Report

Air Quality Assessment

Manor Farm, Slough

For Manor Farm Propco Limited

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Air Quality Consultants | Part of Logika Group

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Executive Summary

The air quality impacts associated with the proposed development at Manor Farm, Slough have been assessed. The proposed development consists of a data centre split across three levels with associated parking, gantry and substation, a battery energy storage system.

The proposed development includes 47 emergency diesel powered generators. An assessment of emissions from routine testing of the generators has demonstrated that the off-site human health impacts of these emissions will be negligible. The impacts of the emergency generator emissions on nearby designated ecological sites have also been assessed.

The proposed development will generate additional traffic on the local road network, but the assessment has shown that this will be below relevant screening thresholds, and therefore will not result in significant impacts.

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

Overall, the operational air quality effects of the proposed development are judged to be 'not significant' for existing human health receptors.

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1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed development at Manor Farm, Slough. The proposed development will consist of a data centre split across three levels with associated parking, gantry and substation, and a battery energy storage system.

1.2 The proposed development lies close to a borough-wide Air Quality Management Area (AQMA) declared by the London Borough of Hillingdon for exceedances in the annual mean nitrogen dioxide (NO_2) objective; close to the Spelthorne Borough Council AQMA declared for exceedances in the annual mean NO_2 objective; and an AQMA declared by Slough Borough Council (SBC) for exceedances of the annual mean NO_2 objective. The proposed development also lies close to three designated ecological sites: the Arthur Jacob Local Nature Reserve (LNR); Wraysbury Reservoir, which forms part of the South West London Waterbodies Special Protection Area (SPA) and Ramsar site and is also designated as a Site of Special Scientific Interest (SSSI); and the Staines Moor Site SSSI, part of which also forms part of the South West London Waterbodies SPA and Ramsar site.

1.3 The proposed development will 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 $PM_{2.5}$).

1.4 The proposals for the development include the provision of 47 diesel generator units with a rated thermal input of 8.1 MW_{th} each (total 382 MW_{th}). The generators will be used during emergency situations to power the data centre in the event of major grid failure, and during routine testing and maintenance only; they will not be used for non-emergency power generation. The generators will be tested for up to 1 hour per month per generator, totalling up to 564 operating hours per annum. The emissions from the generators could impact air quality at nearby existing residential properties, and nearby ecological receptors. The potential impacts of the generators have been assessed using dispersion modelling to establish the air quality impacts arising from the proposed generators' use and has been prepared taking into account all relevant local and national guidance and regulations. The assessment focuses on NO_2 for human health, and on nitrogen oxides (NOx), nitrogen deposition and acid deposition for ecological impacts. The diesel generators will result in minor emissions of other pollutants such as particulate matter: PM emissions are far lower than NOx, and considered to be small compared to the environmental standards, however they have been included in this assessment.

1.5 The location of the proposed development is shown in Figure 1-1, along with the relevant nearby AQMAs and ecological sites.

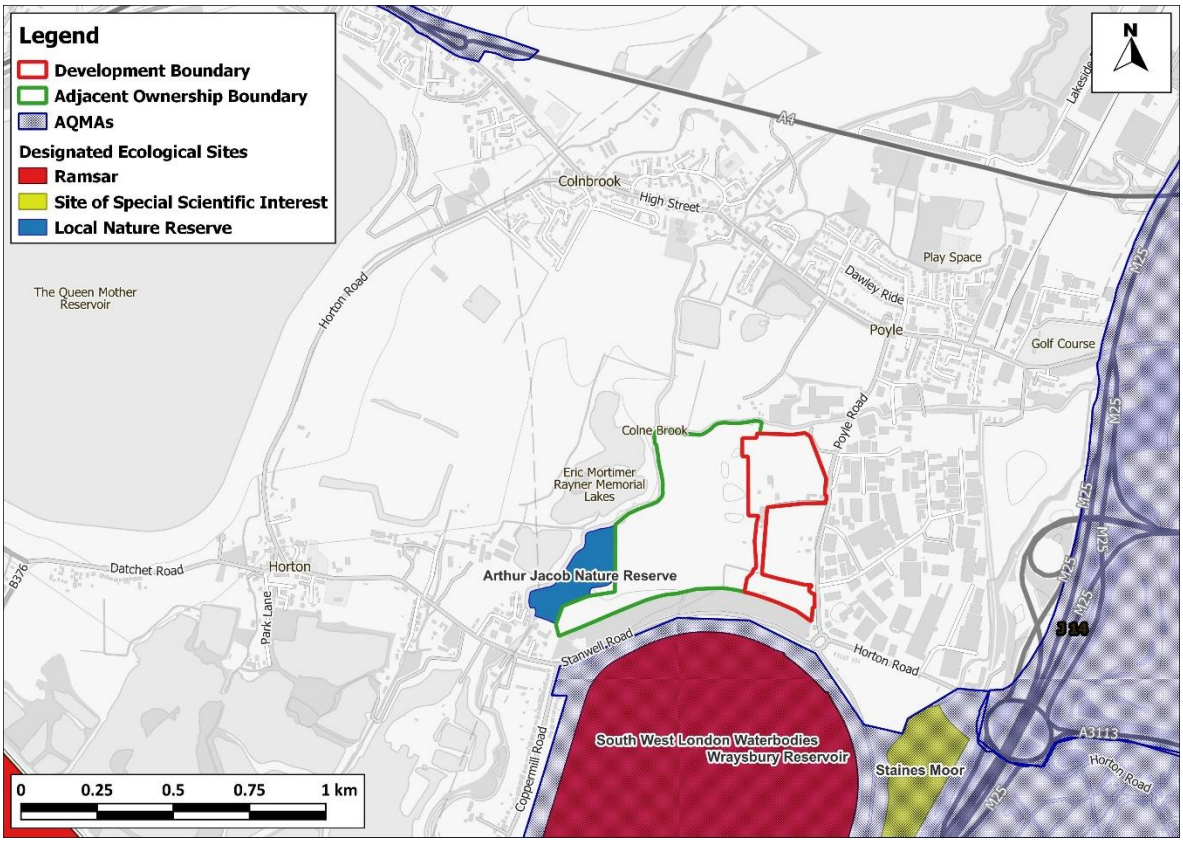

Figure 1-1: Proposed Development Setting in the Context of Air Quality

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

1.6 There is also the potential for the construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and PM_{10}.

1.7 This report describes existing local air quality conditions (base year 2023), and those in the earliest possible year of operation (2027).

1.8 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with SBC.

2 Policy Context

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

Air Quality Strategy 2007

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

Air Quality Strategy 2023

2.3 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023a) 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.

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

2.4 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). 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.

Clean Air Act 1993 & Environmental Protection Act

2.5 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.

2.6 Measures to ensure adequate dispersion of emissions from discharging stacks and vents are included in Technical Guidance Note D1 (Dispersion) (1993), issued in support of the Environmental Protection Act (1990).

Clean Air Strategy 2019

2.7 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main

sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Reducing Emissions from Road Transport: Road to Zero Strategy

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

2.9 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, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Environment Act 2021

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

2.11 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of $PM_{2.5}$. These targets are described in Paragraph 3.5.

Environmental Improvement Plan 2023

2.12 Defra published its 25 Year Environment Plan in 2018 (Defra, 2018a). The Environment Act (2021) requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023 (Defra, 2023b) 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.

2.13 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 Paragraph 3.5, include the long-term targets in the Statutory Instrument described in Paragraph 2.11, and interim targets to be achieved by 2028.

2.14 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 DfT in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

Planning Policy

National Policies

2.15 The National Planning Policy Framework (NPPF) (2024) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

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

2.16 To prevent unacceptable risks from air pollution, Paragraph 187 of the NPPF states that:

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

2.17 Paragraph 198 states:

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

2.18 More specifically on air quality, Paragraph 199 makes clear that:

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

2.19 The NPPF is supported by Planning Practice Guidance (PPG) (Department for Levelling Up, Housing and Communities), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

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

2.20 Regarding plan-making, the PPG states:

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

2.21 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*".

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

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

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

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

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

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

Local Transport Plan

2.25 SBC's third Local Transport Plan (LTP) outlines improvements in local transport during 2011-2026 (Slough Borough Council, 2011). A large component of the LTP concerns poor air quality, arising from the proximity of major transport corridors and hubs (including the M4 motorway and Heathrow Airport) and congested roads.

2.26 Sustainable Community Strategy (SCS) Theme 2: Health and Wellbeing details the LTP objective to '*protect and improve personal health*', to be achieved partially through improving local air quality. The LTP aims to achieve this through:

- Sustainable land use planning (limiting parking, requiring transport assessments, securing financial contributions from development, and tackling congestion through widening travel choices);
- Better management of congestion and speed;
- Cleaner buses, taxis, and commercial vehicles;
- Promoting less polluting travel, encouraging healthy active travel and promoting walking and cycling;
- Managing parking demand; and
- School and workplace travel plans.

2.27 SBC is currently in the process of producing an updated LTP 4; however, this has not yet been published.

Local Policies

Core Strategy

2.28 SBC adopted The Core Strategy Development Plan Document (Slough Borough Council, 2008) in December 2008, and within this Strategy, one of the strategic objectives is *"to reduce areas subject to risk of flooding and pollution and control the location of development in order to protect people and their property from the effects of pollution and flooding"*.

2.29 In relation to air quality, 'Core Policy 7 (Transport)' states:

"…Development proposals will, either individually or collectively, have to make appropriate provisions for:

Improving air quality and reducing the impact of travel upon the environment, in particular climate change…"

2.30 Additionally, 'Core Policy 8 (Sustainability and the Environment)' states:

"All development in the Borough shall be sustainable, of a high quality design, improve the quality of the environment and address the impact of climate change.

[…]

3. Pollution

Development shall not:

a) Give rise to unacceptable levels of pollution including air pollution, dust, odour, artificial lighting or noise;

b) Cause contamination or a deterioration in land, soil or water quality; and

c) Be located on polluted land, areas affected by air pollution or in noisy environments unless the development incorporates appropriate mitigation measures to limit the adverse effects on occupiers and other appropriate receptors."

Emerging Local Plan

2.31 SBC is currently working on a new Local Plan, which will supersede the existing Core Strategy, Site Allocations and Local Plan Saved Policies, once adopted (Slough Borough Council, n.d.). The new Local Plan will set out how to guide development in Slough through to 2036, and will contain policies to guide business and residential developments to meet the needs of Slough's expanding population.

Building Standards

2.32 Part F(1) of Schedule 1 of the Building Regulations 2010 as amended June 2022 (Ministry of Housing, Communities & Local Government, 2022) places a duty on building owners, or those responsible for relevant building work[1], to ensure adequate ventilation is provided to building occupants.

2.33 Approved Document F (HM Government, 2021a), which accompanies the Building Regulations, explains that care should be taken to minimise entry of external air pollutants. Specific steps should be taken to manage ventilation intakes where the building is near to a significant source of emissions,

[1] Building work is a legal term for work covered by the Building Regulations. With limited exemptions, the Regulations apply to all significant building work, including erecting or extending a building.

or if local ambient concentrations exceed values set in the Air Quality Standards Regulations 2010 (see Paragraph 3.10, later). These steps include maximising the distance between emission source and air intake, considering likely dispersion patterns, and considering the timing of pollution releases when designing the ventilation system.

2.34 Part S(1) of Schedule 1, and Regulation 44D, of the Building Regulations 2010 (Ministry of Housing, Communities & Local Government, 2022) define a requirement for the provision of infrastructure for charging electric vehicles. Precise requirements are explained further within Approved Document S (HM Government, 2021b) and depend on the overall number of parking spaces provided and the average financial cost of installation.

2.35 Compliance with the Building Regulations is not required for planning approval, but it is assumed that the Regulations will be complied with in the completed development.

Air Quality Action Plans

National Air Quality Plan

2.36 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018b) 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.

Local Air Quality Action Plan

2.37 SBC currently has five AQMAs for exceedances of the annual mean NO_2 objective. The Council has subsequently prepared Air Quality Action Plans (AQAPs) for AQMAs 1 and 2, as well as AQMAs 3 and 4 (Slough Borough Council, 2020). SBC is currently consolidating these action plans into one comprehensive AQAP to address air quality issues within all of the AQMAs.

2.38 This AQAP will determine existing NO_2 and particulate matter (PM_{10} and $PM_{2.5}$) concentrations, test the effectiveness of the measures outlined in the Low Emission Strategy (LES) programme in achieving compliance with the air quality objectives, and identify additional measures to tackle air pollution in the district.

2.39 SBC are currently consulting on a draft AQAP which will address poor air quality within the borough between 2024 to 2028 (Slough Borough Council, 2024a). The action plan outlines SBC's aim to achieve borough-wide NO_2 annual mean concentrations of under 35 $\mu g/m^3$, and to revoke SBC's AQMAs by 2030.

Low Emission Strategy

2.40 The Slough Low Emission Strategy (LES) (Slough Borough Council, 2018) forms part of the Slough Air Quality Action Plan. The LES lays out an integrated, year on year plan to improve air quality over the period until 2025.

2.41 The overarching aims of the LES are to:

- *"Improve air quality and health outcomes across Slough by reducing vehicle emissions through the accelerated uptake of cleaner fuels and technologies*
- *Embed an innovative approach to vehicle emission reduction through integrated policy development and implementation*
- *Provide a platform for inward investment as part of the transition to a low emission economy"*

2.42 Under Section 3.3 'Land-Use Planning & Development Management', the LES states:

"SBC will:

- *Adopt Air Quality Planning Guidance to provide clarity to developers through the planning system*
- *Seek air quality mitigation to be integrated into development schemes at the design stage*
- *Require appropriate air quality mitigation, proportionate in scale and kind to development scheme impact, including off-set mitigation on major schemes*
- *Introduce standards for plug-in vehicle charging on new development schemes*
- *Adopt emission controls for non-road mobile machinery (NRMM)"*

2.43 At the time of this assessment, SBC has not published the aforementioned Air Quality Planning Guidance.

3 Assessment Criteria

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

3.2 The UK-wide objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour mean nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m^3 (Defra, 2022). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM_{10} objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m^3 (Defra, 2022). The predicted annual mean PM_{10} concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM_{10} objective. Where predicted annual mean concentrations are below 32 µg/m^3 it is unlikely that the 24-hour mean objective will be exceeded.

3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2022). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1 hour or more, including outdoor eating locations and pavements of busy shopping streets.

3.4 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 limit value (see Paragraph 3.10), originally set at 25 µg/m^3 and currently set at 20 µg/m^3.

3.5 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[2]. 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.

3.6 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, as explained in Paragraph 2.14, all four new targets provide metrics against which central Government can assess its own progress. While local authorities have an

[2] 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.

important role delivering the required improvements, these are expected to relate to controlling emissions and not to directly assessing $PM_{2.5}$ concentrations against the targets.

3.7 In March 2023, the Department for Levelling Up, Housing and Communities (DLUHC, 2023) 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."

3.8 Defra has also provided advice (Defra, 2023c) which explains that there is no current requirement to consider the new $PM_{2.5}$ targets in planning decisions and that guidance to local planning authorities will be forthcoming before this position changes. In the future, when planning decisions do need to consider the new targets, the expectation is that this will focus on reducing emissions from new development rather than there being a direct requirement for planning-related air quality assessments to predict $PM_{2.5}$ concentrations.

3.9 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.

3.10 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010)[3]. The limit values for nitrogen dioxide 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).

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

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

Pollutant	Time Period	Value
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [a]
$PM_{2.5}$	Annual Mean	20 µg/m^3 [b]

[a] A proxy value of 32 µg/m^3 as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM_{10} objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM_{10} objective are possible (Defra, 2022).

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

[b] There is no numerical $PM_{2.5}$ objective for local authorities (see Paragraph 3.4). Convention is to assess against the UK limit value which is currently 20 µg/m^3.

3.12 Table 3-2 sets out the relevant critical levels and critical loads for the designated ecological sites in the study area, as taken from the Air Pollution Information System (APIS) website (APIS, 2024). Where critical loads are not available, no assessment can be carried out, although predicted PCs are presented in the report for completeness. The assessment levels for designated ecological sites apply within the boundary of each designated site.

Table 3-2: Assessment Levels for Designated Ecological Sites

Site	Maximum 24-hour Mean NOx	NOx	Annual Mean	
			Nutrient Nitrogen Deposition	Acid Deposition [a]
Arthur Jacob Nature Reserve (LNR)	200 µg/m^3	30 µg/m^3	5 [b]	0.1 [b]
South West London Waterbodies/ Wraysbury Reservoir (Ramsar/SPA/SSSI) [c]			10	- [d]
Staines Moor (SSSI)			10	4.856

[a] MinCLMaxN

[b] Values taken from 'Bogs' habitat type on APIS.

[c] Nutrient Nitrogen Deposition and Acid Deposition values taken from SSSI designation as no data available for Ramsar designation.

[d] Not available on APIS.

3.13 EA guidance (Environment Agency, 2023)describes two assessment levels for maximum 24-hour mean NOx, and advises that the higher 200 µg/m^3 assessment level can be used for detailed assessments where ozone is below the AOT40 critical level and sulphur dioxide is below the lower critical level of 10 µg/m^3 . Background annual mean concentrations of sulphur dioxide are well below 10 µg/m^3 across the UK, and ozone is generally low in urban regions such as Greater London and its surroundings. It is therefore appropriate to use 200 µg/m^3 as the critical level for this assessment.

Construction Dust Criteria

3.14 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)[4] (2024) has been used. Full details of this approach are provided in Appendix A1.

Screening Criteria

Road Traffic Assessments

3.15 Environmental Protection UK (EPUK) and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated

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

by a development have the potential for significant air quality impacts. The approach, as described in Appendix A1, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.

3.16 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A1) inside an AQMA are a change in flows of more than 25 Heavy Duty Vehicles (HDVs) or 100 Light Duty Vehicles (LDVs) as an annual average daily traffic (AADT); 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 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*".

Point Source Assessments

3.17 EPUK and the IAQM have developed an approach (Moorcroft and Barrowcliffe et al, 2017) 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 A1 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".

3.18 This screening approach requires professional judgement, and the experience of the consultants preparing the assessment is set out in Appendix A3.

3.19 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".

3.20 As a first step, the assessment of emissions from the generators within the development has considered the predicted process contributions using the following EPUK/IAQM 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?

3.21 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.

4 Assessment Approach

Consultation

4.1 The assessment follows a methodology agreed with SBC via email correspondence between Sophia Norfolk (Principal Environment Officer at SBC) and Faye Wilder (Air Quality Consultants) on 29 October 2023. Specifically, the following key points were agreed:

- traffic generated by the proposed development will be below screening thresholds, therefore detailed roads dispersion modelling is not required;
- emergency generators will be tested using ADMS-6, considering concentrations of NOx, PM_{10}, and $PM_{2.5}$; and
- a construction dust risk assessment will be undertaken using the IAQM's 2024 Guidance.

Study Area

4.2 The study area covers a 10 km x 10 km model domain, centred on the emergency generator exhaust within the proposed development, described further in Paragraph 4.7.

4.3 The construction dust assessment considers the potential for impacts within 250 m of the site boundary, or within 50 m of roads used by construction vehicles within 250 m of the site. The specific areas considered are detailed in Section 6.

Receptors

4.4 Concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ have been predicted at a number of locations close to the proposed development, in line with the EPUK/IAQM guidance. Receptors have been identified to represent a range of exposure, including worst-case locations (these being at the façades of the residential and commercial properties closest to the sources, and at nearby ecological sites). Attention has been paid to selecting receptors at locations where the impacts of the generator emissions are likely to be greatest.

4.5 Sixteen existing residential properties have been identified as receptors for the assessment, alongside one nearby school, one nearby pub, one nearby hotel, and one nearby commercial food café. Three ecological sites have also been identified as receptors for the assessment, with receptors selected at worst case locations of the ecological site. These locations are described in Table 4-1 and shown in Figure 4-1.

Table 4-1: Description of Receptor Locations

Receptor	Type	X coordinate	Y coordinate	Heights Modelled (m) [a]
Existing properties				
R1	Residential	5021856	176916	1.5
R2	Residential	503266	176585	1.5
R3	Residential	503340	176549	1.5
R4	Residential	503280	176718	1.5

Receptor	Type	X coordinate	Y coordinate	Heights Modelled (m) [a]
R5	Residential	502992	176027	1.5
R6	Residential	502837	176444	1.5
R7	Residential	502786	176445	1.5
R8	Hotel	503024	176430	1.5
R9	Residential	503184	176765	1.5
R10	Residential	502815	176820	1.5
R11	Residential	503047	176859	1.5
R12	Residential	502133	175675	1.5
R13	Residential	502101	175774	1.5
R14	Residential	502955	176481	1.5
R15	Residential	503054	176792	1.5
R16	Residential	503104	175650	1.5
R17	School	502615	176991	1.5
R18	Residential	502553	177011	1.5
R19	Commercial/Food	503122	176234	1.5
R20	Pub	5030452	175737	1.5
Ecological Sites				
E1	Ecological – LNR	502389	176069	1.5
E2	Ecological – SPA and Ramsar	502703	175715	1.5
E3	Ecological – SPA and Ramsar	502839	175688	1.5
E4	Ecological – SPA and Ramsar	502938	175644	1.5
E5	Ecological – SSSI	503446	175477	1.5
E6	Ecological – SSSI	503376	175450	1.5

[a] A height of 1.5 m is used to represent ground-floor level exposure.

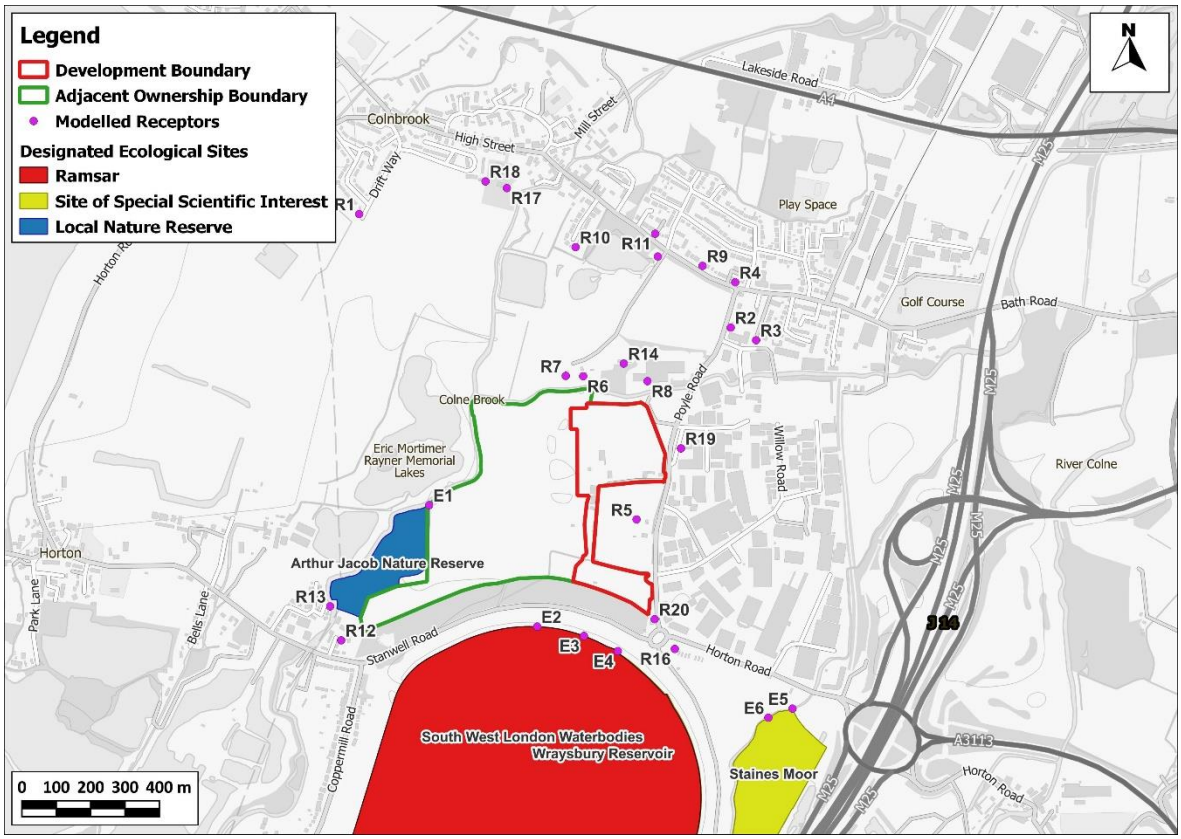

Figure 4-1: Receptor Locations

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

4.6 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the proposed development and the overall significance of effects.

4.7 Impacts as a result of plant emissions have been predicted over a 10 km x 10 km model domain, with the proposed development at the centre. Concentrations have been predicted across this area using nested Cartesian grids (see Figure 4-2). These grids have a spacing of 5 m x 5 m within 200 m of the facility, 25 m x 25 m within 400 m, 50 m x 50 m within 1,000 m, 250 m x 250 m within 2,000 m, and 500 m x 500 m within 5,000 m of the facility. The receptor grid has been modelled at a height of 1.5 m above ground level.

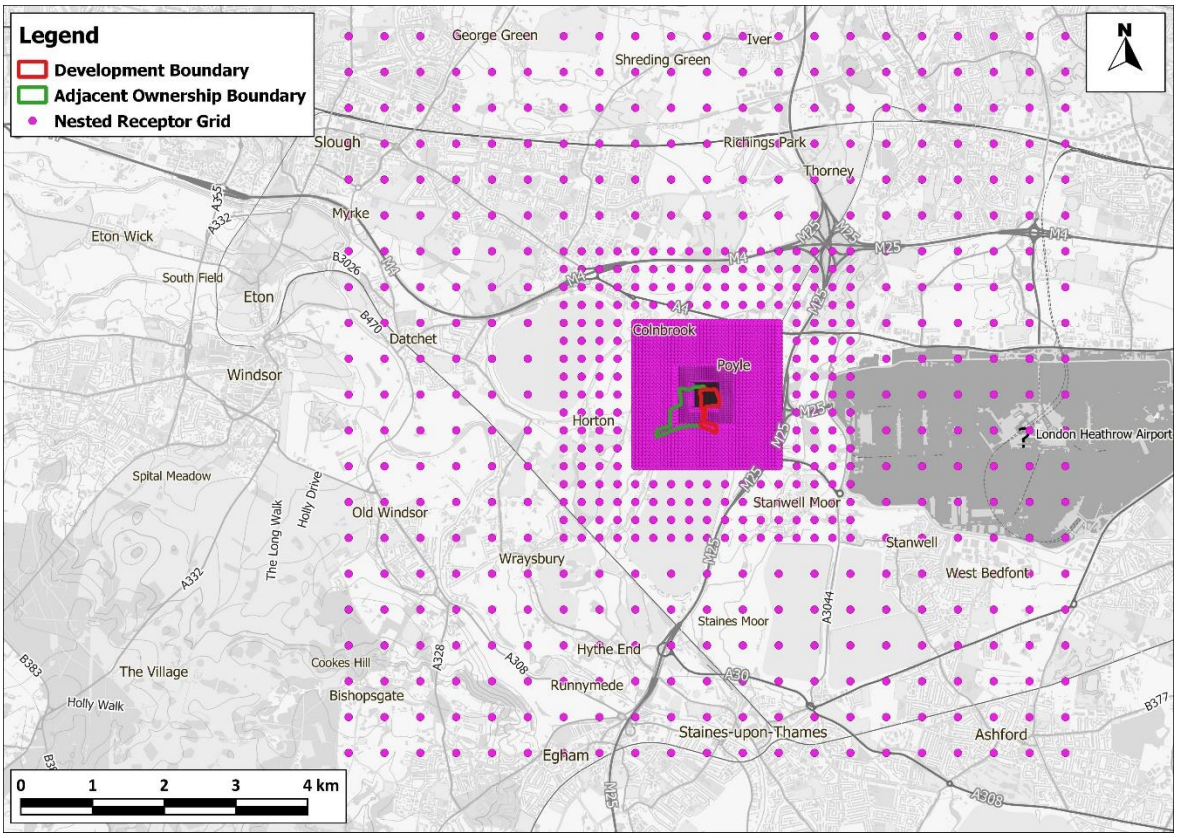

Figure 4-2: Nested Cartesian Grids of Receptors

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

4.8 The construction dust risk assessment approach does not require specific receptors to be identified; instead, the numbers of different types of receptors within given distance bands are counted. These receptor counts are provided in Section 6.

Existing Conditions

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

- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2024b);
- 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. This covers both the study area and nearby sites, the latter being used to provide context for the assessment;
- background concentrations have been defined using Defra's 2018-based background maps (Defra, 2024a). These cover the whole of the UK on a 1x1 km grid. Mapped background concentrations of NO_2, PM_{10} and $PM_{2.5}$ have not been adjusted; and

- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations published by Defra (2020; 2024c). These are the maps used by the UK Government, together with the results from national Automatic Urban and Rural Network (AURN) monitoring sites that operate to the required data quality standards, to identify and report exceedances of the limit value. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2024c), which are available for the years 2009 to 2022, show no exceedances of the limit values anywhere in the UK in 2022.

Construction Impacts

4.10 The construction dust assessment considers the potential for impacts within 250 m of the site boundary, or within 50 m of roads used by construction vehicles. The assessment methodology is that provided by IAQM (2024). 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 A1 explains the approach in more detail.

Road Traffic Impacts

4.11 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 3.15 and detailed further in Appendix A1. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Impacts of the Proposed Diesel Generators

4.12 The proposed development will have 47 emergency diesel generators to power the data centre in the event of major grid failure. The specifications for these generators, upon which the assessment is based, are set out in Appendices A3 and A4.

Screening

4.13 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 (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraphs 3.17 and 3.18. Where plant impacts cannot be screened out against these criteria, a further stage of screening is required, whereby the modelled contributions of the plant are compared to further screening criteria, as described in Paragraphs 3.19 to 3.21. 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 generator emissions, which has been required for this project.

Emissions Data

4.14 The emissions data input into the model for the generators have been determined using the data set out in the technical datasheets for the plant to be installed, based upon the fuel consumption, fuel composition, typical operating conditions and combustion chemistry. Further details of the emissions data used in this assessment are provided in Appendix A3.

Modelling Methodology

4.15 The impacts of emissions from the proposed generators 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 A3. The air quality modelling has been carried out based on a number of necessary assumptions, detailed further in Paragraph 4.26 and in Appendices A3 and A4. Where possible a realistic worst-case approach has been adopted.

4.16 Each generator will be tested once per month for up to one hour, with only one generator being tested at a time. The generators will also be used when there is power failure from the national grid. Since the timings of the testing and of any loss of power from the grid are unknown, there is uncertainty about the future meteorological conditions that will occur when the generators are operational. For assessment purposes, therefore, a reasonable approach has been taken to model a single generator as operating continuously throughout the year. This ensures that worst-case meteorological conditions are captured for assessing impacts against short-term assessment levels. For assessment against the nitrogen dioxide annual mean objective, the modelled annual mean concentrations assuming continuous operation by a single generator have then been factored to account for 564 hours of operation (12 hours per generator per annum, for 47 generators). This has been done by multiplying the annual mean model outputs by 0.0644 (i.e. 564/8760).

Assessment Scenarios

4.17 Nitrogen dioxide concentrations as a result of emissions from the energy plant have been predicted for the year 2023 for the following scenarios:

- with the main development building; and
- without the main development building.

4.18 The assessment year of 2023 has been selected as a worst-case approach, since air quality is expected to improve in future years.

4.19 The maximum predicted concentration from any of these scenarios has been used throughout this assessment. 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.

4.20 Predictions for 2023 are based on a return to 'typical' activity levels and assume no impact as a result of the Covid-19 pandemic in this year, to ensure a worst-case assessment (as the influence of the pandemic has generally been to reduce concentrations of the pollutants considered in this assessment).

Impact Description

4.21 The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table 4-2 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is

the case for this assessment, the AQAL will be the air quality objective. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 4-2: Air Quality Impact Descriptors for Individual Receptors for All Pollutants [a]

Long-Term Average Concentration At Receptor In Assessment Year [b]	Change in concentration relative to AQAL [c]				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

[a] Values are rounded to the nearest whole number.

[b] This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

[c] AQAL = Air Quality Assessment Level, which may be an air quality objective, GLA target, limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

Short Term Impacts

4.22 Environment Agency guidance (Environment Agency, 2023) recommends a criterion of 10% of the short-term environmental standard when assessing short-term concentrations. Thus, if the 99.79th percentile of hourly mean process contributions from the facility is less than 10% of the objective level (i.e. <20 µg/m^3 for 24-hour mean NO_2), the contribution can be considered insignificant without the need to consider total concentrations.

4.23 Where the process contribution cannot immediately be screened out, it is added to the baseline concentration to determine the 99.79th percentile of total hourly mean concentrations. Where this total concentration is below 200 µg/m^3, it can be assumed that the short-term objective will not be exceeded, and the impacts are considered to be 'not significant'.

Uncertainty

4.24 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 proposed development is definitely going ahead, 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 A4, the conclusions of this assessment will remain valid.

4.25 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 applied to address specific uncertainties and to ensure a worst-case assessment.

Assumptions

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

- that the diesel generator will operate for a full hour during testing, which will over-state the emissions from this plant;
- that the tests will be conducted at 100% load;
- that the temperature of the exhaust emissions will not vary significantly between the point of exhaust from the engine and the point of release to the atmosphere; and
- that the Heathrow Airport meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A3).

Assessment of Significance

Construction Dust Significance

4.27 Guidance from IAQM (2024) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational Significance

4.28 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 (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the report is set out in Appendix A3. Full details of the EPUK/IAQM approach are provided in Appendix A1.

5 Baseline Conditions

Relevant Features

5.1 The proposed development is located within the administrative area of SBC, approximately 800 m west of the M25, and 1.5 km west of Heathrow Airport. The application site is bounded by Poyle Road to the east, and Stanwell Road to the south. It currently consists of grassland in the western and southern parts of the site, with existing industrial use in the northeast of the site. There is an existing industrial estate located directly east of the proposed development. There are two residential properties approximately 100 m from both Parcel 1 and Parcel 2 of the proposed development.

5.2 The proposed development is located north of the Spelthorne Borough Council AQMA, west of the London Borough of Hillingdon AQMA, and 1.4 km southeast of the Slough AQMA No.2, as highlighted in Figure 1-1.

Industrial Sources

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

Local Air Quality Monitoring

5.4 SBC operates five automatic monitoring stations within its area, the nearest of which, site 'SLH 3' is located approximately 700 m northeast of the proposed development. Additionally, SBC undertook non-automatic (passive) nitrogen dioxide monitoring at 74 sites during 2023 using diffusion tubes prepared and analysed by SOCOTEC (Didcot) (using the 50% TEA in acetone method). These include thirteen within 800 m of the proposed development, the closest of which being diffusion tube 'SLO 17', located approximately 140 m southeast of the proposed development.

5.5 Annual mean results for the years 2019 to 2023 are summarised in Table 5-1, while results relating to the 1-hour mean objective are summarised in Table 5-2. The monitoring locations are shown in Figure 5-1. The monitoring data have been taken from SBC's 2024 Annual Status Report (ASR) (Slough Borough Council, 2024b).

Table 5-1: Summary of Annual Mean NO_2 Monitoring (2019-2023) (µg/m^3)

Site No.	Site Type	Location	2019	2020	2021	2022	2023
SLH 3	Suburban	Slough-Colnbrook-(Pippins)	26.1	16.2	17.8	21.1	-
SLH 7	Other	Slough-Chalvey, M4	32.7	21.3	20.9	-	-
SLO 13	Suburban	Elbow Meadows	28.9	20.9	19.6	21.9	18.2
SLO 17	Suburban	Horton Road (Caravan Park)	33.3	24.9	25.7	28.3	25.6
SLO 96	Roadside	Poyle Rd	28.4	20.5	20.1	23.1	20.7

Site No.	Site Type	Location	2019	2020	2021	2022	2023
SLO 98	Suburban	The Hawthorns -Pippins (2)	-	17.1	18.1	-	-
SLO 99	Suburban	The Hawthorns -Pippins (3)	-	18.0	18.1	-	-
SLO 100	Suburban	The Hawthorns -Pippins (4)	-	16.7	15.4	-	-
SLO 127	Roadside	King John's Palace, Park Park Street	-	-	-	-	24.1
SLO 128	Roadside	Park Street (north)	-	-	-	-	23.0
SLO 129	Roadside	Park Street (south)	-	-	-	-	17.9
SLO 130	Roadside	Bath Road (a)	-	-	-	-	24.6
SLO 131	Roadside	Bath Road (b)	-	-	-	-	-
Objective			**40**				

Table 5-2: Number of Hours With NO_2 Concentrations Above 200 µg/m^3 [a]

Site No.	Site Type	Location	2019	2020	2021	2022	2023
SLH 3	Suburban	Slough-Colnbrook-(Pippins)	0	0	0	0 (74.0)	-
Objective			**18 (200) [c]**				

[a] Values in brackets are 99.79th percentiles, which are presented where data capture is <75%.

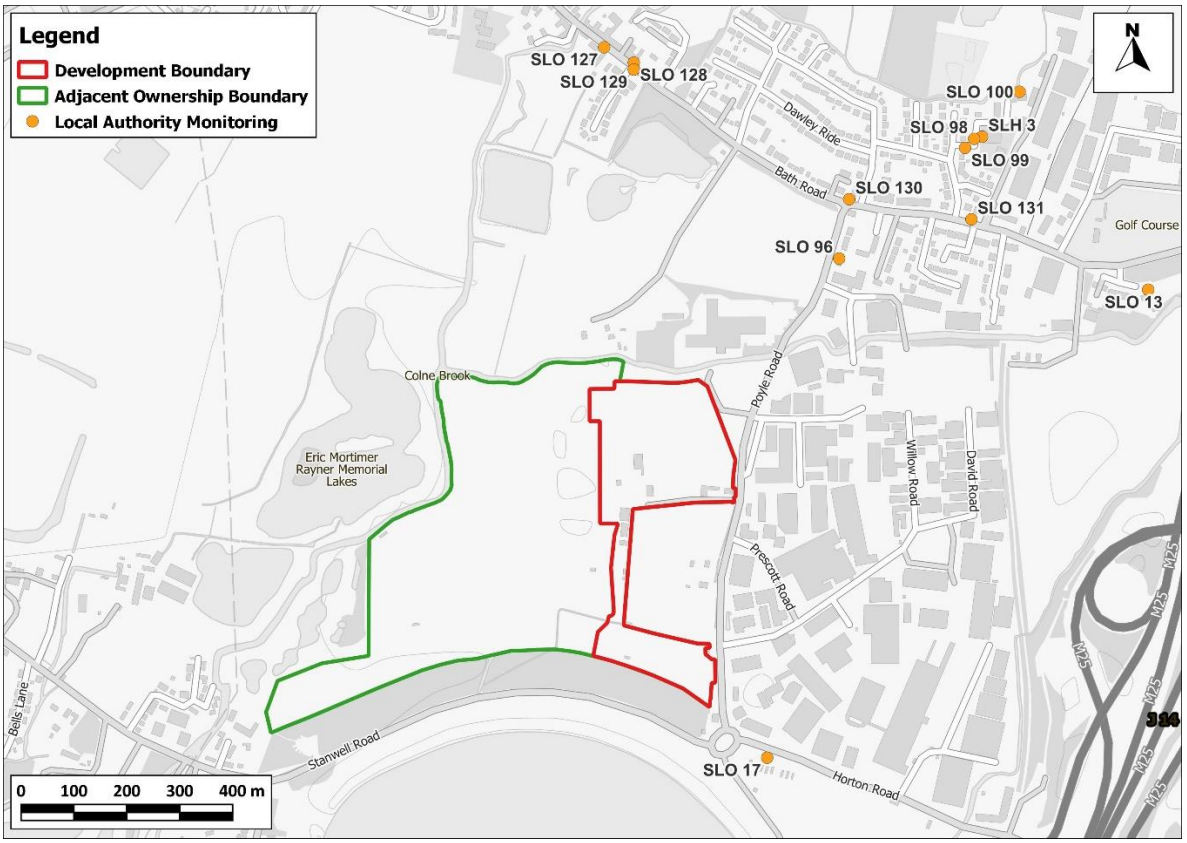

Figure 5-1: Monitoring Locations

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

5.6 As shown in Table 5-1, measured annual mean NO_2 concentrations have been below the annual mean NO_2 objective at all locations for the presented monitoring period of 2019 to 2023. Additionally, as shown in Table 5-2, there have been no exceedances of the 1-hour NO_2 mean in the last five years. At sites which have five years of monitoring data ('SLO 13', 'SLO19' and 'SLO96'), a downward trend in NO_2 concentration can be observed.

5.7 The 'SLH 3' suburban automatic monitoring station, located adjacent to Pippins Primary School approximately 700 m northeast of the proposed development, is the closest station which measures PM_{10} concentrations, however, no data were recorded for 2023. Co-located automatic monitoring stations 'SLH 8' and 'SLH 9', adjacent to the A4, 1.2 km north of the proposed development, were the closest stations which recorded PM_{10} data in 2023. The 'SLH 9' monitor also measures $PM_{2.5}$ concentrations. Annual mean results for the years 2019 to 2023 are summarised in Table 5-3, while results relating to the daily mean objective are summarised in Table 5-4.

Table 5-3: Summary of Annual Mean PM_{10} and $PM_{2.5}$ Monitoring (2019-2023) (µg/m³)

Site No.	Site Type	Location	2019	2020	2021	2022	2023
PM_{10}							
SLH 3	Suburban	Slough Colnbrook-(Pippins)	16.4	17.0	15.2	17.0	-

Site No.	Site Type	Location	2019	2020	2021	2022	2023
SLH 8	Industrial	Slough-Lakeside2 (run by Lakeside Energy from Waste Ltd)	15.0	14.0	12.4	14.5	12.6
SLH 9	Urban Background	Slough-Lakeside2 (run by Lakeside Energy from Waste Ltd) Co-located Osiris	14.0	16.7	12.6	18.3	13.8
Objective			**40**				
$PM_{2.5}$							
SLH 9	Urban Background	Slough-Lakeside2 (run by Lakeside Energy from Waste Ltd) Co-located Osiris	7.0	5.5	5.5	7.6	5.9
Objective			**20 [a]**				

[a] 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.

Table 5-4: Number of Days With PM_{10} Concentrations Above 50 µg/m³

Site No.	Site Type	Location	2019	2020	2021	2022	2023
SLH 3	Suburban	SloughColnbrook-(Pippins)	3	0	0	0 (27.9)	-
SLH 8	Industrial	Slough-Lakeside2 (run by Lakeside Energy from Waste Ltd)	3	0	0	1	0
SLH 9	Urban Background	Slough-Lakeside2 (run by Lakeside Energy from Waste Ltd) Co-located Osiris	0 (24)	4	2 (23.2)	7	1
Objective			**35 (50) [a]**				

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

5.8 As shown in Table 5-3, there have been no exceedances in the annual mean PM_{10} or $PM_{2.5}$ annual mean objectives at any of the presented monitoring sites within the last five years. Furthermore, as demonstrated in Table 5-4, there have been no exceedances of the 24-hour PM_{10} mean.

5.9 While 2020 and 2021 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of 'typical' air quality conditions due to the considerable impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations.

Exceedances of Limit Value

5.10 There are no AURN (Defra, 2024d) monitoring sites within 1 km of the application site with which to identify exceedances of the annual mean nitrogen dioxide limit value. Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2024c), which are used to identify and report exceedances of the limit value, do not identify any exceedances within 1 km of the application site in 2023. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

Background Concentrations

5.11 Estimated background concentrations at the proposed development are set out in Table 5-5 and are all well below the objectives. A range of values is presented as the study area covers multiple 1x1 km grid squares.

Table 5-5: Estimated Annual Mean Background Pollutant Concentrations in 2023 and 2027 (µg/m³)

Year	NO_2	PM_{10}	$PM_{2.5}$
2023	15.1 – 16.3	14.0 – 14.7	9.6 – 9.9
2027	13.4 – 14.6	13.6 – 14.4	9.3 – 9.6
Objective	**40**	**40**	**20** [a]

[a] 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.

Baseline Concentrations

5.12 The baseline concentration at the modelled receptors is best described by nearby local monitoring undertaken by the SBC. Table 5-6 sets out the baseline NO_2 concentrations used in this assessment.

Table 5-6: Baseline NO_2 Concentrations Used in Assessment

Location	Value (µg/m³)	Derivation
Annual Mean NO_2 Concentrations		
All Receptors Close to Roads	25.6	Highest concentration across all of the roadside measurements (excluding within AQMAs) in the nearby study area
All Receptors Away from Roads	18.2	Highest concentration across all of the measurements at monitoring sites away from the road network in the study area

Location	Value (µg/m³)	Derivation
1-hour Mean NO_2 Concentrations		
All Receptors Close to A-Roads	51.2	2 x the annual mean
All Receptors Away from A-Roads	36.4	

Designated Ecological Sites

5.13 The estimated annual mean background NOx concentrations at the designated ecological sites have been derived using Defra's background maps (Defra, 2020). The baseline nutrient nitrogen and acid deposition fluxes have been defined using APIS (APIS, 2024) and are 5 km x 5 km grid square averages based on the three year mean between 2019 and 2021. The results are presented in Table 5-7.

5.14 The NOx concentrations are well below the critical level of 30 µg/m³ at the Arthur Jacob Nature Reserve (LNR) and South West London Waterbodies/ Wraysbury Reservoir (Ramsar/SPA/SSSI). Estimated NOx concentrations at the Staines Moor LNR are substantially higher, which appears to be because the 1 km grid square covering the site in the Defra maps is approximately centred on the M25 motorway; actual concentrations at the LNR are expected to be appreciably lower. Baseline nutrient nitrogen fluxes are above the critical loads at sites South West London Waterbodies/ Wraysbury Reservoir (Ramsar/SPA/SSSI) and Staines Moor (SSSI), which is the case for very many designated ecological sites across the UK.

5.15 Table 5-8 sets out the baseline values used in this assessment.

Table 5-7: Background NOx Concentrations and Deposition Fluxes at Designated Ecological Sites

Designated Site	NOx (µg/m³)	Nutrient Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)
Arthur Jacob Nature Reserve (LNR)	22.9	14.0	1.95
South West London Waterbodies/ Wraysbury Reservoir (Ramsar/SPA/SSSI)	20.8	12.3–12.8	1
Staines Moor (SSSI)	41.3	12.8	1

Table 5-8: Baseline NOx Concentrations and Deposition Fluxes Used in Assessment

Pollutant and Averaging Period	Value	Derivation
Arthur Jacob Nature Reserve (LNR)		
Annual Mean NOx (µg/m³)	22.9	Table 5-7
Maximum 24-hour Mean NOx (µg/m³)	45.7	2 x the annual mean

Pollutant and Averaging Period	Value	Derivation
Nutrient Nitrogen Deposition (kgN/ha/yr)	14.0	Table 5-7
Acid Deposition (keq/ha/yr)	1.95	Table 5-7
South West London Waterbodies/ Wraysbury Reservoir (Ramsar/SPA/SSSI) *		
Annual Mean NOx (µg/m^3)	20.8	Table 5-7
Maximum 24-hour Mean NOx (µg/m^3)	41.6	2 x the annual mean
Nutrient Nitrogen Deposition (kgN/ha/yr)	12.8	Table 5-7
Acid Deposition (keq/ha/yr)	1	Table 5-7
Staines Moor (SSSI)		
Annual Mean NOx (µg/m^3)	41.3	Table 5-7
Maximum 24-hour Mean NOx (µg/m^3)	82.5	2 x the annual mean
Nutrient Nitrogen Deposition (kgN/ha/yr)	12.8	Table 5-7
Acid Deposition (keq/ha/yr)	1	Table 5-7

6 Construction Phase Impact Assessment

Construction Traffic

6.1 The volume of construction traffic that will access the site on any given day is unknown. Given the medium size of the site (see below) it is likely that the peak number of construction vehicles accessing the site each day will be below 25 HGVs AADT; thus, the average daily construction traffic flows will be below the relevant screening criterion recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) for within an AQMA.

6.2 It is 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.

On-Site Exhaust Emissions

6.3 The IAQM guidance (IAQM, 2024) 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".

The proposed development is classed as medium sized (see below), and the majority of the site area is more than 50 m from any sensitive receptors. The areas in which NRMM and site traffic will typically operate are thus likely to be located more than 50 m away from any sensitive properties. It is judged that there is no risk of significant effects at existing receptors as a result of on-site machinery emissions.

Construction Dust and Particulate Matter Emissions

6.4 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A1), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

6.5 There will be a requirement to demolish approximately 12 brick buildings with an approximate total volume of under 18,000 m^3. The method of demolition has not yet been decided. Based on the example definitions set out in Table A1-1 in Appendix A1, the dust emission class for demolition is considered to be *small*.

Earthworks

6.6 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2024), 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	Mixed (Argillac – Arenaceous [a] – Rudaceous [b])
European Soil Bureau Description	Riverine Clay and Floodplain Sands and Gravel / River Terrace Sand / Gravel
Soil Group	All
Soil Texture	Sand to Sandy Loam [c] / Clay to Sandy Loam

[a] grain size 0.06 – 2.0 mm.

[b] grain size > 2.0 mm.

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

6.7 The parcel boundary covers approximately 87,000 m^2 and most of this will be subject to earthworks, involving removal of the foundations of the demolished buildings and breaking up of a paved area. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table A1-1 in Appendix A1, the dust emission class for earthworks is considered to be *medium*.

Construction

6.8 The proposed development involves the construction of one brick industrial properties, with a total building volume of over 75,000 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 A1, the dust emission class for construction is considered to be *large*.

Trackout

6.9 The number of heavy vehicles accessing the site, which may track out dust and dirt, is currently unknown, but given the medium size of the site it is likely that there will be a maximum of 12 outward heavy vehicle movements per day. Based on the example definitions set out in Table A2-1 in Appendix A1, the dust emission class for trackout is considered to be *small*.

6.10 Table 6-2 summarises the dust emission magnitude for the proposed development.

Table 6-2: Summary of Dust Emission Magnitude

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

Sensitivity of the Area

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

6.12 The IAQM guidance explains that residential properties are 'high' sensitivity receptors to dust soiling, while places of work are a 'medium' sensitivity receptor (Table A2-2 in Appendix A1). Residential properties are also classified as being of 'high' sensitivity to human health effects, while places of work are classified as being of 'medium' sensitivity. There are a small number of workplaces within 20 m of the site, and approximately three residential properties and 10 places of work within 50 m of the site (see Figure 6-1).

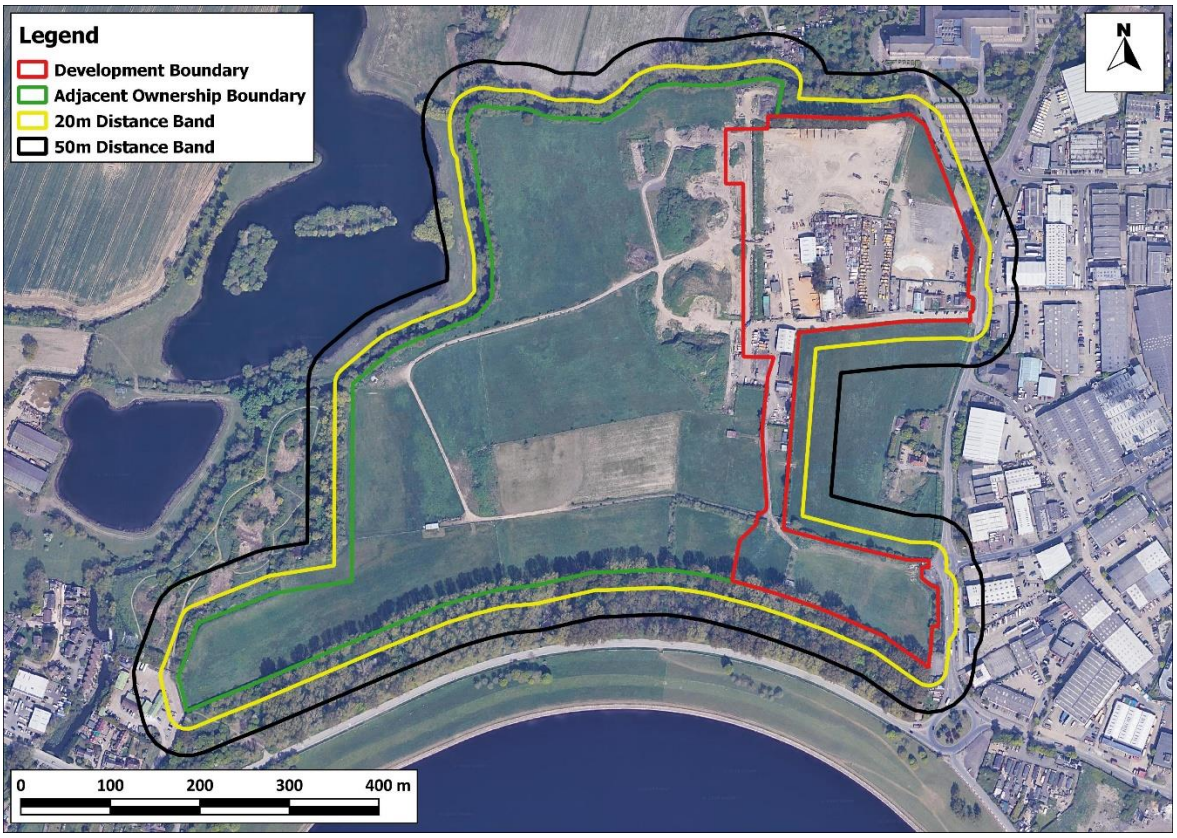

Figure 6-1: 20m and 50 m Distance Bands around Site Boundary

Imagery ©2024 Airbus, Maxar Technologies, Map data ©2024

6.13 The IAQM guidance (IAQM, 2024) explains that there is a risk of material being tracked 250 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are a small number of workplaces within 20 m of the trackout routes, and approximately two residential properties and 10 places of work within 50 m of the roads along which material could be tracked (see Figure 6-2).

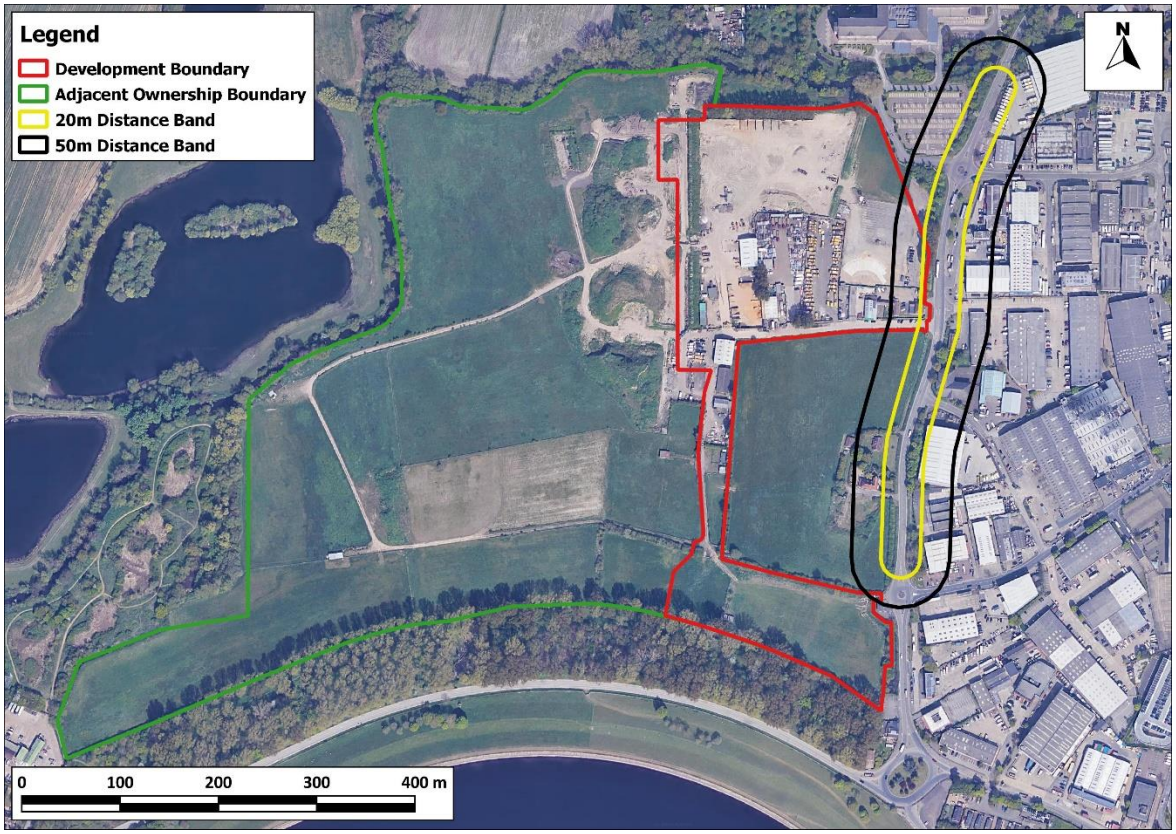

Figure 6-2: 20 m and 50 m Distance Bands around Roads Used by Construction Traffic Within 250 m of the Site Exit

Imagery ©2024 Airbus, Maxar Technologies, Map data ©2024

Sensitivity of the Area to Effects from Dust Soiling

6.14 Using the information set out in Paragraph 6.12 and Figure 6-1 alongside the matrix set out in Table A1-3 in Appendix A1, the area surrounding the onsite works is of 'medium' sensitivity to dust soiling. Using the information set out in Paragraph 6.13 and Figure 6-2 alongside the same matrix, the area is also of 'medium' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

6.15 The matrix in Table A1-4 in Appendix A1 requires information on the baseline annual mean PM_{10} concentration in the area. The properties nearest the site are away from local roads and the existing annual mean PM_{10} concentration is best described by the background concentration from Table 5-5 (14.7 µg/m^3). Using the information set out in Paragraphs 6.12 and Figure 6-1 alongside the matrix in Table A1-4 in Appendix A1, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 6.13 and Figure 6-2 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

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

Summary of the Area Sensitivity

6.17 Table 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	Medium Sensitivity	Medium Sensitivity
Human Health	Low Sensitivity	Low Sensitivity
Ecological	None	None

Risk and Significance

6.18 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 A1-6 in Appendix A1, 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 Section 8 (Step 3 of the assessment procedure).

Table 6-4: Summary of Risk of Impacts Without Mitigation

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

6.19 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2024).

7 Operational Impact Assessment

Assessment of Development-Generated Road Traffic Emissions

7.1 SLR Consulting Limited, the project traffic consultants, have confirmed that the maximum net increase in LDVs generated from the proposed development along any nearby road is 220 AADT (travelling from the site exit north along Poyle Road). These daily trip rates are below the screening threshold of 500 LDVs recommended for use outside of an AQMA in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Paragraph 3.16).

7.2 AADT flows along Stanwell Road will increase by 33 AADT (net). Considering the small increase in traffic expected along Stanwell Road, and the extremely small modelled NOx process contribution from the generators (see Table 7-4), the number of other committed developments that would be required to cause in combination impacts greater than 1000 AADT, or an increase in 1%, would need to be very large. As such, it is judged that there is no need for detailed roads modelling on the nearby Wraysbury Reservoir internationally designated ecological site. Furthermore, the Wraysbury Reservoir is approximately 65 m from Stanwell Road and separated from it by an elevated hillside which extends south of Stanwell Road, and will act as a barrier from road traffic emissions using Stanwell Road, therefore acting as mitigation against any air quality impacts on the road.

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

Detailed Assessment of Energy Plant Emissions

Human Health

Impacts on Annual Mean NO_2 Concentrations

7.4 The predicted annual mean nitrogen dioxide concentrations at each receptor, including emissions from the proposed energy plant, are shown in Table 7-1 for the baseline year 2023. The concentrations shown for "With Plant" include the baseline concentrations. Concentrations have been calculated following the methodology set out in Section 4 and in Appendix A3.

Table 7-1: Predicted Annual Mean Nitrogen Dioxide (NO_2) Concentrations (µg/m³) [c]

Receptor	Baseline [a]	"With Plant"	% Change [b]	Impact Descriptor
R1	18.2	18.2	0	Negligible
R2	25.6	25.9	1	Negligible
R3	18.2	18.5	1	Negligible
R4	25.6	25.8	1	Negligible
R5	18.2	18.3	0	Negligible
R6	18.2	18.4	0	Negligible
R7	18.2	18.4	0	Negligible

Receptor	Baseline [a]	"With Plant"	% Change [b]	Impact Descriptor
R8	18.2	18.6	1	Negligible
R9	25.6	25.9	1	Negligible
R10	18.2	18.3	0	Negligible
R11	25.6	25.8	0	Negligible
R12	18.2	18.3	0	Negligible
R13	18.2	18.3	0	Negligible
R14	18.2	18.4	0	Negligible
R15	25.6	25.8	1	Negligible
R16	25.6	25.7	0	Negligible
R17	18.2	18.3	0	Negligible
R18	18.2	18.3	0	Negligible
R19	25.6	25.7	0	Negligible
R20	25.6	25.7	0	Negligible
Objective	40	-	-	

[a] The baseline concentration is the 2023 annual average NO_2 concentration, as presented in Table 5-6.

[b] % changes are relative to the objective (40 µg/m^3) and have been rounded to the nearest whole number.

[c] The annual mean AQS do not apply at the locations where rows have been greyed out

7.5 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors.

7.6 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to be 0% at 14 receptors. As per paragraph 3.20, these impacts are described as negligible. The percentage changes in concentrations (rounded) are 1 % at the remaining six receptors, and since the total "with plant" concentrations are below 94% at these receptors, the impacts can also be described as negligible.

7.7 Road traffic emissions are not included in this assessment, so receptors in close proximity to roads may have higher concentrations than presented in Table 7-1. However, as detailed in the previous paragraph, the percentage change in concentrations at these receptors are negligible, as the concentrations are 0–1% of the relevant air quality objective or AQAL the impacts would be considered negligible regardless of the absolute concentration.

Impacts on Short-Term NO_2 Concentrations

7.8 Table 7-2 shows the 99.79th percentile 1-hour mean nitrogen dioxide concentrations for each receptor. As explained in Paragraph 4.16, the approach to assessing short-term impacts has been to assume the generator will operate continuously at full load.

7.9 At all receptors, the total 'with plant' concentration will not exceed nor approach the 1-hour mean nitrogen dioxide objective.

Table 7-2: Predicted 99.79th Percentile 1-hour Mean Nitrogen Dioxide Concentrations (µg/m³)

Receptor (height)	Baseline [a]	"With Plant"	% Change [b]	% of short-term Objective
R1	36.4	51.3	7	25.7
R2	51.2	73.9	11	37.0
R3	36.4	57.1	10	28.6
R4	51.2	71.5	10	35.8
R5	36.4	65.2	14	32.6
R6	36.4	76.4	20	38.2
R7	36.4	77.5	21	38.7
R8	36.4	78.7	21	39.4
R9	51.2	70.0	9	35.0
R10	36.4	55.2	9	27.6
R11	51.2	67.2	8	33.6
R12	36.4	55.6	10	27.8
R13	36.4	57.0	10	28.5
R14	36.4	62.3	13	31.2
R15	51.2	68.7	9	34.3
R16	51.2	66.8	8	33.4
R17	36.4	51.3	7	25.7
R18	36.4	52.5	8	26.3
R19	51.2	82.1	15	41.1
R20	51.2	68.1	8	34.1

[a] Annual baseline has been doubled in accordance with standard Environment Agency practice.

[b] % changes are relative to the objective (200 µg/m³) and have been rounded to the nearest whole number.

7.10 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to be 10% or below at 13 receptors, and thus their impacts can be described as being negligible. The percentage changes in concentrations at five receptors are within 11-20% of the AQAL, so their magnitude can be described as small. At the remaining two receptors, the percentage changes in concentration is 21% of the AQAL thus their magnitude can be described as medium.

7.11 As per paragraph 4.23, where the PC is above 10%, the total PC and background concentrations are taken into account. At all receptors, the total "with plant" emissions are well below the 1-hour mean NO_2 objective, even under the highly worst-case assumption that the generator operates every hour of the year, and the impacts are therefore considered to be 'not significant'.

Contour Plot

7.12 A contour plot of the nitrogen dioxide annual mean process contribution at ground level (1.5 m) has been generated for information and is shown in Figure 7-1. The figure presents the area where the annual mean PC for the proposed generators is greater than 0.5% of the objective, i.e. 0.2 µg/m^3. The 0.5% contour covers an area which extends up to approximately 650 m from the proposed generator exhaust flue.

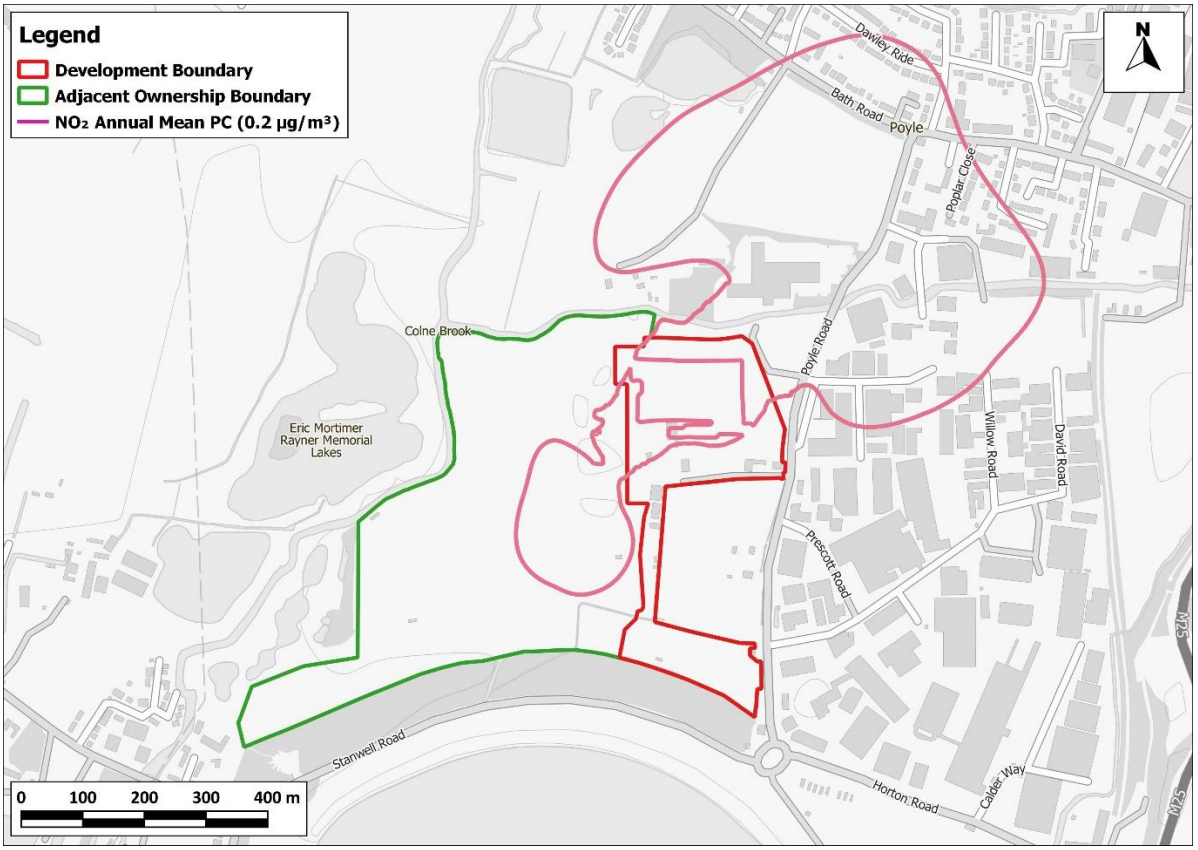

Figure 7-1: Contour Plot of Annual Mean NO_2 PCs

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

Impacts on PM_{10} Concentrations

7.13 Maximum PM_{10} contributions across all discrete receptors for the annual mean and 24-hour mean PM_{10} concentrations are presented in Table 7-3. The maximum PC for the annual mean and the 24-hour mean are below the 1% and 10% criteria respectively, as outlined in 3.20.

7.14 As per paragraph 3.21, the impacts from PM_{10} can be considered 'not significant', thus a more detailed assessment, considering total concentrations and incorporating local baseline conditions is not necessary.

Table 7-3: Maximum PM_{10} PCs at Existing Receptors

Pollutant and Averaging Period	Maximum PC (µg/m³)	Maximum % changes [a]
PM_{10} - Annual Mean	0.0012	0.003
PM_{10} – 90.4th %ile of 24-hour mean	0.069	0.14

[a] % changes are relative to the respective objectives (40 µg/m³ and 50 µg/m³) and have been rounded to the nearest whole number.

Designated Ecological Sites

7.15 Table 7-4 presents the maximum PCs and PECs at any of the designated ecological site receptors. The results presented here are for emissions from the generators only, but including the contribution from the road traffic generated by the proposed development will not appreciably change these results.

Table 7-4: Maximum PCs at Designated Ecological Sites

Pollutant and Averaging period		PC (µg/m³)	PC (% of AQS) [b]	PEC (µg/m³) [a]	PEC (% of AQS) [b]	AQS (µg/m³)
Arthur Jacob Nature Reserve (LNR)						
NOx (µg/m³)	Annual Mean	0.07	0.2%	22.94	76.5%	30
	24-hour	52.34	69.8%	98.08	130.8%	75
Nutrient Nitrogen (kg-N/ha/yr)	Annual Mean	0.007	0.1%	14.01	280.1%	5
Acid Nitrogen (keq/ha/yr)	Annual Mean	0.0005	0.5%	1.95	1950.5%	0.1
South West London Waterbodies/ Wraysbury Reservoir (Ramsar/SPA/SSSI)						
NOx (µg/m³)	Annual Mean	0.08	0.3%	20.88	69.6%	30
	24-hour	50.94	67.9%	92.53	123.4%	75
Nutrient Nitrogen (kg-N/ha/yr)	Annual Mean	0.0084	0.08%	12.81	128.1%	10
Acid Nitrogen (keq/ha/yr)	Annual Mean	0.0006	-	1.00	-	-
Staines Moor (SSSI)						
NOx (µg/m³)	Annual Mean	0.03	0.1%	41.30	137.7%	30
	24-hour	36.39	48.5%	118.94	158.6%	75

Pollutant and Averaging period		PC (µg/m³)	PC (% of AQS) [b]	PEC (µg/m³) [a]	PEC (% of AQS) [b]	AQS (µg/m³)
Nutrient Nitrogen (kg-N/ha/yr)	Annual Mean	0.0034	0.03%	12.80	128.0%	10
Acid Nitrogen (keq/ha/yr)	Annual Mean	0.0002	0.00%	1.00	20.6%	4.856

7.16 Table 7-4 shows that the maximum annual mean NOx PCs are below 1% of the long-term AQS at all of the designated sites within the study area; thus, the impacts can be screened out as not significant under Environment Agency criteria at these sites. The annual mean PEC is above the long-term AQS at Staines Moor (SSSI), but this is due to the existing high baseline conditions, and may be in part an artefact of the 1 km grid square covering this receptor also containing the M25 motorway; actual annual mean NOx concentrations at this location are likely to be appreciably lower.

7.17 The maximum short-term NOx PC is greater than 10% of the short-term AQS at all of designated sites within the study area, and less than the PEC at all sites. The impacts can therefore be screened out as not significant under Environment Agency criteria.

7.18 For nitrogen deposition and acid deposition, the maximum PCs are less than 1% of the long-term critical loads at all sites where there are relevant critical loads against which to assess the PCs. The EA guidance is thus that these PCs are insignificant regardless of the PEC.

7.19 Whilst nitrogen deposition and acid deposition are above the PECs at the Arthur Jacob Nature Reserve (LNR), this is due to existing high baseline conditions. The PCs are below 100% for nitrogen deposition and acid deposition which is the criterion recommended in the EA guidance for locally designated sites, therefore the impacts can be screened out as insignificant.

7.20 Whilst nitrogen deposition is above the PEC at Staines Moor (SSSI), this is due to the existing high baseline conditions. Given that the PC is less than 0.1% of the critical load, effects are likely to be insignificant even with any in combination effects.

Significance of Operational Air Quality Effects

7.21 The operational air quality effects on human health without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A1, and takes account of the assessment that:

- the proposed development will generate traffic well below industry screening thresholds; and
- pollutant concentrations at all of the selected worst-case receptors will be well below the air quality objectives, and all of the impacts are predicted to be negligible, even under conservative worst-case assumptions.

8 Mitigation

Good Design and Best Practice

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

- provision of 20% electric vehicle (EV) "ready" spaces, equating to 17 EV parking spaces;
- provision of a detailed travel plan setting out measures to encourage sustainable means of transport;
- provision of 37 cycle parking spaces;
- running of the proposed generator flues to 1 m above roof level to ensure a suitable dispersion environment; and
- use of exhaust flues for the proposed generators that discharge vertically upwards, unimpeded by any fixture on top of the stack (e.g. rain cowls).

Recommended Mitigation

Construction Impacts

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

8.3 The site has been identified as a Low Risk site during demolition and for trackout, and Medium Risk during earthworks and construction, as set out in Table 6-4. Comprehensive guidance has been published by IAQM (2024) that describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on monitoring during demolition and construction (IAQM, 2018). 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 A6.

8.4 The mitigation measures should be written into a Dust Management Plan (DMP). The DMP can be satisfactorily conditioned by the Local Planning Authority.

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

Road Traffic Impacts

8.6 The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant'; development-generated traffic emissions will not have a significant impact on local air quality. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

8.7 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). The continued implementation SBC's Low Emission Strategy, and the emerging AQAP, will also help to improve air quality.

Energy Plant Impacts

8.8 The assessment has demonstrated that the emissions from the generators within the proposed development will have an insignificant impact on air quality at nearby human receptors. As such, there is no requirement for mitigation beyond the best practice design measures highlighted above. The generators installed within the development should, however, meet the specifications set out in Appendix A4; if the installed generators do not conform to these specifications, additional assessment and/or mitigation may be required.

9 Conclusions

9.1 The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction, emissions from road traffic generated by the completed and operational development, and emissions from forty-seven diesel generators installed to provide back-up power.

Construction Impacts

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

Operational Impacts

Road Traffic Impacts

9.3 The proposed development will generate traffic flows well below industry screening thresholds. The development will have no significant adverse effects on local air quality. Thus, the overall operational air quality effects of the proposed development are judged to be 'not significant' and no additional mitigation has been proposed for operational impacts.

Proposed Generator Impacts

9.4 The assessment has shown that during the worst-case yearly conditions across five years of meteorological conditions, the generators' operation will not cause any exceedances of the annual mean or 1-hour mean NO_2 objectives on human health receptors. The assessment of the generators impacts on nearby designated sites has shown that impacts at the Arthur Jacob Nature Reserve (LNR) and South West London Waterbodies/ Wraysbury Reservoir (Ramsar/SPA/SSSI) are below the EA criteria and can therefore b screened out as 'not significant'; however, significant impacts at Staines Moor (SSSI) cannot be discounted without further assessment.

Policy Implications

9.5 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 191 of the NPPF, being appropriate for its location in terms of its effects on the local air quality environment. It is also consistent with Paragraph 192, as it will not affect compliance with relevant limit values or national objectives. The proposed development is also consistent with Core Policy 7 of SBC's Core Strategy, as it will not cause unacceptable levels of air pollution on existing human health receptors.

10 References

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11 Glossary

AADT	Annual Average Daily Traffic
ADMS-6	Atmospheric Dispersion Modelling System model for point sources
APIS	Air Pollution Information System
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CAZ	Clean Air Zone
CHP	Combined Heat and Power
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
kph	Kilometres Per hour
kW	Kilowatt
LAQM	Local Air Quality Management
LDF	Local Development Framework
LDV	Light Duty Vehicles (<3.5 tonnes)

µg/m^3	Micrograms per cubic metre
MCPD	Medium Combustion Plant Directive
MW_{th}	Megawatts Thermal
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
OEP	Office for Environmental Protection
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PAN	Planning Advice Note
PC	Process Contribution
PEC	Predicted Environmental Concentration
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
RDE	Real Driving Emissions
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide
WHO	World Health Organisation

12 Appendices

A1 Construction Dust Assessment Procedure

A1.1 The criteria developed by IAQM (2024) divide the activities on construction sites into four types to reflect their different potential impacts. These are:

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

A1.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A1.3 An assessment is required where there is a human receptor within 250 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 250 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 250 m from the site entrance(s).

A1.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is negligible and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A1.5 A site is allocated to a risk category based on two factors:

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

A1.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A1.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A1-1.

Table A1-1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >12 m above ground level

Class	Examples
Medium	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12 m above ground level
Small	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >110,000 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 >6 m in height.
Medium	Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3 m – 6 m in height.
Small	Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height.
Construction	
Large	Total building volume >75,000 m^3, on site concrete batching; sandblasting
Medium	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching
Small	Total building volume <12,000 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	20-50 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	<20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

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

Step 2B – Define the Sensitivity of the Area

A1.8 The sensitivity of the area is defined taking account of a number of factors:

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

A1.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table A1-2. These receptor sensitivities are then used in the matrices set out in Table A1-3, Table A1-4 and Table A1-5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered

in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A1.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A1-6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A1.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix A6.

STEP 4: Determine Significant Effects

A1.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

A1.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A1-2: 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 horticulture), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or	Sites of Special Scientific Interest with dust sensitive features

Class	Principles	Examples
	locations with a national designation where the features may be affected by dust deposition	
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A1-3: Sensitivity of the Area to Dust Soiling Effects on People and Property[5]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
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 A1-4: Sensitivity of the Area to Human Health Effects [5]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32 µg/m³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low

[5] 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 250 m, 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	<250
		1-10	Medium	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

Table A1-5: Sensitivity of the Area to Ecological Effects [5]

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

Table A1-6: 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			

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

A2 EPUK & IAQM Planning for Air Quality Guidance

A2.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

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

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

Recommended Best Practice

A2.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

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

A2.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

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

A2.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;

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

A2.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

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

A2.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

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

Screening

Impacts of the Local Area on the Development

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

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

Impacts of the Development on the Local Area

A2.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

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

A2.8 Coupled with any of the following:

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

A2.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;

- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A2.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A2.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

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

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

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

A2.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

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

A2.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

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

A2.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A2.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

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

A2.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

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

A2.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A2.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A3.

A3 Modelling Methodology

Model Inputs

A3.1 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 99.79th percentile of 1-hour mean nitrogen oxides concentrations, and the 90.4th percentile of 24-hour mean PM_{10} concentrations. Model input selections are summarised in Table A3-1, and, where considered necessary, discussed further below. Input emission parameters are presented later in Table A3-3.

Table A3-1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	Yes – 12 km x 12 km Cartesian grid at 50 m resolution
Urban Canopy Flow Used?	No
Building Downwash Effects Modelled?	Yes
Meteorological Monitoring Site	Heathrow Airport
Meteorological Data Years	2019-2023
Dispersion Site Surface Roughness Length (m)	N/A (variable surface roughness file used)
Dispersion Site Minimum MO Length (m)	30
Met Site Surface Roughness Length (m)	0.2
Met Site Surface Minimum MO Length (m)	30

A3.2 The backup diesel generator plant proposed to be installed into the development will have an assumed net fuel input of 8121 kW_{th}, which is equivalent to a fuel consumption of 817.7 litres per hour of diesel oil. The generator will be capable of delivering 3120 kVA on demand. Emissions will rise to roof level in one of the 47 flues. Hoare Lea has advised that the backup generator plant will operator for up to 1 -hour per month each in accordance with the maintenance schedule. The exhaust volume flow rate for the diesel generator has been calculated based on the complete combustion of the assumed diesel oil composition in Table A3-2 and the following typical values for diesel generators of this size:

- 100% load;
- 460.7 ˚C exit temperature; and
- 97.3% excess air in (set so that the calculated exhaust gas mass flow matched that on the technical datasheet for the plant).

Table A3-2: 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/m^3)	835

A3.3 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 location have been obtained from drawings provided by Hoare Lea. The location of the flue is shown in Figure A3-1 along with the modelled buildings and their heights. The flue has been modelled at a height of 31 m (1 m above the roof level).

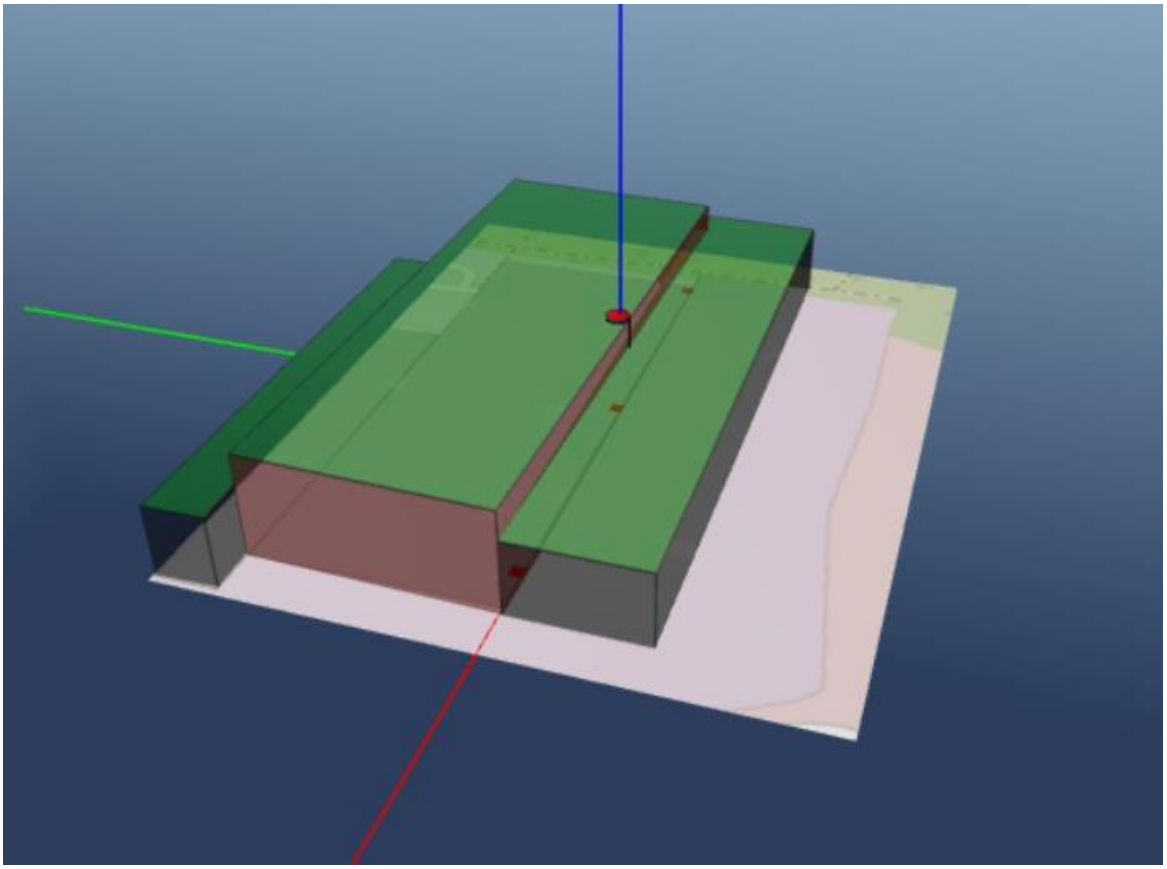

Figure A3-1: Flue Location & Modelled Buildings

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

A3.4 The emissions from the diesel generators have been modelled as a single flue, as they will be tested individually; the emission parameters employed in the modelling are set out in Table A3-3. Further details of the proposed diesel generators parameters are provided in Appendix A4.

Table A3-3: Plant Specifications and Modelled Emissions and Release Conditions

Parameter	Value
Specified Net Fuel Input (kW)	8121
Calculated Gross Fuel Input (kW)	8667.2
Flue Internal Diameter (m)	0.7
Calculated Exhaust Mass Flow Rate (kg/h)	20293.3
Calculated Actual Exhaust Volume Flow (m^3/s) [a]	11.74
Calculated Exit Velocity (m/s)	30.5
Specified Exhaust O_2 Content (%)	9.9
Specified Exhaust H_2O Content (% v/v)	7.3
Specified Exhaust Temperature (°C)	460.7
Calculated Normalised Exhaust Volume Flow (Nm^3/s) [b] K15	2.608
Specified NOx Emission Rate (mg/Nm^3) [b]	2346.1
Calculated NOx Emission Rate (g/s)	6.118
Specified PM Emission Rate (mg/Nm^3) [b]	4.6
Calculated PM Emission Rate (g/s)	0.012
Flue Location (x,y)	(502919.75, 176291.37)
Modelled Flue Height Above Ground (m)	31

[a] Not normalised.

[b] 'Normal' here refers to 5% O_2, 0˚C, 101.325 kPa and 0% H_2O.

A3.5 Hourly sequential meteorological data in sectors of 10 degrees from Heathrow Airport for 2019-2023 have been used in the model. The Heathrow Airport meteorological monitoring station is located at Heathrow Airport, approximately 7 km to the east of the proposed development. Both the application site and the Heathrow Airport meteorological monitoring station are located in the southwest of England where they will be influenced by the effects of inland meteorology in flat-lying topography. The topography of the model domain is similar to that around the meteorological monitoring station and measurements from this site are considered to provide the most robust basis to predict meteorology within the model domain. Wind roses for the site for the years 2019-2023 are provided in Figure A3-2 - Figure A3-6. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

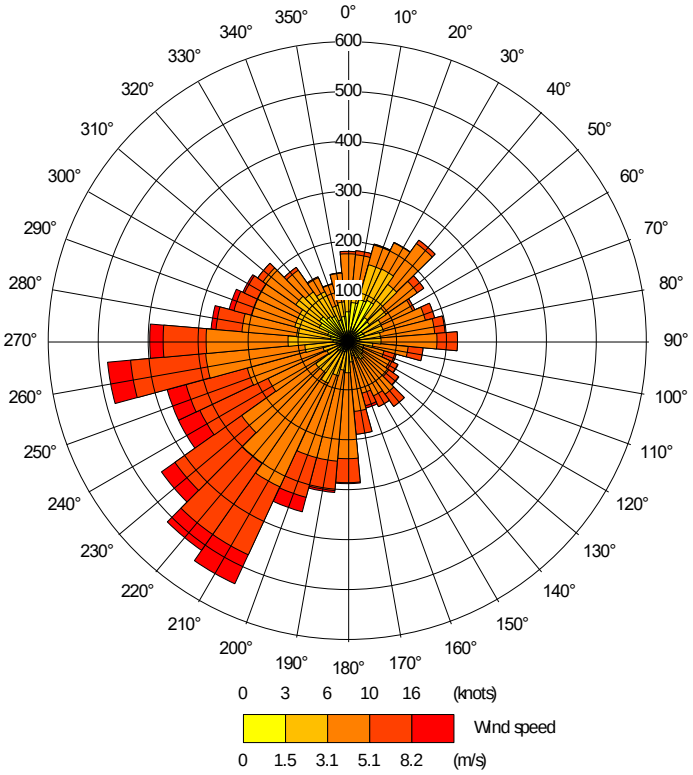

Figure A Error! No text of specified style in document.**-1: Wind Rose 2019**

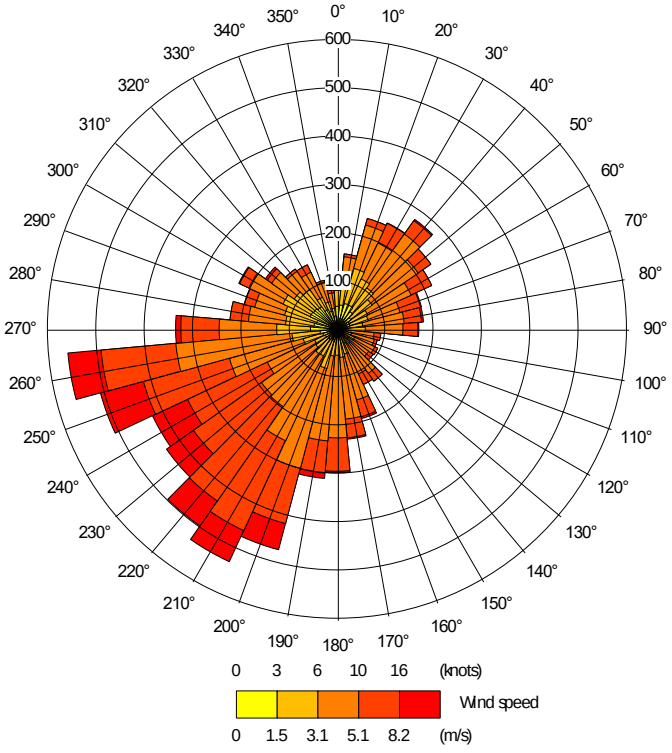

Figure A Error! No text of specified style in document.**-2: Wind Rose 2020**

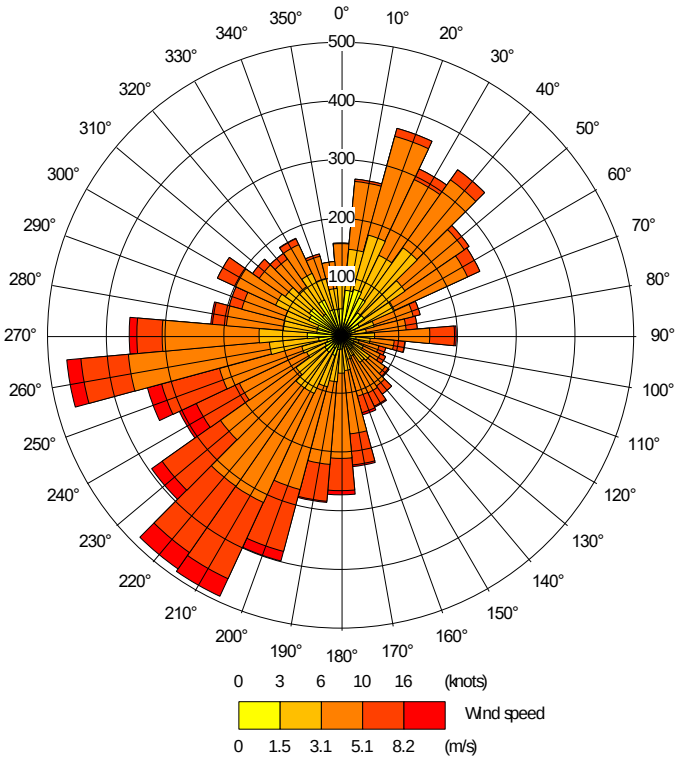

Figure A Error! No text of specified style in document.**-3: Wind Rose 2021**

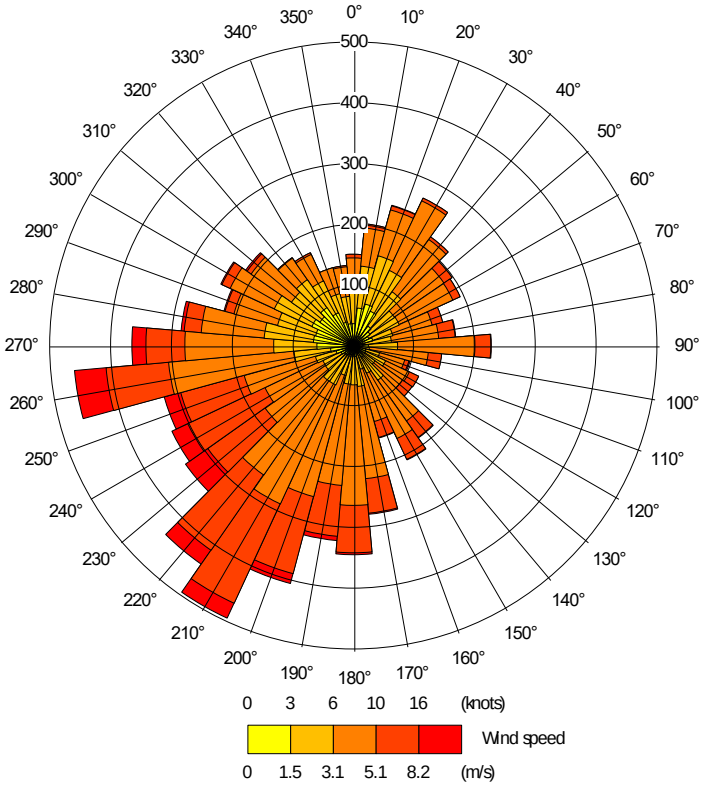

Figure A Error! No text of specified style in document.**-4: Wind Rose 2022**

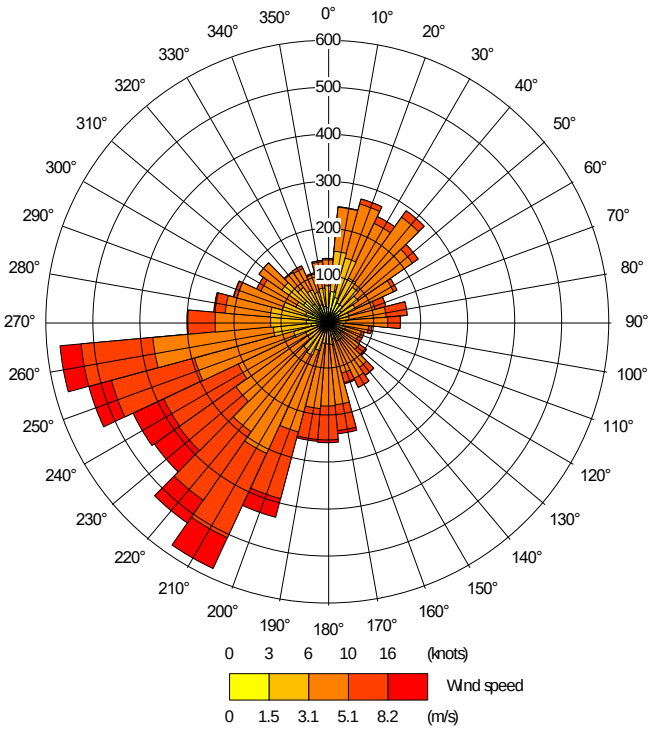

Figure A Error! No text of specified style in document.**-5: Wind Rose 2023**

Post-processing

A3.6 Emissions from the proposed diesel generators will be predominantly in the form of nitrogen oxides (NOx) and PM_{10}. ADMS-6 has been run to predict the contribution of the proposed diesel generators emissions to annual mean concentrations of nitrogen oxides and PM, and to the 99.79th percentile of 1-hour mean nitrogen oxides concentrations and the 90.4th percentile of 24-hour mean PM_{10} concentrations. For the initial screening of the process contributions, the approach recommended by the Environment Agency (2005) has been used to predict nitrogen dioxide concentrations, assuming that:

- annual mean NO_2 concentration = annual mean NOx concentration multiplied by 0.7; and
- 99.79th percentile of 1-hour mean NO_2 concentrations = 99.79th percentile of 1-hour mean NOx concentrations multiplied by 0.35.

A4 Energy Plant Specifications

A4.1 The proposed development includes 47 diesel generators. Specifications for these generators, upon which the assessment has been based, is shown in Table A4-1.

Table A4-1: Energy Plant Specifications

Parameter	Value	Restriction
Gross Peak Fuel Input (kW)	8667.2	Max
Hours of Use per Annum	564	Max
Annual Fuel Input (kWh/annum)	4,888,303	Max
Exhaust Temperature (°C)	460.7	Min
Flue Internal Diameter (m)	0.7	Max
Efflux Velocity (m/s)	30.50630	Min
NOx Emission Rate (mg/Nm^3)[a]	2346.1	Max
PM Emission Rate (mg/Nm3)[a]	4.6	Max
Condensing	No	-

[a] 'Normal' here refers to 5% O_2, 0˚C, 101.325 kPa and 0% H_2O.

A4.2 The restrictions set out in Table A4-1 should be adhered in order to ensure that the final plant design does not lead to impacts greater than those modelled. To further emphasise these, the final design should adhere to the following minimum specifications:

- the generators must be designed such that it will operate with a minimum efflux velocity of 30.5 m/s to allow for good initial dispersion of emissions;
- a generator with a maximum total rated output of 3900 kVA must include a flue outlet with a maximum internal diameter of 0.7 m at the exit point, terminating at least 1 m above the roof level;
- all stacks should discharge vertically upwards and be unimpeded by any fixture on top of the stack (e.g. rain cowls);
- the generator plant must conform to the US EPA Tier 2 emissions standards (optimised engine). Compliance with these standards will be confirmed prior to occupation, based on:
  - monitoring undertaken on the actual installed plant; or
  - manufacturer guaranteed performance levels supported by type approval monitoring undertaken by the equipment supplier.
- in order to attain these values, relevant catalyst or alternative abatement may be required.

A4.3 If the design of the energy centre deviates significantly from the modelled specification, additional future modelling may be required in order to ensure that there are no significant adverse air quality impacts.

A4.4 The following measures should be adhered to in order to ensure adequate dispersion of emissions from discharging stacks and vents. These include the following:

- discharges should be vertically upwards and unimpeded by cowls or any other fixtures on top of the stack. However, the use of coning or of flame traps at the tops of stacks is acceptable. In the case of discharge stacks (whether single or multiple stack) with shrouds or casings around the stack(s), the stack(s) alone should extend above the shroud or casing. This extension should be at least 50% of the shroud or casing's greatest lateral dimension;
- irrespective of the pollutant discharge, there are minimum discharge stack heights based on the heat release and the discharge momentum. These can be calculated following calculations set out in the guidance note, but the absolute minimum value is 1 m;
- no discharge stack should be less than 3 m above the ground or any adjacent area to which there is general access. For example, roof areas and elevated walkways;
- a discharge stack should never be less than the height of any building within a distance of 5 times the stack height; and
- a discharge stack should be at least 3 m above any opening windows or ventilation air inlets within a distance of 5 times the stack height.

A5 Professional Experience

Martin Peirce, BSc (Hons), MSc, MIEncSci, MIAQM

A5.1 Mr Peirce is an Associate Director with AQC and has some thirty years' experience in environmental modelling and assessment, most relating to air quality and carbon and greenhouse gases (GHGs). He has extensive experience in the calculation of emissions to air and compiling emission inventories, for both local air quality assessments and carbon footprinting. For air quality, he also has extensive expertise in modelling the atmospheric dispersion of pollutants for comparison against regulatory limits and for assessment of health and environmental impacts. He has prepared assessments in support of Environmental Impact Assessments (EIA), permit applications and planning applications (under both Town and Country Planning Act (TCPA) and Development Consent Order (DCO) regimes), and has acted as expert witness. He has particular experience in modelling aviation and transport sources, non-road mobile machinery, construction and industrial sources.

Jack Buckley, BSc (Hons) MSc MIEnvSc MIAQM

A5.2 Mr Buckley is a Principal Consultant with AQC. He has over seven years' experience in the field of air quality, carrying out technical work for a range of projects, including road and rail infrastructure schemes, residential and mixed-use developments and industrial facilities. Jack has produced air quality, greenhouse gas and climate change assessments for numerous EIA schemes, using qualitative and quantitative methods, and has air quality monitoring experience. He also has a strong understanding of relevant local, regional and national policies, having been seconded to the Greater London Authority to undertake technical reviews of planning applications, and has assisted in the development of new Air Quality Neutral and Air Quality Positive guidance. Jack completed a BSc (Hons) in Chemistry and an MSc in Environmental Science and Management, with both dissertations investigating the performance of low-cost air quality sensors. He is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

Faye Wilder, BSc (Hons) MSc

A5.3 Miss Wilder is an Assistant Consultant with AQC and joined the company in 2023. During her BSc Geography degree at the University of Birmingham, she developed an interest in air quality, which continued into her MSc in Environmental Management at the University of Reading. Her master's thesis investigated personal air pollution exposure across microenvironments using wearable air pollution sensors, and how this varied from fixed air pollution monitoring stations.

A6 Construction Mitigation

A6.1 Table A6-1 sets out a list of best-practice measures from the IAQM guidance (IAQM, 2024) that should be incorporated into the specification for the works. These measures should ideally 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
Communications		
Develop and implement a stakeholder communications plan that includes community engagement before and during work on site		✓
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager		✓
Display the head or regional office contact information		✓
Dust Management Plan		
Develop and implement a Dust Management Plan (DMP) approved by the Local Authority which documents the mitigation measures to be applied, and the procedures for their implementation and management		✓
Site Management		
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken		✓
Make the complaints log available to the local authority when asked		✓
Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book		✓
Monitoring		
Undertake daily on-site and off-site inspections where receptors (including roads) are nearby, to monitor dust. Record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of the site boundary, with cleaning to be provided if necessary	✓	

Measure	Desirable	Highly Recommended
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Local Authority when asked		✓
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions		✓
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction (IAQM, 2018)		✓
Preparing and Maintaining the Site		
Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible		✓
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site		✓
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period	✓	✓
Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods	✓	✓
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below	✓	✓
Cover, seed, or fence stockpiles to prevent wind whipping	✓	✓
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all vehicles switch off their engines when stationary – no idling vehicles		✓
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable		✓
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	✓	

Measure	Desirable	Highly Recommended
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
Implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing)	✓	
Operations		
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems		✓
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate		✓
Use enclosed chutes, conveyors and covered skips		✓
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate		✓
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods		✓
Waste Management		
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 effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground		✓
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	✓	

Measure	Desirable	Highly Recommended
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		
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use		✓
Avoid dry sweeping of large areas		✓
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport		✓
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;		✓
Record all inspections of haul routes and any subsequent action in a site log book;		✓
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems or mobile water bowsers, and regularly cleaned;		✓
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; and		✓
Access gates should be located at least 10 m from receptors, where possible		✓

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