared and analysed by SOCOTEC (using the 50% TEA in acetone method). There are five diffusion tubes within approximately 600 m of the proposed development. Annual mean results for the years 2016 to 2022 are summarised in Table 5-1. Exceedances of the objective are shown in bold. Although results for 2020 and 2021 are presented for completeness, they should be treated with caution; reduced activity brought about by the Covid-19 pandemic has generally reduced measured pollutant concentrations. The monitoring locations are shown in Figure 5-1. The monitoring data have been taken from the LBHF's 2022 Annual Status Report[46].

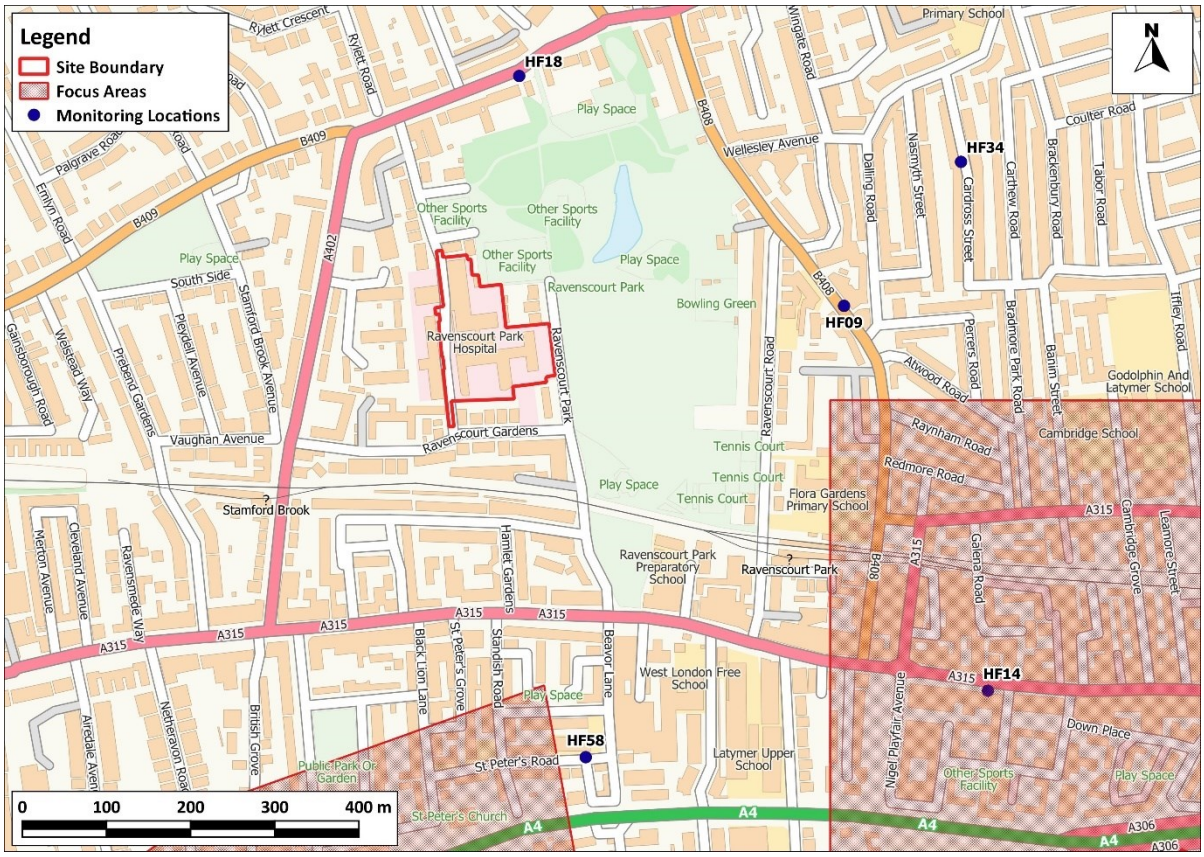
Table 5-1 Summary of Annual Mean NO_2 Monitoring (2016-2021) (µg/m^3) [a]

Site ID	Site Type	Location	2016	2017	2018	2019	2020	2021	2022
HF09	Roadside	Paddenswick Road	-	**44.4**	**42.2**	35.5	25.5	30.4	27.4
HF14	Roadside	King Street	-	**60.1**	**51.9**	**53.8**	38.8	**44.7**	30.0
HF18	Roadside	Goldhawk Road	-	**60.8**	**49.3**	38.6	24.2	27.7	25.1
HF34	Urban Background	Cardross Street	34.4	37.0	27.4	28.2	17.9	20.7	18.6
HF58	Roadside	St Peters Road	-	-	-	-	-	21.1	19.2
		Objective				**40**			

[46] LBHF (2023) Hammersmith and Fulham Council Air Quality Status Report for 2022

[a] Exceedances of the objective are shown in bold. NO_2 annual means in excess of 60 µg/m^3, indicating a potential exceedance of the NO_2 hourly mean objective, are shown in bold and underlined.

Figure 5-1 Monitoring Locations



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Annual mean NO_2 concentrations have exceeded the objective at monitoring sites adjacent to busy roads including the A402, A315 and B408 in recent years; however, by 2019, annual mean concentrations met the objective at all nearby monitoring sites apart from HF14, which is located adjacent to the busy A315 within the Hammersmith Town Centre Focus Area. In 2022, concentrations were well below the annual mean objective at all locations, including HF14. All measured annual mean concentrations have been below 60 µg/m^3 since 2018, indicating that the 1-hour mean objective is unlikely to have been exceeded at any location in recent years[47].

The two automatic monitors measure PM_{10} and $PM_{2.5}$; although not representative of the proposed development site, being located adjacent to heavily trafficked roads, available data are presented in Table 5-2.

[47] 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.

Table 5-2 Summary of PM_{10} and $PM_{2.5}$ Monitoring (2016-2022) (µg/m³)

ID	Site Type	Location	2016	2017	2018	2019	2020	2021	2022
Annual Mean PM_{10} (µg/m³)									
HF4	Roadside	Shepherd's Bush	27.4	38.0	26.4	25.0	28.0	34.0	38.8
HF5	Roadside	Hammersmith Town Centre	-	-	-	22.0	19.0	19.0	22.5
Objective						**40**			
Number of Days PM_{10} > 50 µg/m³									
HF4	Roadside	Shepherd's Bush	17	14	4	11	13	**55**	**74**
HF5	Roadside	Hammersmith Town Centre	-	-	-	5	5	1	8 (36.7)
Objective						**35 (50) [a]**			
Annual Mean $PM_{2.5}$ (µg/m³)									
HF4	Roadside	Shepherd's Bush	-	-	-	-	-	-	13.5
HF5	Roadside	Hammersmith Town Centre	-	-	-	15	14	11	10
Objective						**20 / 10 [b]**			

[a] Values in brackets are 90.4th percentiles, which are presented where data capture is <85%.

[b] The 20 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.

Measured PM_{10} concentrations have been below the relevant objectives in recent years, apart from in 2021 and 2022 at HF4, when LBHF note[48] in their 2021 ASR that "*There were several active construction sites in close vicinity to the monitoring station at HF4 at Shepherds Bush, which may have affected the results for 2020 and 2021*"[46]. It is assumed that these construction activities continued in 2022 and were the cause of the continued elevated concentration measurements.

Measured $PM_{2.5}$ concentrations at monitoring site HF5, which is located approximately 1 m from the kerb of the A219 adjacent to Hammersmith Bus Station, have been well below the objective in all recent years, and in 2022 also met the GLA target. $PM_{2.5}$ monitoring commenced at HF4 in 2022; the concentration was well below the objective but exceeded the GLA target. It is assumed that the $PM_{2.5}$ measurements at HF4 were also affected by nearby construction activities.

[48] LBHF (2022) Hammersmith and Fulham Council Air Quality Status Report for 2021.

5.3 GLA LAEI Concentration Data

In addition to the locally measured concentrations discussed above, the maximum predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ within the proposed development site boundary in 2019, 2025 and 2030 have been determined from the LAEI database produced by the GLA[43].

The predicted concentrations (Table 5-3) indicate that annual mean concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ are below the respective objectives at the proposed development. While the predicted $PM_{2.5}$ annual mean concentration marginally exceeds the GLA target of 10 µg/m^3 in 2019, this is widespread across both Lewisham and much of Greater London (GLA, 2018a), and by 2025 (two years before the earliest year the proposed development could be occupied) and the target year of 2030, the predicted concentration is below 10 µg/m^3.

Table 5-3 Maximum LAEI Modelled Annual Mean Concentrations (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2019	30.4	19.0	11.3
2025	21.4	16.2	9.9
2030	16.7	14.9	9.1
Objective	**40**	**40**	**20/10[a]**

[a] The 20 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.

5.4 Exceedances of EU Limit Value

There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedances of the annual mean NO_2 limit value[49]. Furthermore, Defra's roadside annual mean NO_2 concentrations[50], 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 sections of the A4 within 1 km of the proposed development. The Greater London Urban Area has thus been reported as exceeding the limit value for annual mean NO_2 concentrations. Defra's predicted concentrations for the A4 in 2027 (the anticipated earliest year of occupation) do not exceed the limit value within 1 km of the proposed development.

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 a Low Emission Zone (LEZ) and an Ultra-Low Emission Zone (ULEZ), thus the authority

[49] Defra (2023) Defra AURN Archive.

[50] Defra (2023) UK Ambient Air Quality Interactive Map, Available: https://uk-air.defra.gov.uk/data/gis-mapping.

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.

6 Construction Phase Impact Assessment

6.1 Construction Traffic

During the peak construction year, the proposed development will generate 15 heavy vehicles as an AADT on any road link, which is below the relevant screening threshold of 25 AADT for heavy vehicles recommended by EPUK/IAQM guidance[41]. For light duty vehicles, the peak AADT on any road link is 8, which is well below the 100 AADT screening threshold. It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase and it can be concluded that the proposed development will not have a significant impact on local roadside air quality as a result of construction traffic emissions.

6.2 On-Site Exhaust Emissions

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".

There are sensitive receptors within proximity of the site boundary. In line with the GLA's Control of Dust and Emissions During Construction and Demolition SPG, and as describe in Appendix A5, NRMM are expected to comply with emissions standards. Additionally, there will be no idling when vehicles are not in use, and machinery will be located away from sensitive receptors as far as possible. It is judged that there no risk of significant effects at existing receptors as a result of on-site machinery emissions.

6.3 Construction Dust and Particulate Matter Emissions

The construction works will give rise to a risk of dust impacts during construction of the over-bridge, 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.

6.3.1 Potential Dust Emission Magnitude

Demolition

There will be a requirement to demolish the existing brick buildings at the north of the site (Block E) with an approximate total volume of 15,000 m^3. The remaining building envelopes will be retained with predominantly internal works being required. Based on the example definitions set out in in Table A2-1 in Appendix A2, the dust emission class for demolition is considered to be *medium*.

Earthworks

The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website[51], as set out in Table 6-1. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 6-1 Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Arenaceous [a] – Rudaceous [b]
European Soil Bureau Description	River Terrace Sand / Gravel
Soil Group	Light (Sandy) to Medium (Sandy)
Soil Texture	Sand to Sandy Loam [c]

[a] grain size 0.06 – 2.0 mm.

[b] grain size > 2.0 mm.

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

The site covers approximately 15,800 m^2; earthworks will be required within the northern area of the site, including removal of the foundations of the demolished building. There will also be a requirement for the installation of collector pipes for the ground source heat pump. Large areas of the site will not, however, be disturbed, being occupied by retained buildings. 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

Two new blocks will be constructed to the north of the site, and additional stories will be added to two existing blocks. This will provide a total additional building volume of around 40,000 m^3. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. 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

During peak construction works, a maximum of 12 heavy vehicles will access the site, which may track out dust and dirt from the site. Based on the example definitions set out in Table A2-1 in Appendix A2, the dust emission class for trackout is considered to be *medium.*

[51] British Geological Survey (2023) UK Soil Observatory Map Viewer

Table 6-2 Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Medium
Earthworks	Medium
Construction	Medium
Trackout	Medium

6.3.2 Sensitivity of the Area

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.

The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling and human health effects (Table A2-2 in Appendix A2). There are over 100 residential properties within 20 m of the site boundary (see Figure 6-1).

Figure 6-1 20 m Distance Band around Site Boundary

Imagery ©2023 Google, Imagery ©2023 Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2023

Table 6-2 shows that the dust emission magnitude for trackout is *medium* and Table A2-3 in Appendix A2 thus explains that there is a risk of material being tracked 200 m from the site exits. There are greater than 100 residential properties within 20 m of the roads along which material could be tracked (see Figure 6-2).

Figure 6-2 20 m Distance Bands around Roads Used by Construction Traffic Within 200 m of the Site Exits

Imagery ©2023 Google, Imagery ©2023 Bluesky, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2023

Sensitivity of the Area to Effects from Dust Soiling

Using the information set out above and Figure 6-1 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 above and Figure 6-2 alongside the same matrix, the area is of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

The matrix in Table A3.4 in Appendix A2 requires information on the baseline annual mean PM_{10} concentration in the area. The maximum predicted 2019 PM_{10} concentration at the site is 19.0 µg/m^3

(Table 5-3), and this value has been used. Using the information set out above and Figure 6-1, alongside the matrix in Table A3.4 in Appendix A2, the area surrounding the onsite works is of 'medium' sensitivity to human health effects. Using the information set out in above and Figure 6-2 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'medium' sensitivity.

Sensitivity of the Area to any Ecological Effects

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

Table 6-3 summarises the sensitivity of the area around the proposed construction works.

Table 6-3 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	Medium Sensitivity	Medium Sensitivity

6.3.3 Risk and Significance

The dust emission magnitudes in Table 6-2 have been combined with the sensitivities of the area in Table 6-3 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 6-4. These risk categories have been used to determine the appropriate level of mitigation as set out in step 3 of the assessment procedure.

Table 6-4 Summary of Risk of Impacts Without Mitigation

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

The IAQM guidance[23] 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'.

7 Operational Phase Impact Assessment

7.1 Impacts at Existing Receptors

7.1.1 Road Traffic

Data provided by the project transport consultants (Transport Planning Associates) confirms that the proposed development will generate less than 100 daily light vehicle trips on any local road; the maximum generation on any road link is 84 LDVs and two HDVs on Ravenscourt Square; on all other roads fewer trips are generated. The daily trip generation is below the screening threshold of 100 LDVs and 25 HDVs recommended for use within an AQMA in the EPUK/IAQM guidance[41]. As the relevant screening thresholds will not be exceeded, 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.

7.1.2 Emergency Generator Plant

The combined NOx emission rate of the three proposed generators has been calculated taking account of the limited annual usage as 0.5 mg/s; this is less than the 5 mg/s emission rate provided by EPUK and the IAQM[41] in order to screen about potential impacts. Notwithstanding, modelling has been undertaken to confirm that the impacts at existing properties will be negligible.

The maximum predicted nitrogen dioxide, PM_{10} and $PM_{2.5}$ contributions at existing receptors associated with emissions from the generator plant are shown in Table 7-1. The maximum predicted contributions at any of the identified receptors (at any height) are provided, from any of the nine building and meteorological year combinations considered.

Table 7-1 Predicted Maximum Pollutant Contributions (µg/m^3)

Pollutant / Averaging Period	Maximum Process Contribution		Objective
	µg/m^3	% of Objective	
Annual Mean NO_2	0.0017	0.0040	40
100th %ile of 1-hour NO_2	4.17	2.08	200
Annual Mean PM_{10}	0.00005	0.0001	40
100th %ile of 24-hour PM_{10}	0.0052	0.010	50
Annual Mean $PM_{2.5}$	0.00005	0.00025/0.00050	20/10 [a]

[a] The 20 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.

These predicted maximum concentrations can be compared with the EPUK/IAQM screening criteria, as previously described in Section 3.2.2, and the following conclusions can be drawn:

- the predicted maximum annual mean nitrogen dioxide concentration (0.004% of the objective) is well below the screening criterion (0.5%);
- the predicted maximum 100th percentile of 1-hour mean nitrogen dioxide concentrations (2.1% of the objective) is well below the screening criterion (10%).
- the predicted maximum annual mean PM_{10} concentration (0.0001% of the objective) is well below the screening criterion (0.5%);
- the predicted maximum 100th percentile of 24-hour mean PM_{10} concentrations (0.001% of the objective) is well below the screening criterion (10%); and
- the predicted maximum annual mean $PM_{2.5}$ concentration (0.00025% of the objective and 0.0005% of the GLA target) is well below the screening criterion (0.5%).

The potential for significant impacts at existing receptors as a result of emissions from the testing of the generator plant can thus be discounted. These findings are consistent with the combined NOx emission rate being significantly lower than the 5 mg/s screening criteria defined by EPUK and the IAQM[41].

7.2 Site Suitability

The proposed development will introduce residential properties which represent relevant exposure to the annual- and 1-hour mean NO_2 objectives, as well as the annual PM_{10} and $PM_{2.5}$, and 24-hour mean PM_{10} objectives.

As discussed in Section 5.1, there are no significant industrial sources that are likely to affect the proposed development, in terms of air quality.

Measured annual mean NO_2 concentrations were below the objective at all monitoring locations within the study area in 2019, apart from at HF14 which is located adjacent to the busy A315 within the Hammersmith Town Centre Focus Area; this monitoring site is not representative of conditions at the proposed development. The most representative monitoring site which was operational in 2019 is HF34; in 2019, this site measured an annual mean concentration of 28.2 µg/m^3. Therefore, despite being located within an AQMA, based on this representative monitoring data, it is judged that both the annual mean and 1-hour mean nitrogen dioxide objectives were met at the proposed development in 2019.

The maximum predicted annual mean nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations at the proposed development, as determined from the LAEI database[43] and presented in Table 5-3, are below the respective objectives in 2019, and well below the objectives in 2025 and 2030. As the annual mean NO_2 concentrations at the proposed development site are well below 60 µg/m^3, it is also unlikely that the 1-hour nitrogen dioxide objective will be exceeded[47].

While the predicted $PM_{2.5}$ annual mean concentrations at the proposed development marginally exceed the GLA target of 10 µg/m^3 in 2019, the target is met in both 2025 and 2030.

The maximum predicted generator contributions at any of the proposed receptors considered (at any height), and from any of the nine building and meteorological year combinations assessed, has been combined with these baseline predictions to determine the impact of the generator emissions on site

suitability. The maximum predicted contributions to annual mean nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations are 0.007, 0.0003 and 0.0003 µg/m^3. The total annual mean concentrations are therefore not materially different to the predicted values set out in Table 5-3.

The maximum predicted contribution to 1-hour mean nitrogen dioxide and 24-hour PM_{10} concentrations has been added to twice the 2025 baseline concentration from Table 5-3. The maximum total concentrations including generator contributions that any future resident may be exposed to is 74.3 µg/m^3 and 32.5 µg/m^3 respectively, which are well below 200 µg/m^3 and 50 µg/m^3.

Taking the above into account, it is judged that future users of the proposed development will experience acceptable air quality.

7.3 Significance of Operational Air Quality Effects

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 at worst-case locations within the proposed development, including contributions from emissions associated with the testing of on-site generators, will all be well below the objectives, thus future residents will experience acceptable air quality;
- the proposed development will generate traffic well below industry screening thresholds and the impact of additional emissions on pollutant concentrations at existing properties will therefore be negligible; and
- the impact of generator emissions on concentrations has been shown to be well below industry screening thresholds, and the impact of additional emissions on pollutant concentrations at existing properties will therefore be negligible.

8 'Air Quality Neutral'

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[3]

8.1 Building Emissions

The proposed development does not include any combustion plant for the routine provision of electricity, heating or hot water and will thus have no direct building emissions. Paragraph 2.2.1 of the GLA guidance[3] states that developments which "*do not include new combustion plant such as gas-fired boilers*" are "*assumed to be Air Quality Neutral*".

The Proposed Development will include emergency diesel generators, however the GLA guidance[3] states that "*backup plant installed for emergency and life safety power supply, such as diesel generators, may be excluded from the calculation of predicted building emissions*". The proposed development is, therefore, better than air quality neutral in terms of building emissions.

8.2 Road Transport Emissions

Transport Planning Associates has advised that the proposed development is expected to generate a total of 54,020 car trips per year. Appendix A7 provides the Benchmark Trip Rates for each land use category based on the number of dwellings and Gross Internal Area (GIA) of different land uses. The number of proposed dwellings and GIAs have been provided by SPPARC. Table 8-1 shows the calculation of the TEB for this development.

Table 8-1 Calculation of Transport Benchmarks for the Development [a]

Use Class	GIA (m^2) / dwellings [b]	Benchmark	
		Trips/m^2 or dwelling/yr	Trips/yr
Residential	140	114	15,960
Care Homes	3,692	1.1	4,061
Other Non-Residential Institutions [c]	1,317	30.3	39,905
Total Trip Rate			**59,926**

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

[b] Values are GIAs except for 'residential' which is the number of dwellings.

[c] The benchmark for schools, nurseries, doctors' surgeries, other non-residential institutions has been applied as most representative of the proposed uses, which will include training and education, art galleries and community uses.

The total development trip rate is less than the TEB. The proposed development is thus air quality neutral in terms of transport emissions.

9 Mitigation

9.1 Good Design and Best Practice

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:

- provision of only approximately 40 basement car parking spaces, including blue badge spaces, and further blue badge parking at ground level adjacent to Block A, to discourage the use of private cars to access the proposed development;
- provision of active electric vehicle charging facilities for 20% of spaces, with passive provision for all remaining spaces, as required by Policy T6.1 of the London Plan;
- provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public, cycling and walking);
- provision of 68 short stay and 271 long stay secure cycle spaces;
- running of the generator flues to at least 1 m above roof level to ensure the best possible dispersion environment; and
- the use of ground source heat pumps for energy provision to avoid the need for on-site combustion.

9.2 Construction

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

The site has been identified as a *Medium* Risk during demolition, earthworks, construction and for trackout, as set out in Table 6-4. The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition[52] 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 A5.

The mitigation measures should be written into a dust management plan (DMP). 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.

[52] GLA (2014) The Control of Dust and Emissions from Construction and Demolition SPG.

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.

9.3 Road Traffic Impacts

The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant'; it will not introduce any new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

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).

9.4 Generator Impacts

The assessment has demonstrated that the emissions from the generator plant within the proposed development will have an insignificant impact on air quality at existing nearby properties, and will not lead to any objective exceedances within the development itself. As such, there is no requirement for mitigation. The generator plant installed within the development should, however, meet the specifications set out in Appendix A5; if the installed plant does not conform to these specifications, additional assessment and/or mitigation may be required.

10 Residual Impacts

10.1 Construction Impacts

The IAQM guidance, on which the GLA's guidance is based, is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out in Section 9 and Appendix A5 are based on the GLA guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

The IAQM guidance does, however, recognise 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. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be 'not significant'.

10.2 Operational Impacts

The residual impacts will be the same as those identified in Section 7. The overall effects of the proposed development will be 'not significant'.

11 Conclusion

The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction, 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).

11.1 Construction Impacts

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'.

11.2 Operational Impacts

The proposed development will generate traffic below industry screening thresholds and will be provided with energy via an all electric system; the impact of emissions from the testing of the proposed generators will also be well below industry screening thresholds. The operational air quality effects will therefore be 'not significant'.

Air quality conditions for future residents of the proposed development have been shown to be acceptable, with concentrations well below the air quality objectives throughout the site. $PM_{2.5}$ concentrations will also be below the GLA target by 2025, prior to occupation in 2027.

11.3 Air Quality Neutral

The building and transport related emissions associated with the proposed development are both below the relevant benchmarks. The proposed development therefore complies with the requirement that all new developments in London should be at least air quality neutral.

11.4 Policy Implications

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. It is also consistent with Paragraph 186, as it will not affect compliance with relevant limit values or national objectives.

The proposed development is also consistent with the LBHF Local Plans, and is compliant with Policy SI 1 of the London Plan in the following ways:

- it will not lead to further deterioration of existing poor air quality;
- it will not cause or extend and exceedances of legal air quality limits;
- it will not create new exposure to poor air quality; and
- it is better than air quality neutral.

12 Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants Ltd
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
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)
HGV	Heavy Goods Vehicle
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LB	London Borough

LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
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
OEP	Office for Environmental Protection
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
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
ULEZ	Ultra Low Emission Zone
WHO	World Health Organisation
ZEC	Zero Emission Capable

13 Appendices

A1 London-Specific Policies and Measures

A1.1 London Plan

A1.1.1 Preliminary Air Quality Assessment

The London Plan[2] sets out expectations around the consideration of air quality in the design of all major developments:

"For major developments, a preliminary Air Quality Assessment should be carried out before designing the development to inform the design process. The aim of a preliminary assessment is to assess:

- *The most significant sources of pollution in the area*
- *Constraints imposed on the site by poor air quality*
- *Appropriate land uses for the site*
- *Appropriate design measures that could be implemented to ensure that development reduces exposure and improves air quality.*

Further assessments should then be carried out as the design evolves to ensure that impacts from emissions are prevented or minimised as far as possible, and to fully quantify the expected effect of any proposed mitigation measures, including the cumulative effect where other nearby developments are also underway or likely to come forward".

A preliminary assessment was undertaken and is presented in Appendix A8.

A1.1.2 Electric Vehicle Charging

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".

A1.2 London Environment Strategy

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 PM2.5 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"*

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.

A1.3 Low Emission Zone (LEZ)

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.

A1.4 Ultra Low Emission Zone (ULEZ)

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 Section A1.3.

The ULEZ was expanded across all London boroughs in August 2023, applying the emissions standards set out above.

A1.5 Other Measures

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.

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

The criteria developed by IAQM[53], 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.

The assessment procedure includes the four steps summarised below:

A2.1 STEP 1: Screen the Need for a Detailed Assessment

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).

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.

A2.2 STEP 2: Assess the Risk of Dust Impacts

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).

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).

A2.2.1 Step 2A – Define the Potential Dust Emission Magnitude

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.

[53] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1.

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 <20,000 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.

A2.2.2 Step 2B – Define the Sensitivity of the Area

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.

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.

A2.2.3 Step 2C – Define the Risk of Impacts

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.

A2.3 STEP 3: Determine Site-specific Mitigation Requirements

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 A5.

A2.4 STEP 4: Determine Significant Effects

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'.

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		

Class	Principles	Examples
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 [54]

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

Table A2-4: Sensitivity of the Area to Human Health Effects [64]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	**>32 µg/m^3**	**>100**	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low

[54] 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.

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
		1-10	High	Medium	Low	Low	Low
		>100	High	High	Medium	Low	Low
	28-32 µg/m³	10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
		>100	High	Medium	Low	Low	Low
	24-28 µg/m³	10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
		>100	Medium	Low	Low	Low	Low
	<24 µg/m³	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 [64]

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

The guidance issued by EPUK and IAQM[41] 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.

A3.1 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".*

A3.2 Recommended Best Practice

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".

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.

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.

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".

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.

A3.3 Screening

A3.3.1 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".*

A3.3.2 Impacts of the Development on the Local Area

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.

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.

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 5 m 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.

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.

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".

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".

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".

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.

A3.4 Assessment of Significance

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.

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.

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.

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 Denise Evans, BSc (Hons) PhD MIEnvSc MIAQM

Dr Evans is an Associate Director with AQC, with more than 20 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.

Dr Frances Marshall, MSci PhD MIEnvSc MIAQM

Dr Marshall is a Principal Consultant with AQC with ten years' relevant experience. Prior to joining AQC, she spent four years carrying out postgraduate research into atmospheric aerosols at the University of Bristol. Dr Marshall has experience preparing air quality assessments for a range of projects, including residential and commercial developments, road traffic schemes, energy centres, energy from waste schemes and numerous power generation schemes. She has experience in producing air quality assessments for EIA schemes, and has also assessed the impacts of Local Plans on designated ecological areas, prepared Annual Status Reports for Local Authorities, and undertaken diffusion tube monitoring studies. She is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

A5 Generator Modelling

A5.1 Model Inputs

The impacts of emissions from the proposed generators have been predicted using the ADMS-6 dispersion model. ADMS-6 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model has been run to predict the contribution of the proposed generator emissions to annual mean concentrations of nitrogen oxides and PM (assumed to be both $PM_{2.5}$ and PM_{10}), the 100th percentile of 1-hour mean nitrogen oxides concentrations, and the 100th percentile of 24-hour mean PM_{10} concentrations. Model input selections are summarised in Table A5-1, and, where considered necessary, discussed further below.

Table A5-1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	N
Variable Surface Roughness File Used?	N
Urban Canopy Flow Used?	Y
Building Downwash Effects Modelled?	Y
Meteorological Monitoring Site	Heathrow Airport
Meteorological Data Years	2020, 2021, 2022
Dispersion Site Surface Roughness Length (m)	1.5
Dispersion Site Minimum MO Length (m)	100
Met Site Surface Roughness Length (m)	0.2
Met Site Surface Minimum MO Length (m)	75

The proposed generators to be installed into the proposed development will have assumed net fuel inputs that range between 106 and 1,132 kWth, which is equivalent to fuel consumptions ranging between 10.7 and 114 litres per hour of diesel oil. The generators will be capable of delivering between 50 and 650 kVA on demand.

Emissions from each generator will rise to roof level in a dedicated flue. Cudd Bentley, the project M&E consultant, has advised that each generator will operate for 15 minutes each month (totalling three hours per year, per generator) in accordance with the maintenance schedule. It is important to operate the generators for this period of time to ensure that they are well lubricated and that the fuel within the system does not degrade. The exhaust volume flow rates for the generators have been calculated based on the complete combustion of the assumed diesel oil composition in Table A5-2

and the emission parameters employed in the modelling, which are set out in Table A5-3 for when operating at full load.

Table A5-2: Typical Diesel Fuel Composition

Elemental Component	Diesel Oil
Carbon	86.5%
Hydrogen	13.2%
Oxygen	0.3%
Net Calorific Value (LHV) (MJ/kg)	42.82
Gross Calorific Value (HHV) (MJ/kg)	45.70
HHV/LHV	1.07
Liquid Density @ 15°C (kg/m3)	835

Table A5-3: Generator Specifications, Modelled Emissions and Release Conditions

Parameter	Value
50 kVA Generator	
Calculated Net Fuel Input (kW)	106.0
Calculated Gross Fuel Input (kW)	113.1
Flue Internal Diameter (m)	0.15
Specified Fuel Consumption (l/h)	10.7
Calculated Exhaust Mass Flow Rate (kg/h)	241.8
Calculated Actual Exhaust Volume Flow (m^3/s) [a]	0.128
Calculated Exit Velocity (m/s)	7.26
Assumed Exhaust O_2 Content (%)	8.9
Assumed Exhaust H_2O Content (% v/v)	7.9
Assumed Exhaust Temperature (°C)	400
Calculated Normalised Exhaust Volume Flow (Nm^3/s) [b]	0.091
NOx Emission Rate (mg/kWh)	4,700
Calculated NOx Emission Rate (g/s)	0.052

PM_{10} Emission Rate (mg/kWh)	25
Calculated PM_{10} Emission Rate (g/s)	0.00028
Flue Location (x,y)	522161.56, 179025.03
Modelled Flue Height Above Ground (m)	21.1
410 kVA Generator	
Calculated Net Fuel Input (kW)	755.0
Calculated Gross Fuel Input (kW)	805.8
Flue Internal Diameter (m)	0.30
Specified Fuel Consumption (l/h)	76.0
Calculated Exhaust Mass Flow Rate (kg/h)	1,846.9
Calculated Actual Exhaust Volume Flow (m^3/s) [a]	1.000
Calculated Exit Velocity (m/s)	14.2
Assumed Exhaust O_2 Content (%)	9.7
Assumed Exhaust H_2O Content (% v/v)	7.4
Specified Exhaust Temperature (°C)	414
Calculated Normalised Exhaust Volume Flow (Nm^3/s) [b]	0.650
NOx Emission Rate (mg/kWh)	400
Calculated NOx Emission Rate (g/s)	0.0365
PM_{10} Emission Rate (mg/kWh)	25
Calculated PM_{10} Emission Rate (g/s)	0.0023
Flue Location (x,y)	522145.20, 179012.98
Modelled Flue Height Above Ground (m)	21.1
650 kVA Generator	
Calculated Net Fuel Input (kW)	1,132.0
Calculated Gross Fuel Input (kW)	1,208.1
Flue Internal Diameter (m)	0.35
Specified Fuel Consumption (l/h)	114.0
Calculated Exhaust Mass Flow Rate (kg/h)	2,783.7
Calculated Actual Exhaust Volume Flow (m^3/s) [a]	1.683

Calculated Exit Velocity (m/s)	17.5
Assumed Exhaust O_2 Content (%)	9.7
Assumed Exhaust H_2O Content (% v/v)	7.4
Specified Exhaust Temperature (°C)	494
Calculated Normalised Exhaust Volume Flow (Nm^3/s) [b]	0.975
NOx Emission Rate (mg/kWh)	400
Calculated NOx Emission Rate (g/s)	0.058
PM_{10} Emission Rate (mg/kWh)	25
Calculated PM_{10} Emission Rate (g/s)	0.0036
Flue Location (x,y)	522170.76, 178953.39
Modelled Flue Height Above Ground (m)	21.8

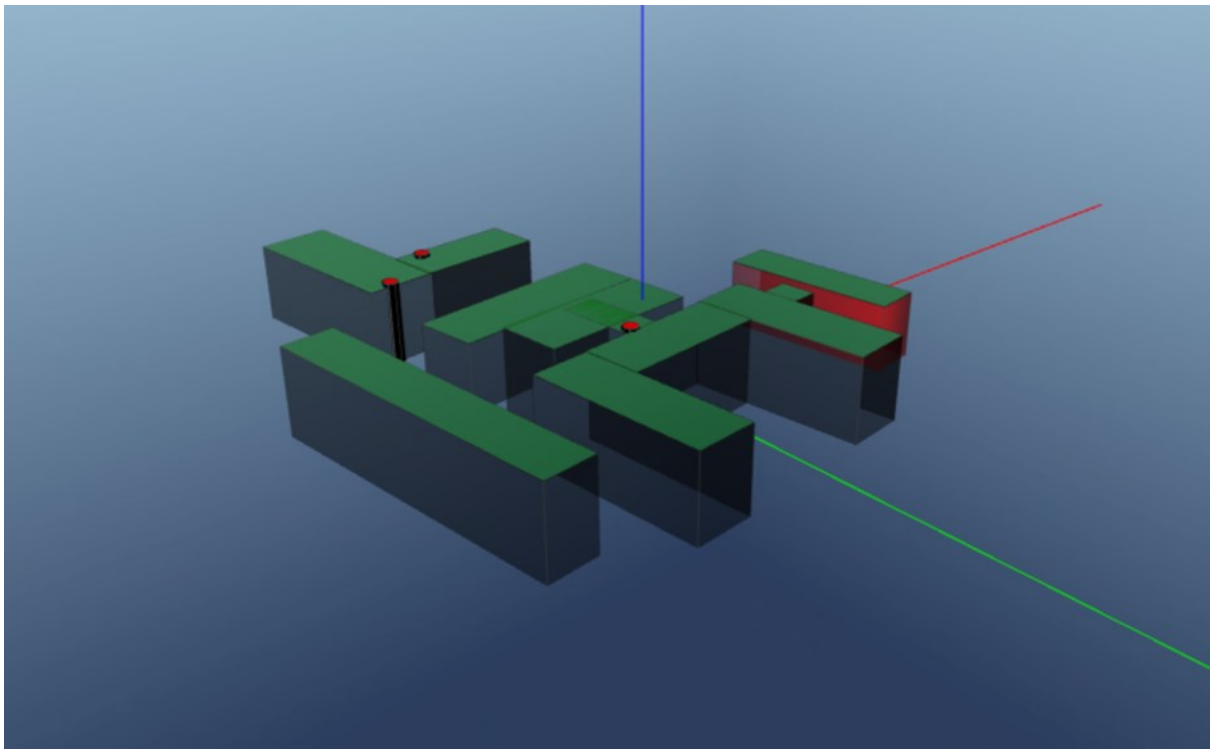
Note: Orange highlighted cells contain the values entered into the model. The number of significant figures presented should not be taken to represent the accuracy of the information used.

[a] Not normalised.

[b] 'Normal' here refers to 15% O_2, 0˚C, 101.325 kPa and 0% H_2O.

Entrainment of the plume into the wake of the buildings (the so-called building downwash effect) has been taken into account in the model. The building dimensions and flue locations have been obtained from drawings provided by SPPARC. The locations of the flues are shown in Figure A5-1 along with the modelled buildings.

Figure A5-1 Flue Locations & Modelled Buildings



Hourly sequential meteorological data in sectors of 10 degrees from Heathrow Airport for 2020 to 2022 have been used in the model. The Heathrow Airport meteorological monitoring station is located approximately 14 km to the west of the proposed development and is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of the proposed development; both the development site and the Heathrow Airport meteorological monitoring station are located in London where they will be influenced by the effects of urban meteorology. Wind roses for the site for the years 2020-2022 are provided in Figures A5-2 to A5-4, respectively. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

Figure A5-2 Heathrow Airport Wind Rose - 2020

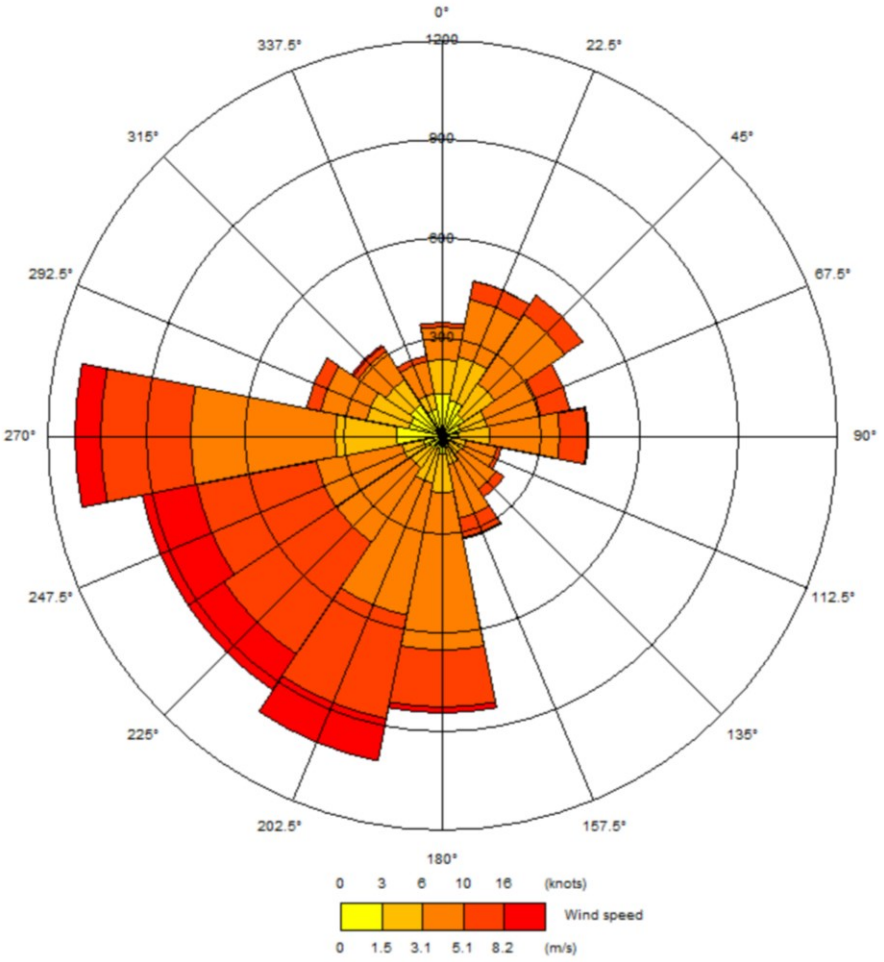


Figure A5-3 Heathrow Airport Wind Rose - 2021

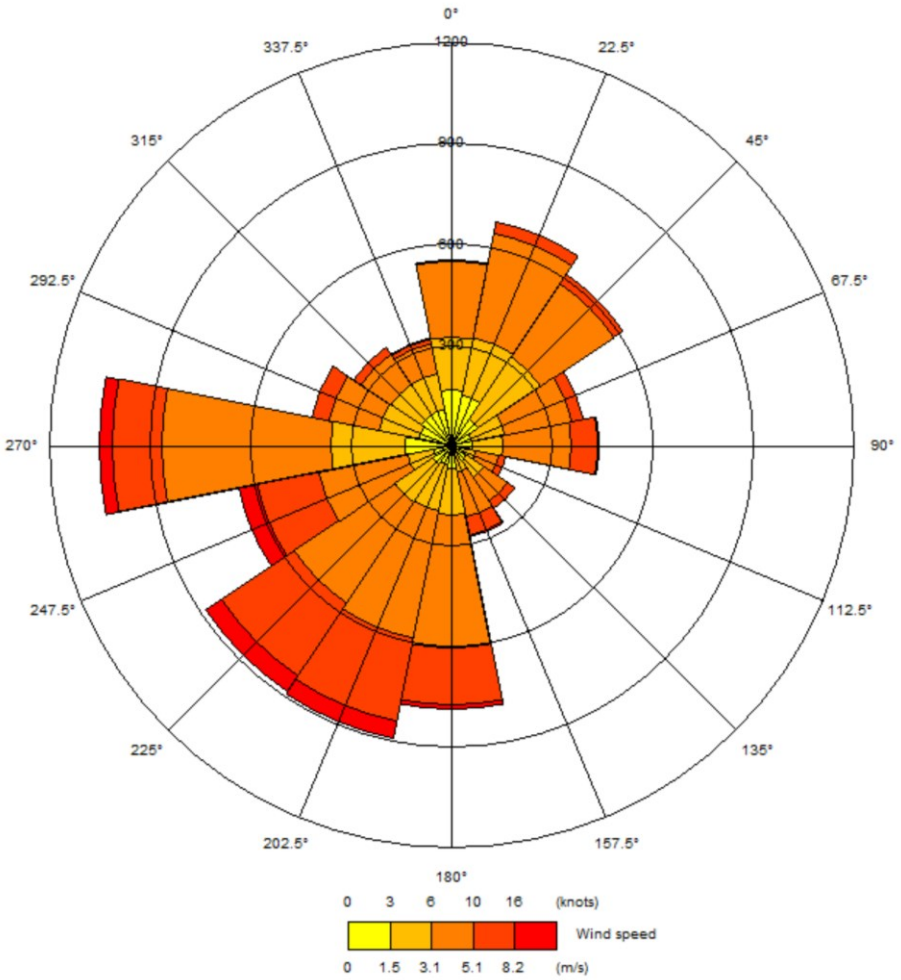
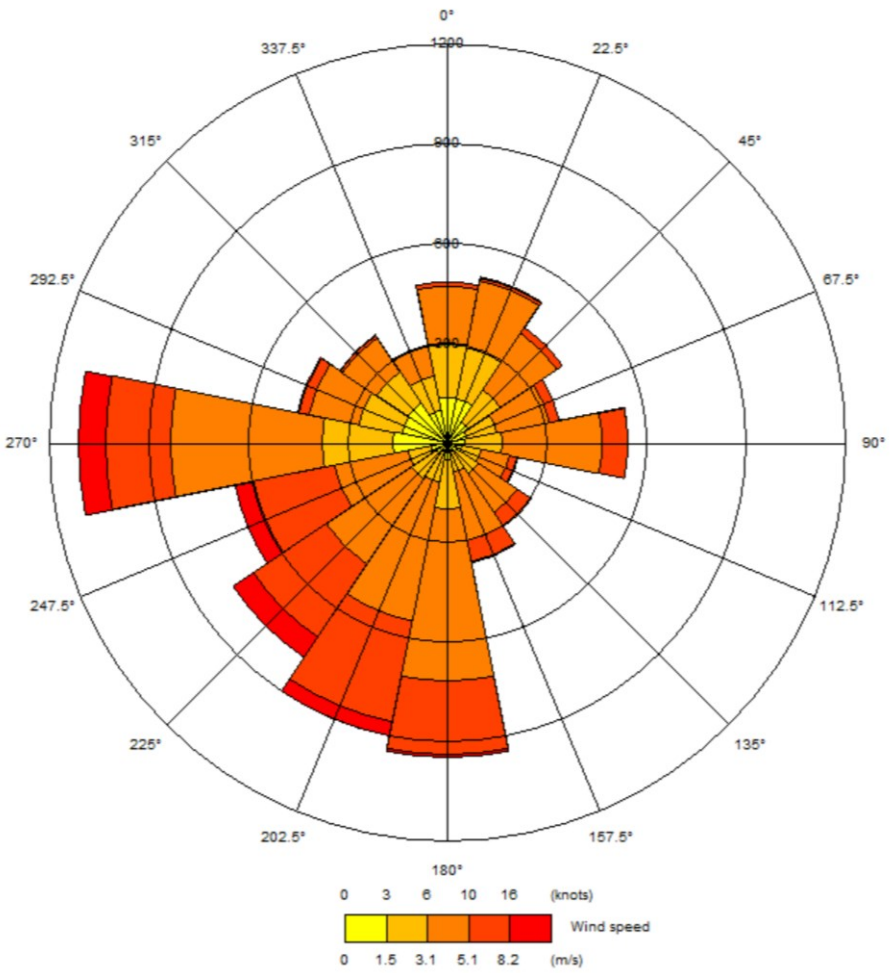


Figure A5-4 Heathrow Airport Wind Rose - 2022



A5.2 Receptors

The contribution of emissions generated during the routine testing of the emergency generator plant to concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations have been predicted at a number of locations both within, and close to, the proposed development. Receptors have been identified to represent worst-case locations (for instance, at the façades of the residential properties closest to the sources). The receptor locations are shown in Figure 4-1; concentrations have been predicted at a range of heights as described in Table A5-4.

Table A5-4: Receptor Locations

Receptor	Type	X Coordinate	Y Coordinate	Heights Modelled (m)
Existing Receptors				
E1	Residential	522140.6	179066.7	1.5
E2	Residential	522147.6	179075.5	1.5, 7.5
E3	Tennis Courts [a]	522144.2	179100.3	1.5
E4	Tennis Courts [a]	522139.0	179134.4	1.5
E5	Residential	522161.6	179066.6	1.5, 10.5
E6	Football Pitch [a]	522179.7	179046.1	1.5
E7	Football Pitch [a]	522208.9	179086.0	1.5
E8	Football Pitch [a]	522254.0	179067.9	1.5
E9	Football Pitch [a]	522218.3	179035.4	1.5
E10	Residential	522226.0	179000.6	1.5, 10.5
E11	Residential	522247.0	178915.4	1.5, 13.5
E12	Residential	522184.6	178884.6	1.5, 7.5
E13	Residential	522124.2	178967.6	1.5, 13.5
E14	Residential	522082.2	179025.1	1.5, 10.5
E15	Residential	522113.3	179052.3	1.5, 10.5
E16	Residential	522109.3	179069.0	1.5, 7.5
E17	Residential	522074.2	179067.9	1.5, 10.5
Proposed Receptors				
P1	Block A	522237.4	178931.2	1.5, 16.5, 17.0
P2	Block A	522224.8	178975.0	1.5, 16.5, 17.0
P3	Block A	522218.1	178956.4	1.5, 16.5, 17.0
P4	Block B	522207.9	178956.9	1.5, 19.5, 21.1
P5	Block B	522206.4	178910.5	1.5, 19.5, 21.1
P6	Block B	522175.6	178936.9	1.5, 19.5, 21.1
P7	Block B	522152.4	178903.3	1.5, 19.5, 21.1
P8	Block B	522141.6	178929.2	1.5, 19.5, 21.1

P9	Block B	522148.1	178949.7	1.5, 19.5, 21.1
P10	Block B	522187.2	178954.0	1.5, 19.5, 21.1
P11	Block C	522178.1	178955.6	1.5, 19.5, 20.8
P12	Block C	522168.2	178954.9	1.5, 19.5, 20.8
P13	Block C	522192.3	178968.8	1.5, 19.5, 20.8
P14	Block C	522169.9	178975.0	1.5, 19.5, 20.8
P15	Block C	522150.6	178965.0	1.5, 19.5, 20.8
P16	Block D	522168.2	178979.2	1.5, 16.5, 17.7
P17	Block D	522195.0	178991.7	1.5, 16.5, 17.7
P18	Block D	522166.5	178995.6	1.5, 16.5, 17.7
P19	Block D	522141.8	178984.6	1.5, 16.5, 17.7
P20	Block E	522138.9	179010.8	1.5, 19.5, 20.1
P21	Block E	522157.1	179012.9	1.5, 19.5, 20.1
P22	Block E	522189.0	179016.3	1.5, 19.5, 20.1
P23	Block E	522188.2	179030.3	1.5, 19.5, 20.1
P24	Block F	522155.8	179028.0	1.5, 19.5, 20.1
P25	Block F	522152.7	179060.4	1.5, 19.5, 20.1
P26	Block F	522133.6	179058.0	1.5, 19.5, 20.1
P27	Block F	522135.9	179038.6	1.5, 19.5, 20.1

[a] Receptors represent relevant exposure to the short-term objectives only.

A5.3 Model Verification

It is not practical, nor usual, to verify the ADMS-6 model.

A5.4 Post-processing

Emissions from the generator plant will be predominantly in the form of nitrogen oxides (NOx), PM_{10} and $PM_{2.5}$. ADMS-6 has been run to predict the contribution of the proposed generator emissions to annual mean concentrations of nitrogen oxides and PM, and to the 100th percentile of 1-hour mean nitrogen oxides concentrations and the 100th percentile of 24-hour mean PM_{10} concentrations. The approach recommended by the Environment Agency[55] (2005) has been used to predict nitrogen dioxide concentrations, assuming that:

[55] Environment Agency (2005) Conversion ratios for NOx and NO_2.

- annual mean NO_2 concentration = annual mean NOx concentration multiplied by 0.7; and
- 100th percentile of 1-hour mean NO_2 concentrations = 100th percentile of 1-hour mean NOx concentrations multiplied by 0.35.

A5.5 Plant Restrictions

The restrictions set out in Table A5-5 should be adhered in order to ensure that the final plant design does not lead to impacts greater than those modelled.

Table A5-5: Generator Specifications and Modelled Emissions and Release Conditions

Parameter	Value	Restriction
50 kVA Generator		
Gross Fuel Input (kW)	113.1	Max
Flue Internal Diameter (m)	0.15	Max
Hours of Use per Annum	3	Max
Efflux Velocity (m/s)	7.26	Min
Exhaust Temperature (°C)	400	Min
NOx Emission Rate (mg/kWh)	4,700	Max
PM_{10} Emission Rate (mg/kWh)	25	Max
410 kVA Generator		
Gross Fuel Input (kW)	805.8	Max
Flue Internal Diameter (m)	0.30	Max
Hours of Use per Annum	76.0	Max
Efflux Velocity (m/s)	14.2	Min
Exhaust Temperature (°C)	414	Min
NOx Emission Rate (mg/kWh)	400	Max
PM_{10} Emission Rate (mg/kWh)	25	Max
650 kVA Generator		
Gross Fuel Input (kW)	1,208.1	Max
Flue Internal Diameter (m)	0.35	Max
Hours of Use per Annum	3	Max
Efflux Velocity (m/s)	17.5	Min

Exhaust Temperature (°C)	494	Min
NOx Emission Rate (mg/kWh)	400	Max
PM_{10} Emission Rate (mg/kWh)	25	Max

A6 Construction Mitigation

Table A6-1 presents a set of best-practice measures from the GLA guidance[4] 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 A6-1: 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 site layout: machinery and dust causing activities should be located away from receptors.		✓
Erect solid screens or barriers around dust 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 from site as soon as possible.		✓
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		✓
Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
Implement a Travel Plan that supports and encourages sustainable 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 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		✓
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 Demolition		
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)	✓	
Ensure water suppression is used during demolition operations.		✓
Avoid explosive blasting, using appropriate manual or mechanical alternatives		✓
Bag and remove any biological debris or damp down such material before demolition		✓
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 securely 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)		✓
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits		✓
Access gates should be located at least 10 m from receptors, where possible		✓
Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site	✓	

A7 Air Quality Neutral

The GLA's London Plan Guidance; Air Quality Neutral[3] 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.

The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table A7-1, while the 'Transport Emissions Benchmarks' ('TEBs') are set out in Table A7-2.

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 A7-3 and Table A7-4, respectively.

Table A7-1: 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	14.90	36.86	14.90
Schools, nurseries, doctors' surgeries, other non-residential institutions	0.90	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 NOx. 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 A7-2: 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	5.6	6.5
Storage and distribution	m^2 (GIA)	N/A	5.5	6.5
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 A7-3: Emission Factors per vehicle-km

Pollutant	Emission factors (g/veh-km)		
	Central Activity Zone (CAZ)	Inner London [a] (excluding CAZ)	Outer London [a]
NOx	0.48	0.39	0.35
PM_{10}	0.036	0.032	0.028

[a] Inner London and Outer London as defined in the London Plan[2].

Table A7-4: Average Distance Travelled by Car per Trip

Land Use	Distance (km)		
	Central Activity Zone (CAZ)	Inner London [a] (excluding CAZ)	Outer London [a]
Residential	4.2	3.4	11.4
Office	3.0	7.2	10.8
Retail	9.2	5.5	5.4

[a] Inner London and Outer London as defined in the London Plan[2].

A8 Preliminary Air Quality Assessment

Logika GROUP

Ravenscourt Park

Preliminary Air Quality Assessment

For TT Group

09 December 2022

Document Control

Client:	Telereal Trillium
Principal Contact:	Nick Greenwood
Project Number:	J30/13691A/10
Prepared By:	Dr Denise Evans
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Date:	9 December 2022
Reviewed by:	Chris Whall (Director)

Registered Office: 23 Coldharbour Road, Bristol BS6 7JT Tel: 0117 974 1086

24 Greville Street, Farringdon, London, EC1N 8SS Tel: 020 3873 4780

6 Bankside, Crosfield Street, Warrington WA1 1UD Tel: 01925 937 195

Contents

1 Introduction

This report provides a preliminary air quality assessment, as required by the Greater London Authority's (GLA's) London Plan (GLA, 2021), for the proposed residential-led development of the former Ravenscourt Park hospital, in the London Borough of Hammersmith and Fulham (LBHF), hereafter referred to as the 'proposed development'.

The proposed development involves the retention and extension of a number of existing blocks to provide residential and community uses, and the demolition of one block to be replaced by residential apartments and around 2,800 m^2 of care home use. The energy strategy for the proposed development is expected to be all electric (Air Source Heat Pumps (ASHP) and photovoltaic panels) and therefore there will not be any emissions associated with energy provision. The development is expected to have diesel generators for the provision of power in an emergency.

Policy SI 1 of the London Plan specifically states "*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*".

This preliminary air quality assessment has thus been undertaken to identify any constraints to the proposed development in terms of air quality, and to allow for air quality design principles to be included within the design of the proposed development. The aim of the preliminary assessment is to assess:

- the most significant sources of pollution in the area;
- constraints imposed on the site by poor air quality;
- appropriate land uses for the site; and
- appropriate design measures that could be implemented to ensure that the proposed development reduces exposure and improves air quality.

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. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).

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, 2019). 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.

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

Table 1-1 Air Quality Criteria for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
NO_2	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
$PM_{2.5}$	Annual Mean	25 µg/m^3 [a]

[a] 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.

The GLA has set a target to achieve an annual mean $PM_{2.5}$ 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/m^3. The guideline is not currently in UK regulations and there is no explicit requirement to assess against it.

2 Policy Context

All European legislation referred to in this report is written into UK law and remains in place.

2.1 The Environmental Permitting (England and Wales) (Amendment) Regulations 2018

The Medium Combustion Plant Directive (MCPD) (The European Parliament and the Council of the European Union, 2015) regulates pollutant emissions from combustion plant with a rated input between 1 and 50 megawatts (MW_{th}) and was transposed into UK law in January 2018 through an amendment to the Environmental Permitting Regulations (2018). The legislation sets emission limits to be applied from December 2018 for new plant and from 2025 or 2030 for existing plant (depending on the rated input). In addition to addressing emissions from plant with a rated input of 1 to 50 MW_{th}, as required by the MCPD, the amendment also introduces emission limits on generator plant, regardless of their rated input. Generators whose sole purpose is maintaining power supply at a site during an on-site emergency, that are operated for the purpose of testing/maintenance for no more than 50 hours per year, will be exempt from the emission limits, but may still require a permit.

2.2 Clean Air Act 1993 & Environmental Protection Act

Small combustion plant of less than 20 MW net rated thermal input are controlled under the Clean Air Act 1993 (1993). This requires the local authority to approve the chimney height. Plant which are smaller than 366 kW have no such requirement.

2.3 Environment Act 2021

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.

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 were expected to have been set by November 2022 but are currently delayed with no fixed publication date. As the targets have not yet been either finalised or adopted by the Government, they cannot impact on current planning policy

2.4 Planning Policy

2.4.1 National Policies

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".

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".

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".

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".

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".

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".

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 *"Odour and dust can also be a planning concern, for example, because of the effect on local amenity"*.

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*".

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"*.

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".

2.4.2 London-Specific Policies

The London Plan

The London Plan (GLA, 2021) 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 SI 1 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".

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".

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."

The proposed development is not currently subject to an EIA, thus an Air Quality Positive statement is not required.

Regarding construction and demolition impacts, Part D of Policy SI 1 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".*

Part E of Policy SI 1 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".

The explanatory text around Policy SI 1 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 [sic] *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 [sic] *targets for Particulate Matter, are already exceeded and areas where current pollution levels are within 5 per cent of these limits"*[1].

[1] The London Plan was developed based on a World Health Organization guideline for $PM_{2.5}$ of 10 μg/m^3.

Design-led Approach

Policy D3 of the London Plan, on optimising site capacity through the design-led approach, states that *"development proposals should…help prevent or mitigate the impacts of noise and poor air quality"*. The explanatory text around this Policy states the following:

"Measures to design out exposure to poor air quality and noise from both external and internal sources should be integral to development proposals and be considered early in the design process. Characteristics that increase pollutant or noise levels, such as poorly-located emission sources, street canyons and noise sources should also be designed out wherever possible. Optimising site layout and building design can also reduce the risk of overheating as well as minimising carbon emissions by reducing energy demand".

Electric Vehicle Charging

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

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 a target to achieve, by 2030, the guideline value for $PM_{2.5}$ which was set by the World Health Organisation (WHO) in 2005. 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

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".*

2.4.3 Local Policies

The Local Plan for the LBHF was adopted in 2018 (LBHF, 2018a), replacing the 2011 Core Strategy and the 2013 Development Management Local Plan documents as the basis for planning decisions and future development in the borough. 'Policy CC10' specifically focuses on air quality, and states that:

"*The council will seek to reduce the potential adverse air quality impacts of new developments by:*

a. requiring all developments which may be impacted by local sources of poor air quality or may adversely contribute to local air quality to provide an air quality assessment that considers the

potential impacts of pollution from the development on the site and on neighbouring areas and also considers the potential for exposure to pollution levels above the Government's air quality objective concentration targets. The assessment should include separate consideration of the impacts of (i) the construction/demolition phase of development and (ii) the operational phase of development with appropriate mitigation measures highlighted for each phase;

b. *requiring mitigation measures to be implemented to reduce emissions, particularly of nitrogen oxides and small particles, where assessments show that developments could cause a significant worsening of local air quality or contribute to the exceedances of the Government's air quality objectives;*

c. *requiring mitigation measures that reduce exposure to acceptable levels where developments are proposed that could result in the occupants being particularly affected by poor air quality;*

d. *requiring developments to be 'air quality neutral' and resist development proposals which would materially increase exceedances of local air pollutants and have an unacceptable impact on amenity or health unless the development mitigates this impact through physical measures and/or financial contributions to implement proposals in the Council's Local Air Quality Management Plan; and*

e. *requiring all decentralised energy schemes to demonstrate that they can be used without having an unacceptable impact on air quality. Where this is not possible, CHP systems will not be prioritised over other air quality neutral technologies."*

'Policy CC2 – Ensuring Sustainable Design and Construction' requires:

"...the implementation of sustainable design and construction measures in all major developments…" and;

"The integration of sustainable design and construction measures will be encouraged in all other (i.e. non-major) developments, where feasible."

'Policy T1 – Transport' states that the Council will:

"...work with strategic partners to improve transportation provision, accessibility, and air quality in the borough, by improving and increasing the opportunities for cycling and walking, and by improving connections for bus services, underground, national and regional rail".

'Policy CC13 – Control of Potentially Polluting Sources' states that:

"*All proposed developments (including new buildings, demolition of existing buildings, conversions and changes of use) will be required to show that there will be no undue detriment to the general amenities enjoyed by existing surrounding occupiers of their properties, particularly where commercial and service activities will be close to residential properties. In the case of mixed use developments, similar protection will also be afforded to the prospective residents and other users where there is potential for activities within the new development to impact on their immediate neighbours on the same site.*

The council will, where appropriate, require mitigation measures if a nuisance, for example, from smoke, fumes, gases, dust, steam, light, vibration, smell, noise, spillage of gravel and building

aggregates or other polluting emissions, would otherwise be likely to occur, to ensure that it will not."

The Planning Guidance Supplementary Planning Document (SPD) was adopted in February 2018 (LBHF, 2018b) and provides information and guidance to supplement policies within the LBHF Local Plan 2018. It focuses on four key principles related to air quality, which effectively reiterates Policy CC10 of the Local Plan, as follows:

"*AQ1 Assessment of Air Quality Impacts of new Development*

Requiring all developments which may be impacted by local sources of poor air quality or may adversely contribute to local air quality to provide air quality assessments that considers the potential impacts of pollution from the development on the site and on neighbouring areas and also considers the potential for exposure to pollution levels above Government's air quality objective concentrations targets.

The assessment should include separate consideration of the impacts of (i) the construction/demolition phase of the development (ii) the operational phase of the development with appropriate mitigation measures highlighted for each phase."

"*AQ2 Mitigation of Emissions from New Developments*

Requiring mitigation measures to be implemented to reduce emissions, particularly of Nitrogen Dioxides and small particles, where assessments show that developments could cause a significant worsening of local air quality or contribute to the exceedances of the Government's air quality objectives."

"*AQ3 Mitigation of exposure caused by new development*

Requiring mitigation measures that reduce exposure to acceptable levels where developments are proposed that could result in the occupants being particularly affected by poor air quality."

"*AQ4 Air quality neutral requirements*

Requiring developments to be 'air quality neutral' and resist development proposals which would materially increase exceedances of local air pollutants and have an unacceptable impact on amenity or health unless the development mitigates this impact through physical measures and/or financial contributions to implement proposals in the Council's Local Air Quality Management Plan."

3 Baseline Air Quality

The proposed development site is located within a borough-wide Air Quality Management Area (AQMA) declared by LBHF for exceedances of the annual mean NO_2 and 24-hour mean PM_{10} objectives. The proposed development does not, however, lie within any of the GLA's air quality Focus Areas[2], as shown in Figure 3-1.

A search of the UK Pollutant Release and Transfer Register (Defra, 2022b) website has not identified any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality.

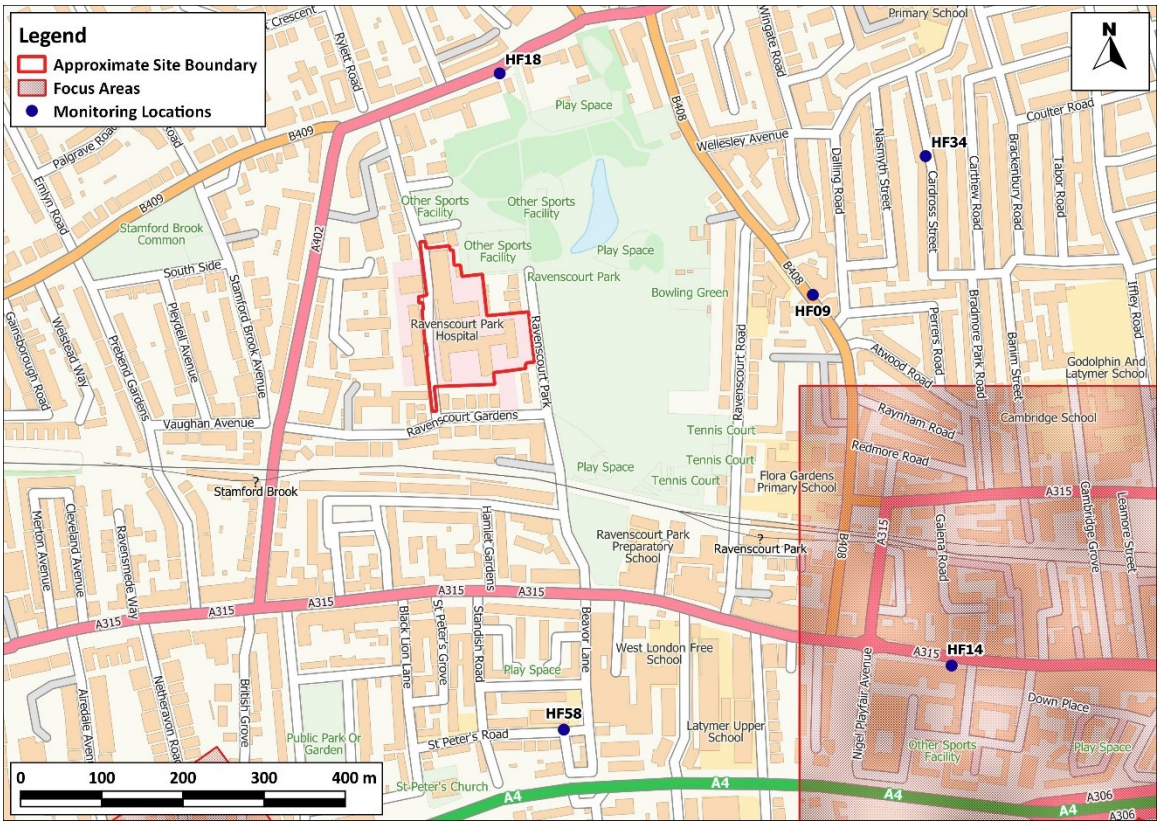
The LBHF operates two automatic monitoring stations within its area, however both are located over 1.1 km from the proposed development adjacent to major roads within air quality Focus Areas, and are not considered representative of conditions at the proposed development. The Council also operates a number of NO_2 monitoring sites using diffusion tubes prepared and analysed by SOCOTEC (using the 50% TEA in acetone method). There are five diffusion tubes within approximately 600 m of the proposed development. Annual mean results for the years 2015 to 2021 are summarised in Table 3-1. Exceedances of the objective are shown in bold. Although results for 2020 and 2021 are presented for completeness, they should be treated with caution; reduced activity brought about by the Covid-19 pandemic has generally reduced measured pollutant concentrations. The monitoring locations are shown in Figure 3-1 and data have been taken from LBHF's 2021 Annual Status Report (2022).

Table 3-1 Summary of NO_2 Monitoring (2015-2021) [a]

ID	Site Type	Location	2015	2016	2017	2018	2019	2020	2021
HF09	Roadside	Paddenswick Road	-	-	**44.4**	**42.2**	35.5	25.5	30.4
HF14	Roadside	King Street	-	-	**60.1**	**51.9**	**53.8**	**38.8**	**44.7**
HF18	Roadside	Goldhawk Road	-	-	**60.8**	**49.3**	38.6	24.2	27.7
HF34	Urban Background	Cardross Street	30.7	34.4	37.0	27.4	28.2	17.9	20.7
HF58	Roadside	St Peters Road	-	-	-	-	-	-	21.1
Objective			**40**						

[2] These are locations with high levels of human exposure where the annual mean limit value for NO_2 is exceeded.

Figure 3-1 Monitoring Locations and Air Quality Focus Areas



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Annual mean NO_2 concentrations have exceeded the objective at monitoring sites adjacent to busy roads including the A402, A315 and B408 in recent years; however, by 2019, annual mean concentrations met the objective at all nearby monitoring sites apart from HF14, which is located within the Hammersmith Town Centre Focus Area. All measured annual mean concentrations have been below 60 µg/m^3 since 2018, indicating that the 1-hour mean objective is unlikely to have been exceeded at any location in recent years[3].

The two automatic monitors measure PM_{10} and $PM_{2.5}$; although not representative of the proposed development site, being located adjacent to heavily trafficked roads, available data are presented in Table 3-2. Exceedances of the objective are shown in bold.

[3] 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, 2022a).

Table 3-2 Summary of PM_{10} and $PM_{2.5}$ Monitoring (2015-2021) [a]

ID	Site Type	Location	2015	2016	2017	2018	2019	2020	2021
Annual Mean PM_{10} (µg/m³)									
HF4	Roadside	Shepherd's Bush	25.0	27.4	38.0	26.4	25.0	28.0	34.0
HF5	Roadside	Hammersmith Town Centre	-	-	-	-	22.0	19.0	19.0
Objective			**40**						
Number of Days PM_{10} > 50 µg/m³									
HF4	Roadside	Shepherd's Bush	10	17	14	4	11	13	**55**
HF5	Roadside	Hammersmith Town Centre	-	-	-	-	5	5	1
Objective			**35**						
Annual Mean $PM_{2.5}$ (µg/m³)									
HF5	Roadside	Hammersmith Town Centre	-	-	-	-	15	14	11
Objective			**25 / 10 [b]**						

[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.

Measured PM_{10} concentrations have been below the relevant objectives in recent years, apart from in 2021 at HF4, when LBHF note that "*There were several active construction sites in close vicinity to the monitoring station at HF4 at Shepherds Bush, which may have affected the results for 2020 and 2021*" (LBHF, 2022).

Measured $PM_{2.5}$ concentrations at monitoring site HF5, which is located approximately 1 m from the kerb of the A219 adjacent to Hammersmith Bus Station, have been well below the objective, but have exceeded the GLA target since monitoring commenced.

In addition to the locally measured concentrations discussed above, estimated background concentrations at the proposed development have been determined using Defra's 2018-based background maps (Defra, 2022c); these cover the whole of the UK on a 1x1 km grid. The background annual mean NO_2 maps for 2019 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2020). The calibration factor calculated has also been applied to future year backgrounds. Mapped background concentrations of PM_{10} and $PM_{2.5}$ have not been adjusted.

The estimated background pollutant concentrations at the proposed development site are set out in Table 3-3 for the years 2019 (to align with the most recent year of monitoring data available from LBHF unaffected by Covid-19 restrictions) and 2022 (the current year).

The background concentrations are well below the respective objectives; however, the background annual mean $PM_{2.5}$ concentrations exceed the GLA target value of 10 µg/m^3.

Table 3-3 Estimated Annual Mean Background Pollutant Concentrations in 2019 and 2022

Year	NO_2	PM_{10}	$PM_{2.5}$
2019	22.2	18.6	12.3
2022	19.4	17.7	11.7
Objective / GLA Target	**40**	**40**	**25 / 10** [a]

[a] 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. 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.

4 Air Quality Constraints

4.1 Impact of the Proposed Development

The trip generation of the proposed development is currently unknown; however, should the proposed development generate more than 100 annual average daily traffic (AADT) vehicle trips or 25 heavy goods vehicle (HGV) trips on the local road network, then detailed dispersion modelling of road traffic emissions will need to be undertaken to determine the impact of these emissions upon existing residential properties in the surrounding area. If the development-generated traffic flows are below these criteria, then the air quality impacts from development-generated road traffic emissions can be considered to 'not significant'.

The energy strategy for the proposed development is expected to be all electric (Air Source Heat Pumps (ASHP) and photovoltaic panels) and therefore there will not be any emissions associated with energy provision. The development is expected to have diesel generators for the provision of power in an emergency. The emissions from these plant will be assessed to determine their impact upon sensitive properties in the surrounding area, and to determine the need for mitigation.

4.2 Site Suitability

The proposed development will introduce residential properties which represent relevant exposure to the annual- and 1-hour mean NO_2 objectives, as well as the annual PM_{10} and $PM_{2.5}$, and 24-hour mean PM_{10} objectives.

Measured annual mean NO_2 concentrations were below the objective at all monitoring locations within the study area in 2019, apart from at HF14 which is located within the Hammersmith Town Centre Focus Area. The 1-hour mean NO_2 objective is likely to have met the objective since 2018.

Annual and 24-hour mean PM_{10} concentrations have below the objectives in recent years, with the exception of the 24-hour mean objective in 2021, which was attributed by LBHF to nearby construction activities. Measured $PM_{2.5}$ concentrations have been well below the objective, although the GLA target continues to be exceeded.

Defra's Technical Guidance (Defra, 2022a) states that "*Concentrations fall-off rapidly on moving away from the source*", and defines urban background monitoring locations as being 50 m from major sources of pollution. It is therefore judged that the annual mean concentrations for future residents are best described by the background concentrations presented in Table 3-3, which are well below the relevant objectives.

Taking all of these aspects into account, it is therefore judged that future residents and users will experience acceptable air quality.

Additionally, 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), as well as the implementation of the Low Emission Zone (LEZ) and expanded Ultra Low Emission Zone (ULEZ).

5 Air Quality Design Principles

The following design principles to reduce exposure to air pollution and improve air quality should be considered and incorporated within the design of the proposed development:

- Alternatives to the use of diesel generators for emergency power provision should be considered to reduce or avoid associated emissions (i.e. through connection to a second sub-station, for example);
- If diesel generators are unavoidable, the exhaust stack(s) should be located at roof level on the tallest building, and away from any amenity space accessible to the residents (i.e. roof terraces), and the testing and maintenance schedule should be minimised as far as possible;
- Increasing the distance of new residential properties from the adjacent roads as far as practically possible, to reduce exposure to vehicle emissions, and use of building form and distribution to promote dispersion (i.e. avoid street canyons);
- Ensuring that any ventilation air intakes, where proposed, are distanced appropriately from sources of air pollution, including the adjacent road network and the flues of any combustion plant exhausts (if such plant are proposed);
- Provision of home working facilities for residents to reduce the need to travel;
- Boundary planting along the site taking account of the GLA's guide to using green infrastructure to protect people from air pollution (https://www.london.gov.uk/sites/default/files/green_infrastructure_air_pollution_may_19.pdf);

- Minimising car parking to minimise private car trips generated by the proposed development;
- Maximising access to public transport options, prioritisation of cycle parking, as well as cycle and walking routes;
- Provision of cycle storage facilities at locations which are easy to access and are close to cycle routes both within and outside of the proposed development, and showers / changing facilities for commercial uses to enable staff to cycle to work;
- Incorporating the Healthy Streets Approach into the scheme to reduce the need to travel, or to promote sustainable transport opportunities;
- Provision of car-sharing schemes, season ticket loans or discounts for residents; and
- Electric vehicle charging provision in line with the London Plan requirements.

6 Conclusions

The proposed development is located within an AQMA, but is over 100 m from any major road.

Baseline conditions show elevated NO_2 concentrations close to major roads; however, concentrations at locations away from these roads, and particulate matter concentrations at all monitoring locations, are below the objectives. Concentrations are expected to reduce in the future.

The trip generation of the proposed development is currently unknown, however comparison against published screening criteria will be undertaken to determine whether further assessment of road traffic emissions is required to determine air quality impacts upon sensitive land-uses in the surrounding area, utilising detailed dispersion modelling.

The energy strategy for the proposed development utilises an all electric system, avoiding the need for on-site combustion for the routine provision of energy to the site.

Emergency generators will however form part of the proposals; consideration should be given to alternatives to diesel generators. If diesel generators are proposed, careful consideration of the flue location(s) and testing and maintenance schedule will be required to avoid impacts at both proposed and existing sensitive locations.

It is judged that future residents and users will experience acceptable air quality in the anticipated year of opening.

A list of design principles to reduce exposure to air pollution has been provided, which should be considered and incorporated within the design of the proposed development.

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8 Glossary

AQMA	Air Quality Management Area
Defra	Department for Environment, Food and Rural Affairs
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 EU annual mean limit value for NO_2 but also has a high level of human exposure
GLA	Greater London Authority
LBHF	London Borough of Hammersmith and Fulham
µg/m^3	Microgrammes per cubic metre
NO_2	Nitrogen dioxide
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
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
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
WHO	World Health Organization

9 Professional Experience

Chris Whall, BSc (Hons) MSc CEnv MIEnvSc MIAQM

Mr Whall is the Managing Director of Air Quality Consultants Limited. He is Chartered Environmentalist with over 20 years in environmental consulting with multi-sector Environmental Impact Assessment (EIA) experience. He has a background in air quality, climate change and emissions quantification, impact assessment and management. Mr Whall has substantial practical experience of establishing and managing environmental monitoring programmes. Mr Whall regularly undertakes atmospheric dispersion modelling assessments to evaluate the impact of residential, industrial, transport, waste management and mining operations upon the air environment. He has strong track record in the delivery, management and direction of high profile and high value consultancy projects for public and private sector clients. He has experience of managing large teams as well as multiple partner organisations and has managed and directed multi-disciplinary environmental consultancy projects. Chris has particular expertise and a successful track record in delivery of air quality and carbon assessments for major infrastructure projects, particularly in the energy and transport sectors; he is a recognised expert in the assessment of environmental effects of airport operations. He has experience of being an expert witness at Public Inquiry.

Dr Denise Evans, BSc (Hons) PhD MIEnvSc MIAQM

Dr Evans is an Associate Director with AQC, with more than 23 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise also has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.