Redevelopment of Units DC5 and DC6, Iron Bridge Road North, West Drayton, Uxbridge

Appendix 6.1: Air Quality

Prologis UK CCCXXXVIII S.à r.l.

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1.0 Legislation, Policy and Guidance

1.1 Legislation

A dual set of regulations, separately applicable to National and Local Government, are currently operable within the UK.

1.1.1 National Obligations

The Air Quality Standards Regulations 2010[1] (AQSR) transpose both the EU Ambient Air Quality Directive (2008/50/EC), and the Fourth Daughter Directive (2004/107/EC) within UK legislation. The AQSR includes Limit Values which are legally binding ambient concentration thresholds, for which compliance is assessed by measurements at specific locations (Schedule 1: AQSR)[2].

Following the UK's withdrawal from the EU, the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[3] was introduced to mirror revisions to supporting EU legislation. As a result, the fine particulate matter ($PM_{2.5}$) Limit Value was reduced to 20µg/m^3 (to be met by 2020).

The responsibility of achieving the AQSR is a National obligation for Central Government who undertake assessments on an annual basis. Local Authorities have no statutory obligation to achieve the AQSR or the European equivalent Directives, unless otherwise instructed to assist Central Government under Ministerial Direction.

1.1.1.1 Environmental Targets (Fine Particulate Matter) Regulations

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[4] introduced an annual mean concentration target of 10µg/m^3 to be met across England by 2040. Central Government is responsible for meeting this future target, whereas Local Authorities have no statutory obligation within the Local Air Quality Management (LAQM) framework to achieve these targets.

1.1.2 Local Obligations

Part IV of the Environment Act 1995 (as amended by the Environment Act 2021) requires the Secretary of State to review the national Air Quality Strategy (AQS) every five years and modify this if necessary. It also established the system of LAQM for Local Authorities to regularly review and assess air quality within their respective administrative areas.

The Air Quality (England) Regulations 2000 (as amended) ('the Regulations') provide the statutory basis for the Air Quality Objectives Local Authorities must adhere to under LAQM in England.

$PM_{2.5}$ is not currently cited within the Regulations. However, as per the national AQS, Local Authorities are required to work towards reducing $PM_{2.5}$. To support this, the Department for Environment, Food and Rural Affairs (Defra) released '*$PM_{2.5}$ Targets: Interim Planning*

[1] The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.
[2] Schedule 1 of the 2010 AQSR provides the locations of the sampling points where the AQSR Limits Values can be assessed.
[3] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, Statutory Instrument No. 1313, The Stationary Office Limited.
[4] The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. UK Statutory Instruments 2023 No. 96.

Guidance'[5] which Local Authorities are encouraged to apply when determining planning applications, to ensure national obligations are considered.

The Air Quality Objectives apply at locations where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period (referred to as 'relevant exposure'). Table 1-2 provides an indication of those locations. Where any of the prescribed Air Quality Objectives are not likely to be achieved, the authority must designate an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality and achieve compliance.

The latest AQS for England was published in 2023[6]. The AQS provides the delivery framework for air quality management across England for local authorities and summarises the air quality standards and objectives operable within England for the protection of public health and the environment.

1.1.3 Air Quality Assessment Levels

The ambient air quality standards of relevance to this assessment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in Table 1-1. These are primarily based upon the Air Quality Objectives Local Authorities are responsible for achieving. The $PM_{2.5}$ AQSR AQAL has also been included for completeness.

Table 1-1: Relevant Ambient AQALs

Pollutant	AQAL ($\mu g/m^3$)	Averaging Period	Reference
Nitrogen dioxide (NO_2)	40	Annual mean	Air Quality (England) Regulations 2000
	200	1-hour mean (not to be exceeded on more than 18 occasions per annum)	
Particles (as PM_{10})	40	Annual mean	
	50	24-hour mean (not to be exceeded on more than 35 occasions per annum)	
Particles (as $PM_{2.5}$)	20	Annual mean	Air Quality Standards Regulations (as amended)
	10	Annual mean (by 2040)	Environmental Targets (Fine Particulate Matter) (England) Regulations 2023
	10	Annual mean (by 2030)	Mayor of London (London Environment Strategy)

[5] Defra, $PM_{2.5}$ Targets: Interim Planning Guidance, (2024).

[6] Defra, Air Quality Strategy: Framework for Local Authority Delivery, April 2023.

Table 1-2: Human Health Relevant Exposure

AQAL Averaging Period	AQALs Should Apply At	AQALs Should Not Apply At
Annual mean	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

The assessment of impact and significance provided in the Environmental Statement is based upon legislative air quality standards. For informational purposes, the impact of the proposed development has also been considered against the more stringent World Health Organisation (WHO) guideline values for NO_2 of 10µg/m^3, PM_{10} of 15µg/m^3 and $PM_{2.5}$ of 5µg/m^3 as annual means[7]. At present there is no established approach by the Institute for Air Quality Management setting out impact descriptors or significance thresholds.

1.1.4 Environmental Permitting Regulations

The Site would be regulated by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016 (as amended) (EPR).

The interaction of the EPR and the NPPF is described in Section 1.2.3 below.

1.2 Policy

1.2.1 Clean Air Strategy

The 2019 Clean Air Strategy[8] sets out the Government's proposals aimed at delivering cleaner air in England and indicates how devolved administrations intend to make emissions reductions. It sets out the comprehensive action that is required from across all parts of government and society to deliver clean air.

1.2.2 Environmental Improvement Plan 2023

The 2023 Environmental Improvement Plan[9] is the first revision of the UK Government's 25 Year Environmental Plan (25YEP) – planned on a five-year rolling cycle. This document sets out the 5-year delivery plan to improve the natural environment. The 2023 Environmental Improvement Plan builds on the 2019 Clean Air Strategy by setting environmental targets and commitments to reduce air pollution. Goal 2 of the 25YEP is Clean Air – which relates to improving air quality.

[7] World Health Organisation (WHO) (2021) WHO global air quality guidelines, Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide

[8] Defra, The Clean Air Strategy, (2019).

[9] Defra, Environmental Improvement Plan 2023, (2023).

1.2.3 National Planning Policy

The 2024 update to the National Planning Policy Framework[10] (NPPF) sets out planning policy for England. In specific relation to air quality policy, the document states:

Chapter 15 – Conserving and Enhancing the Natural Environment

> Paragraph 187: *"Planning policies and decisions should contribute to and enhance the natural and local environment by: […]*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of .. air, … pollution […]. Development should, wherever possible, help to improve local environmental conditions such as air […]."*
>
> *Paragraph 199:* "*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.*"

The NPPF is accompanied by web based supporting Planning Practice Guidance (PPG)[11] which includes guiding principles on how planning can take account of the impacts of new development on air quality. The November 2019 update details several factors that may need to be considered within an air quality assessment. Assessments and mitigation options need to be proportionate to the nature and scale of development proposed and potential impacts (taking into account existing conditions).

With respect to developments that fall under Environmental Permitting Regulations, paragraph 201 states:

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

1.2.4 Regional Policy

1.2.4.1 London Environment Strategy

The London Environment Strategy[12] is a strategic planning policy document developed by the Mayor of London. The strategy aims to tackle the environmental pressures associated with an ever-growing London populace and has the following aims with respect to air quality:

[10] National Planning Policy Framework, Ministry of Housing, Communities & Local Government. December 2024.
[11] Planning Practice Guidance Air Quality, Ministry of Housing, Communities & Local Government. November 2019.
[12] GLA, May 2018, London Environment Strategy.

- Reducing exposure of Londoners to harmful pollution across London – especially at priority locations like schools – and tackling health inequality;
- Achieving legal compliance with UK and EU limits as soon as possible, including by mobilising action from the London boroughs, government, and other partners; and
- Establishing and achieving new, tighter air quality targets for a cleaner London, meeting World Health Organisation (WHO) health-based guidelines by 2030 by transitioning to a zero emission London.

1.2.4.2 London Plan 2021

The London Plan[13] was formally adopted by the Greater London Authority (GLA) on 2nd March 2021. The London Plan is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years (to the period 2041) and contains policies which are harmonious to those of Development Plan Documents to the 32 London boroughs.

The following policy relating to air quality is contained within the London Plan:

"***Policy SI 1 Improving air quality***

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

B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

1. Development proposals should not:

a) lead to further deterioration of existing poor air quality

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

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

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

a) development proposals must be at least Air Quality Neutral.

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

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

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

[13] Mayor of London, The London Plan, (2021).

C. *Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:*
   a) *how proposals have considered ways to maximise benefits to local air quality, and*
   b) *what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.*

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

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

The London Plan is accompanied by London Plan Guidance (LPG) which provides further information about how the current London Plan should be implemented.

1.2.5 Local Policy

1.2.5.1 Local Plan

The London Borough of Hillingdon (LBH) Local Plan (Part 1)[14] was adopted in 2012 and sets out the overall planning vision and strategic policies for the Borough until 2026. The LBH Local Plan (Part 2)[15] was adopted in 2020 and builds on Part 1 by providing detailed policies that will form the basis of the Borough's decisions on individual planning applications.

The key policy with respect to air quality is Policy EM8: Land, Water, Air and Noise, within LBH Local Plan (Part 1) which states:

"***Policy EM8: Land, Water, Air and Noise***

[…]

Air Quality

All development should not cause deterioration in the local air quality levels and should ensure the protection of both existing and new sensitive receptors.

All major development within the Air Quality Management Area (AQMA) should demonstrate air quality neutrality (no worsening of impacts) where appropriate; actively contribute to the promotion of sustainable transport measures such as vehicle charging points and the increased provision for vehicles with cleaner transport fuels; deliver increased planting through soft landscaping and living walls

[14] London Borough of Hillingdon, Local Plan: Part 1 (Strategy Policies), November 2012.

[15] London Borough of Hillingdon, Local Plan: Part 2 (Development Management Policies), January 2020.

and roofs; and provide a management plan for ensuring air quality impacts can be kept to a minimum.

The Council seeks to reduce the levels of pollutants referred to in the Government's National Air Quality Strategy and will have regard to the Mayor's Air Quality Strategy. London Boroughs should also take account of the findings of the Air Quality Review and Assessments and Actions plans, in particular where Air Quality Management Areas have been designated.

The Council has a network of Air Quality Monitoring stations but recognises that this can be widened to improve understanding of air quality impacts. The Council may therefore require new major development in an AQMA to fund additional air quality monitoring stations to assist in managing air quality improvements. […]"

Within the LBH Local Plan (Part 2), the most relevant policy to air quality is DMEI 14 which states:

"***Policy DMEI 14: Air Quality***

A) Development proposals should demonstrate appropriate reductions in emissions to sustain compliance with and contribute towards meeting EU limit values and national air quality objectives for pollutants.

B) Development proposals should, as a minimum:

i) be at least "air quality neutral";

ii) include sufficient mitigation to ensure there is no unacceptable risk from air pollution to sensitive receptors, both existing and new; and

iii) actively contribute towards the improvement of air quality, especially within the Air Quality Management Area."

1.2.6 LBH Air Quality Action Plan

The current published LBH Air Quality Action Plan covers the period 2019-2024[16]. The most relevant actions contained within the AQAP are as follows:

- Action 5:
  - Action Description: "*Enforce Air Quality Neutral (AQN) policy with more stringent application of mitigation required in the Hillingdon Focus Areas*".
  - Further Information: "*Air quality neutral assessments requested for all relevant development; In AQ focus areas NOx damage calculation costs are requested to form the basis of planning obligation for costs where the developer mitigation is insufficient*".
- Action 9:
  - Action Description: "*Master planning and redevelopment areas aligned with Air Quality Positive and Healthy Streets approaches*".

A consultation draft is currently available on the LBH website for the period 2025-2030[17]. The most relevant actions contained within the draft AQAP are as follows:

[16] London Borough of Hillingdon, Air Quality Action Plan 2019 - 2024, May 2019

[17] London Borough of Hillingdon, Air Quality Action Plan 2025 - 2030, pre-consultation Dratf (undated)

- *"Action 8: Require all new developments (where applicable) are as a minimum air quality neutral applying the DEFRA damage cost approach for those that cannot achieve compliance within the development"*
- *"Action 9: Require all new major developments located in Air Quality Focus Areas to be air quality positive (i.e. result in improvements) and applying the DEFRA damage cost approach for those that cannot achieve compliance within the development"*
- *"Action 20: Ensuring that data centres utilise the most low polluting fuel for back up generators and that proposals for their operation are assessed on a reasonable worse case scenario, with clear plans in place for testing and reporting."*

1.3 Guidance

This assessment has been informed by the principles contained within the guidance documents below.

- Defra: Local Air Quality Management Technical Guidance (TG22) (LAQM.TG22)[18];
- Defra: $PM_{2.5}$ Targets: Interim Planning Guidance[19];
- GLA: London Local Air Quality Management Technical Guidance (LLAQM.TG(19))[20];
- GLA: London Plan Guidance, Air Quality Neutral[21] (the 'AQN guidance');
- GLA: London Plan Guidance, Air Quality Positive[22] (the 'AQP guidance');
- Environment Agency (EA): Air emissions risk assessment for your environmental permit[23];
- EA: Specified generators: dispersion modelling assessment[24];
- Environmental Policy Implementation Community (EPIC) (formerly EPUK) and the Institute of Air Quality Management (IAQM): Land-Use Planning and Development Control: Planning for Air Quality[25]; and
- Defra: *Air quality appraisal: damage cost guidance (*hereafter referred to as the 'Defra damage cost guidance')[26].

[18] Local Air Quality Management Technical Guidance (TG22), Published by Defra in partnership with the Scottish Government, Welsh Government and Department of Agriculture, Environment and Rural Affairs. May 2025.

[19] Defra, $PM_{2.5}$ Targets: Interim Planning Guidance, published 4 October 2024.

[20] Mayor of London, London Local Air Quality Management Technical Guidance LLAQM.TG(19), (2019).

[21] GLA, London Plan Guidance, Air Quality Neutral, (2023).

[22] GLA, London Plan Guidance, Air Quality Positive, (2023).

[23] Environment Agency, Air emissions risk assessment for your environmental permit. Available: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit.

[24] https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.

[25] EPIC (formerly EPUK) and IAQM, Land-Use Planning and Development Control: Planning for Air Quality, v1.2 2017.

[26] Defra: *Air quality appraisal: damage cost guidance*, March 2023. Available at: https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance.

2.0 Assessment Methodology

2.1 Back-up Generator Emissions Assessment

2.1.1 Dispersion Model

The US American Meteorological Society and Environmental Protection Agency Regulatory Model (AERMOD v13) dispersion model has been used for the assessment; this model is widely used and accepted by the Environment Agency for undertaking such assessments and its predictions have been validated against real-time monitoring data.

2.1.2 Generator Emissions and Abatement

The Proposed Development includes a total of 32 CAT 175-20 back-up generators across the two buildings DC01 (20 back-up generators across 4 Data Halls) and DC02 (12 back-up generators across 2 Data Halls). The site layout is presented in Figure 2-1.

The generator emission parameters have been based on design and manufacturer's specifications sheets and are presented in Table 2-1. The generators will be provided with a Selective Catalytic Reduction (SCR) system to abate NOx emissions. It has been assumed that a warm-up period of 20 minutes is required before the SCR reaches a fully effective operating temperature, therefore the first hour of operation applies a time weighted-average emission.

The air quality impact assessment has used the highest mass emission rate (g/s) regardless of actual generator load, i.e. NOx g/s at 100% load and PM g/s at 50% load. The DCC has been based upon the closest load category, e.g. 0% load is based upon 10% load.

Table 2-1: Proposed Generators (CAT 175-20) – Emission Parameters

Parameter	Value (per generator)			
Stack Height (m Above Ground Level)	12.5			
Stack Internal Diameter (m)	0.70			
Load (%)	100	75	50	10
Volume Flow (Nm^3/s) [(A)]	2.71	2.12	1.46	0.44
Emission Temperature (°C)	460.7	433.4	422.9	281.2
Oxygen Content (% O_2 dry gas)	10.14	11.44	11.90	15.30
Moisture content (% H_2O)	8.35	8.35	8.35	8.35
Actual Flow Rate (Am^3/s) per stack	11.74	10.07	7.18	2.76
Emission velocity (m/s)	30.5	26.16	18.7	7.2
NO_x Concentration (mg/Nm^3)	2346	1627	1631	2162
NO_x Emission (g/s) per gen-set	6.357	3.450	2.384	0.949
NOx Concentration with SCR (mg/Nm^3)	250	250	250	n/a[(B)]
NOx Emission with SCR (g/s)	0.677	0.53	0.365	n/a[(B)]
NOx Conc. SCR warm-up (1hr avg.) (mg/Nm^3)	949	709	710	n/a[(B)]
NOx SCR Warm-up Emission (g/s) (1hr avg.)	2.571	1.510	1.038	n/a[(B)]
PM Concentration (mg/Nm^3)	4.6	13.5	27.0	36.0
PM Emission (g/s)	0.012	0.03	0.039	0.016

Parameter	Value (per generator)
Table Note: (A) Normalised to 273K, dry, 5% O_2. (B) Tests at 10% are less than 15 minutes and therefore it has been assumed there is no reduction due to SCR as a precautionary approach.	

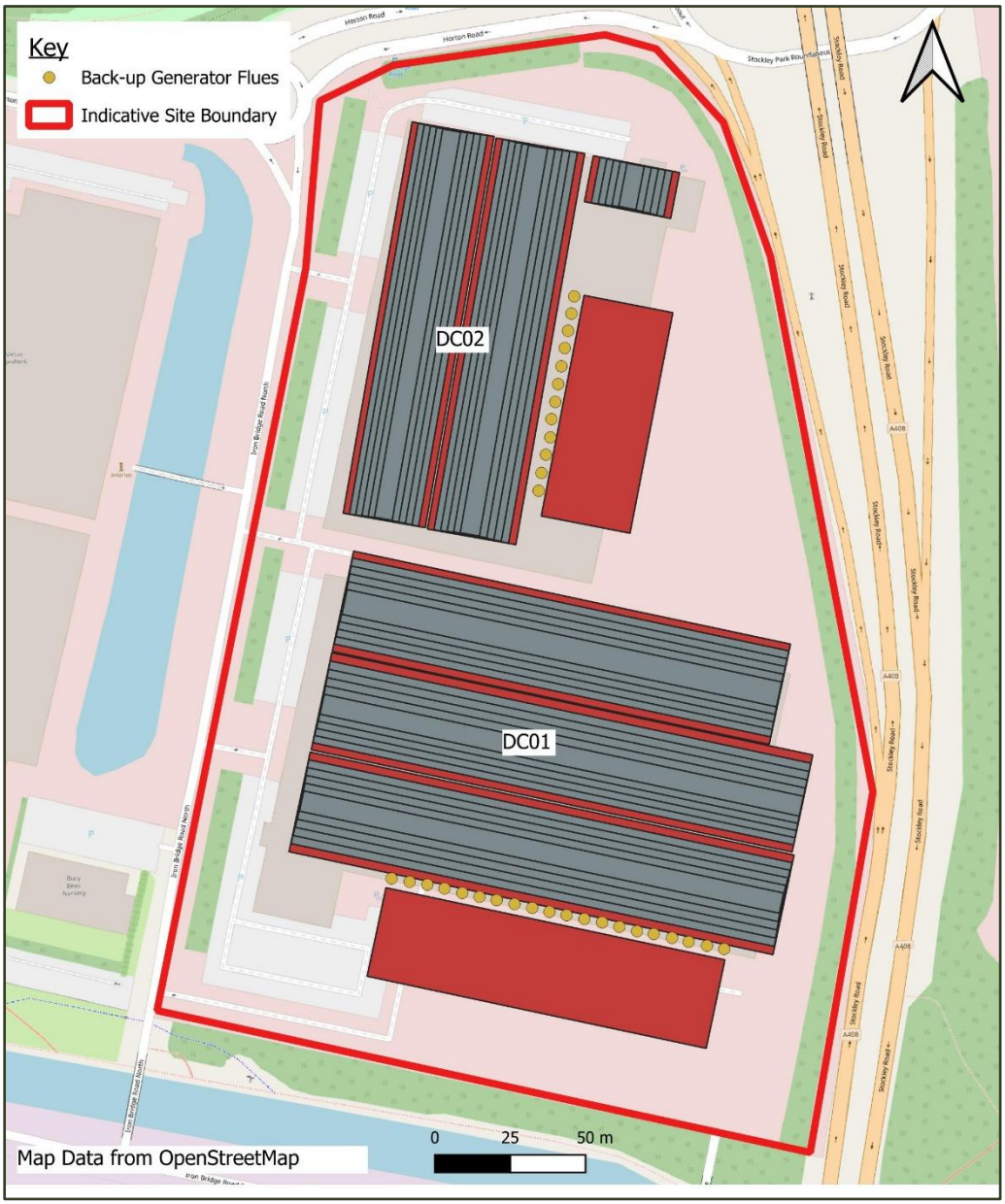


Figure 2-1: Site Layout and Emission Points

2.1.3 Operating Scenarios

The operating scenarios at the Site include the following:

- Routine Testing Operations – the predictable, managed testing and maintenance activity; and
    - Monthly generator by generator tests (various test types taking between 15 minutes and 2 hours per test, a total of 11 hours per year per generator); and

  - Quarterly Data Hall Block tests where multiple generators operate to support the power load of a Data Hall (2-hours duration, a total of 8 hours per year per generator).
- Emergency Outage Operations (whole Site) – the unpredictable emergency grid outage any time during the year requiring plant to operate for the required outage duration. Outages are typically durations of seconds to minutes, as a highly precautionary approach 24 outage hours have been assessed.

The scenarios above have been assessed in-combination with the adjacent Virtus Data Centre (see Section 2.2).

2.1.4 Model Study Area and Receptors

The modelling has been undertaken using a receptor grid across OpenSource mapping data of the study area. Impact isopleths have been generated by interpolation between receptor points and superimposed onto the map. A receptor grid was applied extending 2.5km from the Site as follows:

- 200m x 200m at 20m grid resolution;
- 500m x 500m at 50m grid resolution;
- 1000m x 1000m at 100m grid resolution; and
- 2500m x 2500m at 250m grid resolution.

In addition, the modelling has included both discrete sensitive receptors and grids over residential areas to capture the maximum impacts in each area as described in the ES Chapter 6.

2.1.5 Building Downwash

Building downwash occurs when turbulence, induced by nearby structures, causes pollutants emitted from an elevated source to be displaced and dispersed rapidly towards the ground, resulting in elevated ground level concentrations. Building downwash is considered for buildings that have a maximum height equivalent to at least 40% of the emission height and which are within a distance defined as five times the lesser of the height or maximum projected width of the building.

The integrated Building Profile Input Programme (BPIP) module within AERMOD has been used to assess the potential impact of building downwash upon predicted dispersion characteristics.

2.1.6 Topography

The presence of elevated terrain can significantly affect the dispersion of pollutants and the resulting ground level concentration in several ways. Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away.

AERMOD utilises digital elevation data to determine the impact of topography on dispersion from a source. Topography has been incorporated within the modelling using 30m resolution Shuttle Radar Topography Mission (SRTM) terrain data files and processed by the AERMAP function within AERMOD to calculate terrain heights.

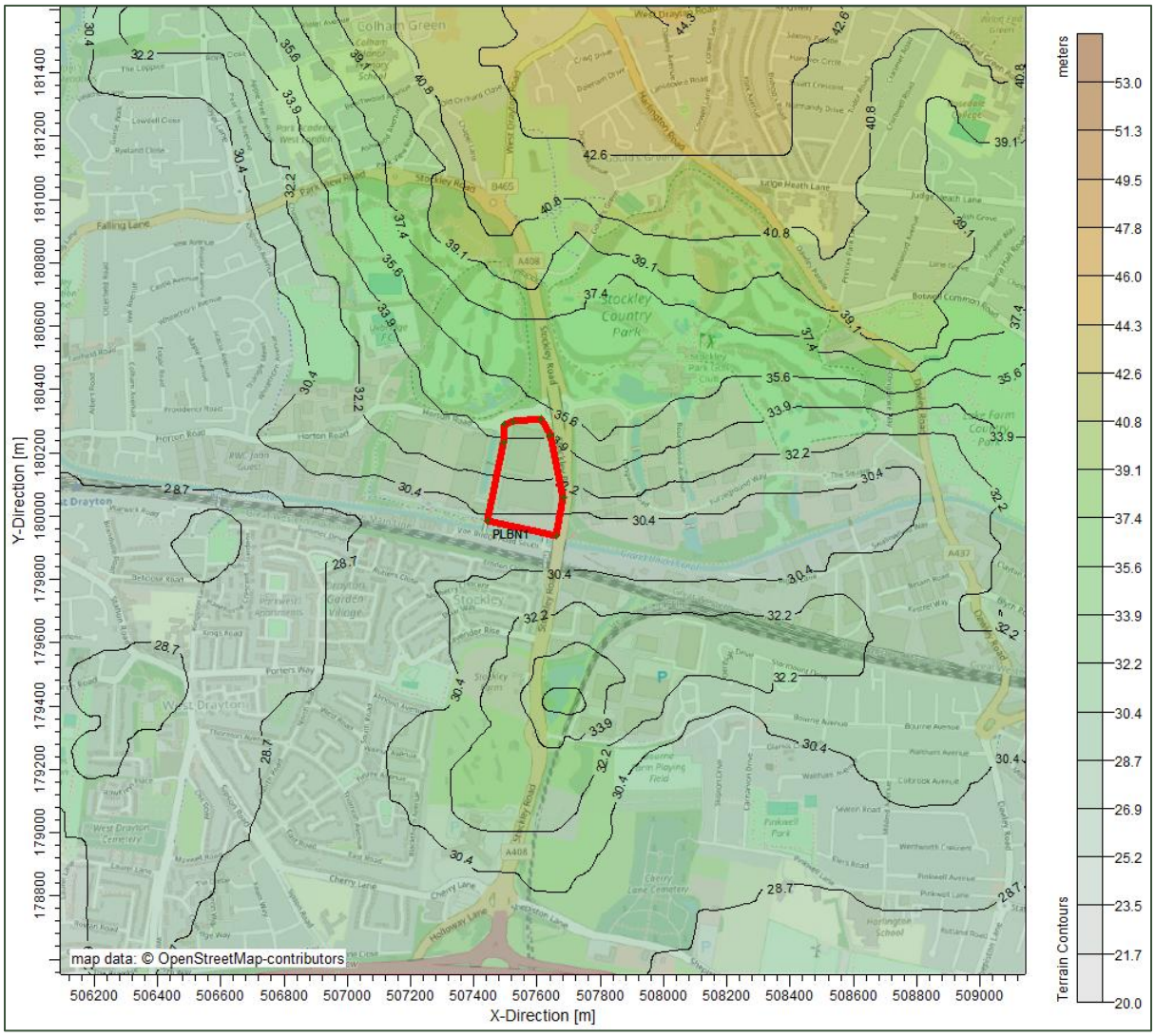


Figure 2-2: Surrounding Topography

2.1.7 Dispersion Coefficients

The 'urban' option for dispersion coefficients has been applied in accordance with AERMOD guidance[27].

2.1.8 Meteorological Data and Preparation

Meteorological data from Heathrow Airport, located approximately 8.8km to the south of the Site has been used in the assessment. The meteorological data (5 years of hourly sequential data) obtained in '.met' format has been converted to the required surface and profile formats for use in AERMOD using AERMET View meteorological pre-processor. Details specific to the Site location have been used to define the surface characteristics; albedo (0.18), bowen ratio (0.89) and surface roughness (1.0), applied in the conversion.

[27] US EPA, AERMOD Implementation Workgroup, AERMOD Implementation Guide, August 3, 2015.

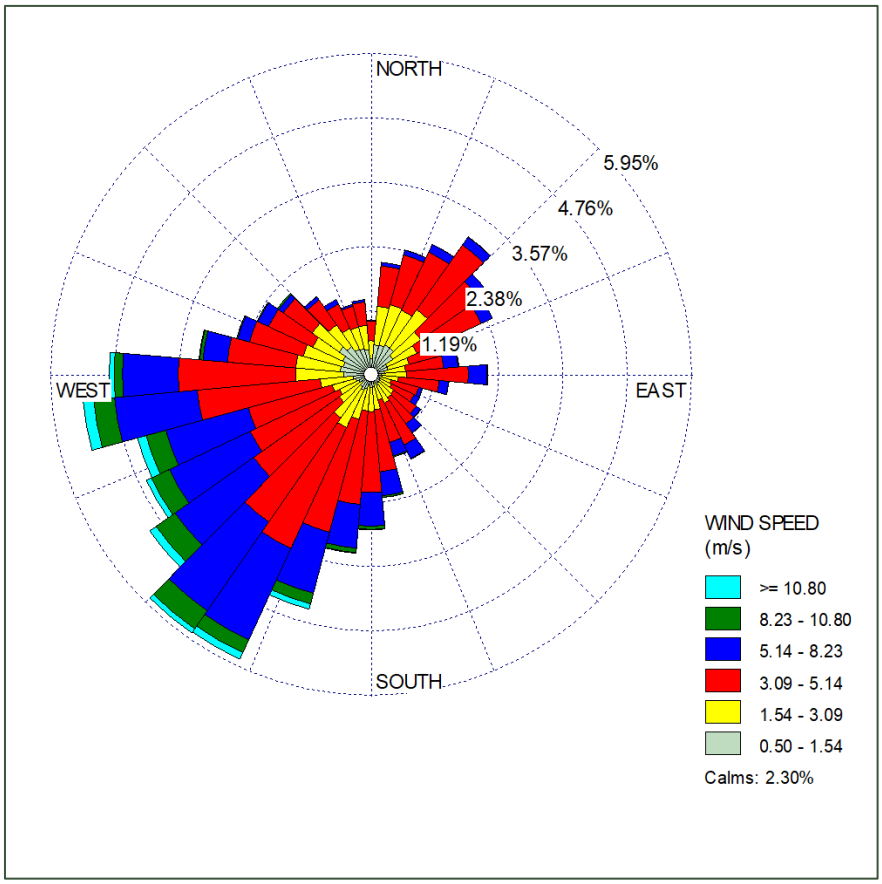


Figure 2-3: Windrose (Heathrow Airport 2020-2024)

2.1.9 Treatment of Model Output

The assessment of impacts against the AQALs as defined in Section 1.1.3 has been undertaken using model output as described in Table 2-2 below.

Table 2-2: Model Outputs

AQAL being assessed	Model Output – Process Contribution (PC)	Predicted Environmental Concentration (PEC)
NO_2, PM_{10} and $PM_{2.5}$ annual mean	Annual mean from 5 met. years (factored for operational hours). NO_x PC factored for 70% conversion to NO_2 [(a)]	PC + annual mean background
NO_2 1-hour mean. Not to be exceeded more than 18 times a calendar year	99.79%ile of 1-hour means. PC factored for 35% NO_x conversion to NO_2 as per EA guidance [(a)(b)]. Threshold violation file counts number of hours per annum exceeding threshold (e.g. 20% of AQAL).	Probability of exceedance calculated using hypergeometric distribution.
PM_{10} 24-hour mean. Not to be exceeded more than 35 times a calendar year	90.41%ile of 24-hour means for PM_{10}. (factored for operational hours). Threshold violation file counts number of hours per annum exceeding threshold (e.g. 20% of AQAL).	Probability of exceedance calculated using hypergeometric distribution.

AQAL being assessed	Model Output – Process Contribution (PC)	Predicted Environmental Concentration (PEC)
Table note: a) DC01 and DC02 As per EA Air emissions risk assessment for your environmental permit guidance AQMAU reference: b) Virtus converted in accordance with Virtus Data Centres Stockley Park Campus Air Quality Assessment Project No. 70091579 Our Ref. No. AQ02 DATE: MAY 2022 approved by Environment Agency		

2.1.10 Statistical Analysis of Short-Term Impacts

The approach to assessment of short-term impacts adopted is consistent with the EA's approach defined in the *Guidance on dispersion modelling for oxides of nitrogen assessment from generators*. The approach requires modelling the impact of the generator plant for 8,760 hours of the year in order to ensure that the operating hours coincide with the worst-case dispersal conditions.

In order to determine the probability of an exceedance of a particular threshold for a short-term infrequent operation, the cumulative hypergeometric distribution will be used (with the 2.5 factor applied for consecutive operating hours) to assess the likelihood of exceedance hours coinciding with the operational hours.

2.2 Cumulative Impact Approach

Emissions from existing industrial and commercial sources are already represented in the baseline monitoring data, and those included in the London Atmospheric Emissions Inventory (LAEI) are also represented in future air quality projections[28]. Therefore, they have been accounted for in the assessment through precautionary application of baseline ambient air quality datasets. This is considered to be the case for the majority of emission sources. However, where baseline monitoring data is unlikely to adequately account for these impacts, in particular where there is the potential for short-term impacts as a result of plumes combining this has been modelled specifically. This is considered to be the case for the adjacent Virtus Data Centre to the west, due to its location and proximity. Other Data Centres, either proposed, or not yet fully commissioned, have been specifically modelled to represent a future cumulative scenario. The impact assessment approach is therefore as follows:

- *Present* Impact Assessment - Assessment of impacts of the proposed development combined *with existing emissions sources* represented either in the baseline datasets or specifically modelled in the case of Virtus; and
- *Future Cumulative Effects* Impact Assessment - Assessment of impacts of the proposed development in combination with existing *and future emissions sources* (or those not yet represented in the baseline data) which have been specifically modelled, i.e. Hayes Digital Park, Union Park, Tudor Works and West London Technology Park. This is reported in the 'Cumulative Effects' section in the ES Chapter 6.

2.2.1 Virtus Data Centre

The Virtus Data Centre Air Emissions Risk Assessment and dispersion model files were obtained from the Environment Agency via a Freedom of Information request. The 'worst case' testing scenario (i.e. 'Virtus Test 2 on-load test' carried out once per year per

[28] London Atmospheric Emissions Inventory LAEI 2022, Transport for London and the Greater London Authority

generator) was selected for the cumulative impact assessment, this is precautionary as it assumes that every DC01 and DC02 test occurs with a Virtus 'on-load' test.

Table 2-3: Virtus – Emission Parameters

Source / Scenario ID	X Coord. (m)	Y Coord. (m)	Release Height (m)	NOx Emission Rate (g/s)	Gas Exit Temperature (°C)	Gas Exit Velocity (m/s)	Inside Diameter (m)
VT_OM01	507326	180161	12.50	10.2	82.00	13.09	2.80
VT_OM02	507324	180150	12.50	6.8	82.00	13.09	2.80
VT_OM03	507322	180141	12.50	4.5	68.60	12.61	2.80
VT_OM04	507320	180133	12.50	6.8	82.00	13.09	2.80
VT_OM05	507318	180125	12.50	6.8	82.00	13.09	2.80
VT_OM06	507316	180116	12.50	6.8	82.00	13.09	2.80
VT_OM07	507314	180108	12.50	4.5	68.60	12.61	2.80
VT_OM08	507312	180100	12.50	6.8	82.00	13.09	2.80
VT_OM09	507310	180091	12.50	6.8	82.00	13.09	2.80
VT_OM10	507304	180066	12.50	4.5	68.60	12.61	2.80
VT_OM11	507344	180238	12.50	20.2	87.30	13.26	2.80
VT_OM12	507341	180227	12.50	8.5	71.80	12.72	2.80
VT_OM13	507339	180219	12.50	7.9	81.00	13.06	2.80
VT_OM14	507337	180210	12.50	7.9	81.00	13.06	2.80
VT_OM15	507336	180202	12.50	5.1	68.10	12.06	2.80
VT_OM16	507334	180194	12.50	7.9	81.00	13.06	2.80
VT_OM17	507332	180185	12.50	5.1	68.10	12.06	2.80
VT_OM18	507286	180264	12.50	7.0	82.50	13.10	2.80
VT_OM19	507284	180255	12.50	7.0	82.50	13.10	2.80
VT_OM20	507282	180247	12.50	7.0	82.50	13.10	2.80
VT_OM21	507280	180238	12.50	4.6	68.70	12.61	2.80
VT_OM22	507278	180230	12.50	7.0	82.50	13.10	2.80
VT_OM23	507276	180222	12.50	7.0	82.50	13.10	2.80
VT_OM24	507274	180213	12.50	7.0	82.50	13.10	2.80
VT_OM25	507272	180205	12.50	4.6	68.70	12.61	2.80
VT_OM26	507270	180197	12.50	7.0	82.50	13.10	2.80
VT_OM27	507268	180188	12.50	7.0	82.50	13.10	2.80
VT_OM28	507267	180180	12.50	7.0	82.50	13.10	2.80
VT_OM29	507265	180171	12.50	4.6	68.70	12.61	2.80
VT_OM30	507257	180138	12.50	12.8	84.80	13.24	2.80
VT_OM31	507255	180130	12.50	12.8	84.80	13.24	2.80
VT_OM32	507253	180122	12.50	12.8	84.80	13.24	2.80

Source / Scenario ID	X Coord. (m)	Y Coord. (m)	Release Height (m)	NOx Emission Rate (g/s)	Gas Exit Temperature (°C)	Gas Exit Velocity (m/s)	Inside Diameter (m)
VT_OM33	507251	180113	12.50	0.2	70.20	12.66	2.80
VT_OM34	507249	180105	12.50	0.3	84.80	13.17	2.80
VT_OM35	507247	180096	12.50	0.3	84.80	13.17	2.80
VT_OM36	507246	180088	12.50	0.2	70.20	12.66	2.80
VT_OM37	507208	180167	18.00	0.12	84.00	15.75	2.95
VT_OM38	507207	180163	18.00	0.12	84.00	15.75	2.95
VT_Test	507327	180164	12.5	6.27	70.20	13.04	1.98
Table Notes: In the outage scenario (VT_OMxx) back-up generators at Virtus are modelled as combined sources (with virtual diameter) due to plume merging, as per the EP application. During routine testing (VT_Test) the generators are run one by one and therefore there is no potential for plume merging. Particulate matter has been modelled at the same ratio of NOx:PM as the C175-20 generator.							

2.2.2 Other Data Centres for Potential Future Cumulative Scenario

During scoping LBH requested the Data Centres currently proposed within the planning system to be included in a cumulative impact scenario. In addition, Data Centres on these campuses under construction but not yet fully commissioned and therefore not included in the baseline monitoring have also been included. The Data Centres are:

- Union Park – Union Park 3 and 4 (ref 75111/APP/2020/1955 and 75111/APP/2022/1007). Union Park 1 and 2 also included.
- Tudor Works – (ref 38421/APP/202021/4045)
- Hayes Digital Park (ref 78343/APP/2025/719)
- West London Technology Park (Buckinghamshire Council app Ref: PL/24/0754/OA) (SoS Ref: APP/N0410/W/24/3347353)

The inputs (buildings, emission sources, and testing hours) for the dispersion modelling have been sourced from the planning application documents. Table 2-4 below summarises the emissions input data and Figure 2-4 illustrates the locations.

Table 2-4: Cumulative Assessment - Modelled Data Centre Emission Sources

Parameter	Union Park	Tudor Works	West London Tech. Park	Hayes Bridge
No. of generators	56	46	114	74
Stack Height (m Above Ground Level)	21.1 to 28	38.6	18	38.6 to 56
Stack Internal Diameter (m)	0.70	0.55	0.45	0.70
Emission Temperature (°C)	482	528	485	475
Emission velocity (m/s)	30.9	44.6	39.7	30.9
NOx SCR Warm-up Emission (g/s) (1hr avg.)	2.43	2.33	2.08	2.40
PM Emission (g/s)	0.018	0.128	0.013	0.032
Table notes:				

Parameter	Union Park	Tudor Works	West London Tech. Park	Hayes Bridge
• Union Park testing regime: 56 generators across 4 energy centres. 3122 hours of individual generator tests across UP1 to UP4, and 16 hours of all generators simultaneously at UP3 and UP4. • Tudor Works testing: (highest emitting 2.4MWe applied), 552 hours of individual generator testing plus 1 hour all generators simultaneously. • West London Tech. Park testing: groups of 10 generators simultaneously 12 hours per year. 137 hours total of testing. • Hayes Bridge testing: 888 hours of individual generator testing.				

Figure 2-4: Location of Data Centres for Cumulative Assessment

3.0 Impact Assessment Results (with Present Baseline)

3.1 Testing and Maintenance Scenario

3.1.1 Annual Mean Impacts

The predicted annual mean impacts, inclusive of current cumulative impact from existing sources, at receptor locations relevant for 'annual mean' exposure are presented in Table 3-1 to Table 3-3, for NO_2, PM_{10} and $PM_{2.5}$ respectively. A contour plot is presented for NO_2 annual mean as the key pollutant to illustrate the annual mean dispersal pattern (Figure 3-1).

The PC does not exceed 1% of the AQAL at any receptor. The PEC does not exceed the AQAL at any of the modelled receptor locations. The impacts can be described as negligible at all relevant receptors, and therefore the effect can be considered 'not significant'.

The assessment of impact and significance provided in the Environmental Statement is based upon legislative air quality standards. For informational purposes the impact of the proposed development has also been considered against the more stringent WHO guideline value. The maximum PC at a receptor is less than 1% of the WHO NO_2, PM_{10} and $PM_{2.5}$ guideline values.

Table 3-1: Annual Mean NO_2 Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	0.09	0.2%	30.6	76.6%	Negligible
DR2	0.04	0.1%	30.1	75.3%	Negligible
DR3	0.04	0.1%	30.1	75.2%	Negligible
GR1	0.07	0.2%	30.2	75.5%	Negligible
GR2	0.03	0.1%	30.1	75.2%	Negligible
GR3	0.04	0.1%	30.1	75.2%	Negligible
GR4	0.07	0.2%	30.1	75.4%	Negligible
GR5	0.06	0.1%	30.1	75.3%	Negligible
GR6	0.04	0.1%	30.1	75.2%	Negligible
GR7	0.04	0.1%	30.1	75.2%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

Table 3-2: Annual Mean PM_{10} Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	13.0	32.5%	Negligible
DR2	<0.01	<0.1%	13.0	32.5%	Negligible
DR3	<0.01	<0.1%	13.0	32.5%	Negligible
GR1	<0.01	<0.1%	13.0	32.5%	Negligible
GR2	<0.01	<0.1%	13.0	32.5%	Negligible
GR3	<0.01	<0.1%	13.0	32.5%	Negligible

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
GR4	<0.01	<0.1%	13.0	32.5%	Negligible
GR5	<0.01	<0.1%	13.0	32.5%	Negligible
GR6	<0.01	<0.1%	13.0	32.5%	Negligible
GR7	<0.01	<0.1%	13.0	32.5%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

Table 3-3: Annual Mean $PM_{2.5}$ Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	7.0	70.0%	Negligible
DR2	<0.01	<0.1%	7.0	70.0%	Negligible
DR3	<0.01	<0.1%	7.0	70.0%	Negligible
GR1	<0.01	<0.1%	7.0	70.0%	Negligible
GR2	<0.01	<0.1%	7.0	70.0%	Negligible
GR3	<0.01	<0.1%	7.0	70.0%	Negligible
GR4	<0.01	<0.1%	7.0	70.0%	Negligible
GR5	<0.01	<0.1%	7.0	70.0%	Negligible
GR6	<0.01	<0.1%	7.0	70.0%	Negligible
GR7	<0.01	<0.1%	7.0	70.0%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

3.1.2 1-Hour Mean Nitrogen Dioxide Impacts

The predicted risk of 1-hour mean NO_2 impacts are presented in Table 3-4, alongside current cumulative impacts from existing sources. The probability of impacts being greater than 'small' (i.e. 20% of the AQAL) is less than 1% and therefore considered 'highly unlikely'. Therefore, effects on air quality are considered 'not significant''. The process contribution from DC01 and DC02 is illustrated in Figure 3-2.

Table 3-4: Risk of Exceedances of 1-hour mean NO_2 AQAL

ID	DC01 and DC02 Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor	Cumulative Impact with adjacent DC Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor
DR1	<1%	Highly Unlikely	<1%	Highly Unlikely
DR2	<1%	Highly Unlikely	<1%	Highly Unlikely
DR3	<1%	Highly Unlikely	<1%	Highly Unlikely
DR4	<1%	Highly Unlikely	<1%	Highly Unlikely
DR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR1	<1%	Highly Unlikely	<1%	Highly Unlikely

ID	DC01 and DC02 Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor	Cumulative Impact with adjacent DC Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor
GR2	<1%	Highly Unlikely	<1%	Highly Unlikely
GR3	<1%	Highly Unlikely	<1%	Highly Unlikely
GR4	<1%	Highly Unlikely	<1%	Highly Unlikely
GR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR6	<1%	Highly Unlikely	<1%	Highly Unlikely
GR7	<1%	Highly Unlikely	<1%	Highly Unlikely

3.1.3 24-Hour Mean PM_{10} Impacts

The predicted risk of 24-hour mean PM_{10} impacts are presented in Table 3-4, alongside current cumulative impacts from existing sources. The probability of impacts being greater than 'small' (i.e. 20% of the AQAL) is less than 1% and therefore considered 'highly unlikely'. Therefore, effects on air quality are considered 'not significant''.

Table 3-5: Risk of Exceedances of 24-hour mean PM_{10} AQAL

ID	DC01 and DC02 Probability of PC > 'Small' (>10µg/m^3)	Impact Risk Descriptor	Cumulative Impact with adjacent DC Probability of PC > 'Small' (>10µg/m^3)	Impact Risk Descriptor
DR1	<1%	Highly Unlikely	<1%	Highly Unlikely
DR2	<1%	Highly Unlikely	<1%	Highly Unlikely
DR3	<1%	Highly Unlikely	<1%	Highly Unlikely
DR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR1	<1%	Highly Unlikely	<1%	Highly Unlikely
GR2	<1%	Highly Unlikely	<1%	Highly Unlikely
GR3	<1%	Highly Unlikely	<1%	Highly Unlikely
GR4	<1%	Highly Unlikely	<1%	Highly Unlikely
GR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR6	<1%	Highly Unlikely	<1%	Highly Unlikely
GR7	<1%	Highly Unlikely	<1%	Highly Unlikely

3.2 Outage Scenario

3.2.1 Annual Mean Impacts

The predicted annual mean impacts as a result of a 24-hour outage, inclusive of current cumulative impact from existing sources, and maintenance and testing, at receptor locations relevant for 'annual mean' exposure are presented in Table 3-6 to Table 3-8, for NO_2, PM_{10} and $PM_{2.5}$ respectively. A contour plot is presented for NO_2 annual mean as the key pollutant to illustrate the annual mean dispersal pattern (Figure 3-3).

The PC does not exceed 1% of the AQAL at any receptor. The PEC does not exceed the AQAL at any of the modelled receptor locations. The impacts can be described as negligible at all relevant receptors, and therefore the effect can be considered 'not significant'.

The assessment of impact and significance provided in the Environmental Statement is based upon legislative air quality standards. For informational purposes the impact of the proposed development has also been considered against the more stringent WHO guideline value. The maximum PC at a receptor is 2.5% of the NO_2 WHO guideline value, and less than 1% of the PM_{10} and $PM_{2.5}$ WHO guideline values.

Table 3-6: Annual Mean NO_2 Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	0.25	0.6%	31.5	78.8%	Negligible
DR2	0.07	0.2%	30.4	76.0%	Negligible
DR3	0.07	0.2%	30.4	76.0%	Negligible
GR1	0.16	0.4%	30.5	76.1%	Negligible
GR2	0.05	0.1%	30.2	75.5%	Negligible
GR3	0.08	0.2%	30.2	75.6%	Negligible
GR4	0.13	0.3%	30.4	75.9%	Negligible
GR5	0.11	0.3%	30.3	75.7%	Negligible
GR6	0.08	0.2%	30.2	75.5%	Negligible
GR7	0.06	0.2%	30.2	75.4%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

Table 3-7: Annual Mean PM_{10} Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	13.0	32.5%	Negligible
DR2	<0.01	<0.1%	13.0	32.5%	Negligible
DR3	<0.01	<0.1%	13.0	32.5%	Negligible
GR1	<0.01	<0.1%	13.0	32.5%	Negligible
GR2	<0.01	<0.1%	13.0	32.5%	Negligible
GR3	<0.01	<0.1%	13.0	32.5%	Negligible
GR4	<0.01	<0.1%	13.0	32.5%	Negligible
GR5	<0.01	<0.1%	13.0	32.5%	Negligible
GR6	<0.01	<0.1%	13.0	32.5%	Negligible
GR7	<0.01	<0.1%	13.0	32.5%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

Table 3-8: Annual Mean $PM_{2.5}$ Impacts

ID	Max. PC (µg/m³)	PC % of AQAL	Max. PEC [(a)] (µg/m³)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	7.0	70.0%	Negligible
DR2	<0.01	<0.1%	7.0	70.0%	Negligible
DR3	<0.01	<0.1%	7.0	70.0%	Negligible
GR1	<0.01	<0.1%	7.0	70.0%	Negligible
GR2	<0.01	<0.1%	7.0	70.0%	Negligible
GR3	<0.01	<0.1%	7.0	70.0%	Negligible
GR4	<0.01	<0.1%	7.0	70.0%	Negligible
GR5	<0.01	<0.1%	7.0	70.0%	Negligible
GR6	<0.01	<0.1%	7.0	70.0%	Negligible
GR7	<0.01	<0.1%	7.0	70.0%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

3.2.2 1-Hour Mean Nitrogen Dioxide Impacts

The predicted risk of 1-hour mean NO_2 impacts are presented in Table 3-9, alongside current cumulative impacts (illustrated in Figure 3-4). The probability of impacts being greater than 'small' (i.e. 20% of the AQAL) is less than 1% and therefore considered 'highly unlikely'. Therefore, effects on air quality are considered 'not significant'.

Table 3-9: Risk of Exceedances of 1-hour mean NO_2 AQAL

ID	DC01 and DC02 Probability of PC > 'Small' (>40µg/m³)	Impact Risk Descriptor	Cumulative Impact with adjacent DC Probability of PC > 'Small' (>40µg/m³)	Impact Risk Descriptor
DR1	<1%	Highly Unlikely	<1%	Highly Unlikely
DR2	<1%	Highly Unlikely	<1%	Highly Unlikely
DR3	<1%	Highly Unlikely	<1%	Highly Unlikely
DR4	<1%	Highly Unlikely	<1%	Highly Unlikely
DR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR1	<1%	Highly Unlikely	<1%	Highly Unlikely
GR2	<1%	Highly Unlikely	<1%	Highly Unlikely
GR3	<1%	Highly Unlikely	<1%	Highly Unlikely
GR4	<1%	Highly Unlikely	<1%	Highly Unlikely
GR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR6	<1%	Highly Unlikely	<1%	Highly Unlikely
GR7	<1%	Highly Unlikely	<1%	Highly Unlikely

3.2.3 24-Hour Mean PM_{10} Impacts

In the context of the 24 outage hours considered, it is not statistically possible to exceed the AQAL (i.e. 50µg/m^3 as a 24-hour mean not to be exceeded more than 35 times a calendar year). Therefore, effects on air quality are considered 'not significant'.

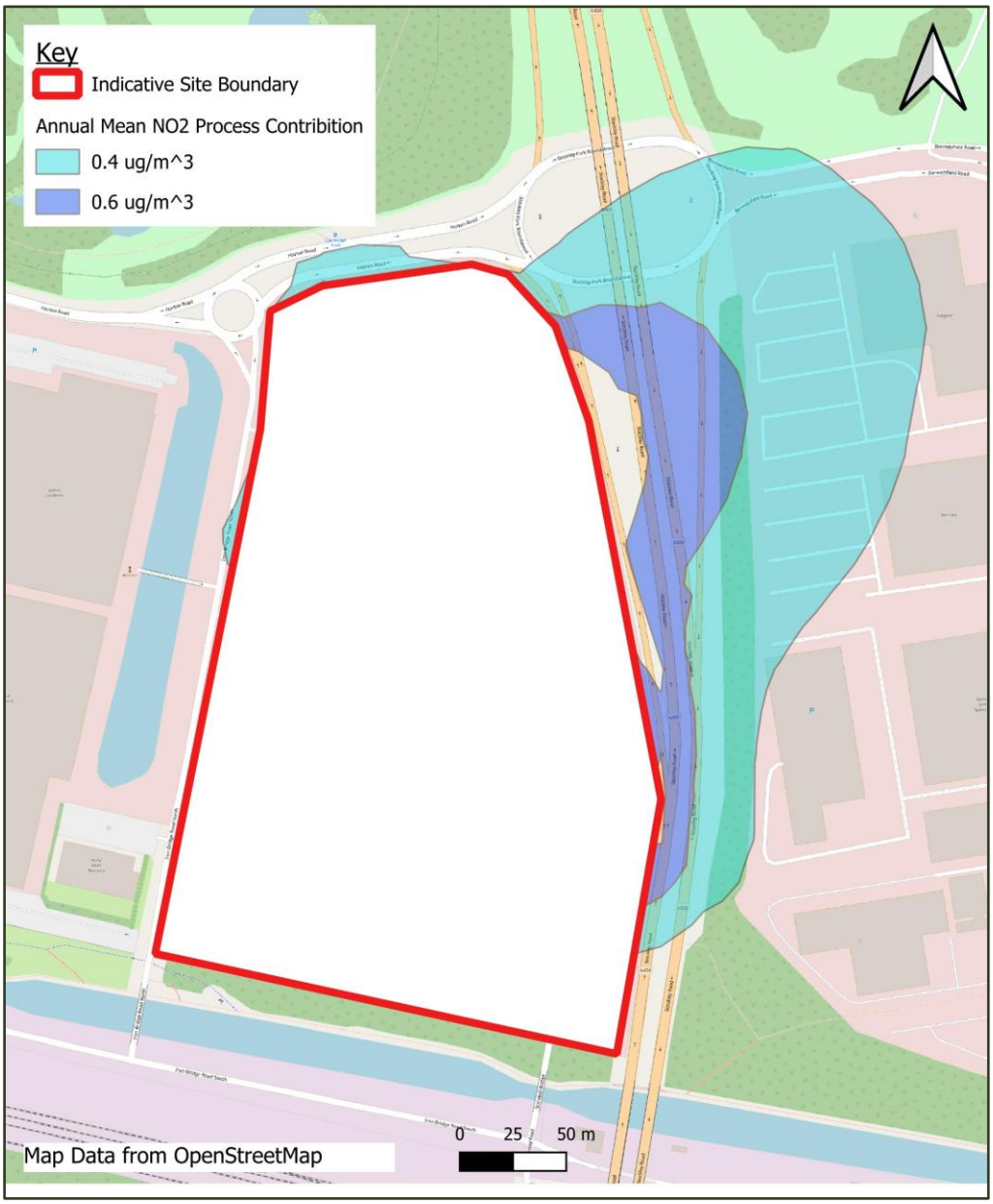


Figure 3-1: Testing Scenario - Annual Mean NO_2 Process Contribution

Figure 3-2: Testing Scenario – 1-hour Mean Probability of 'Small Impact'

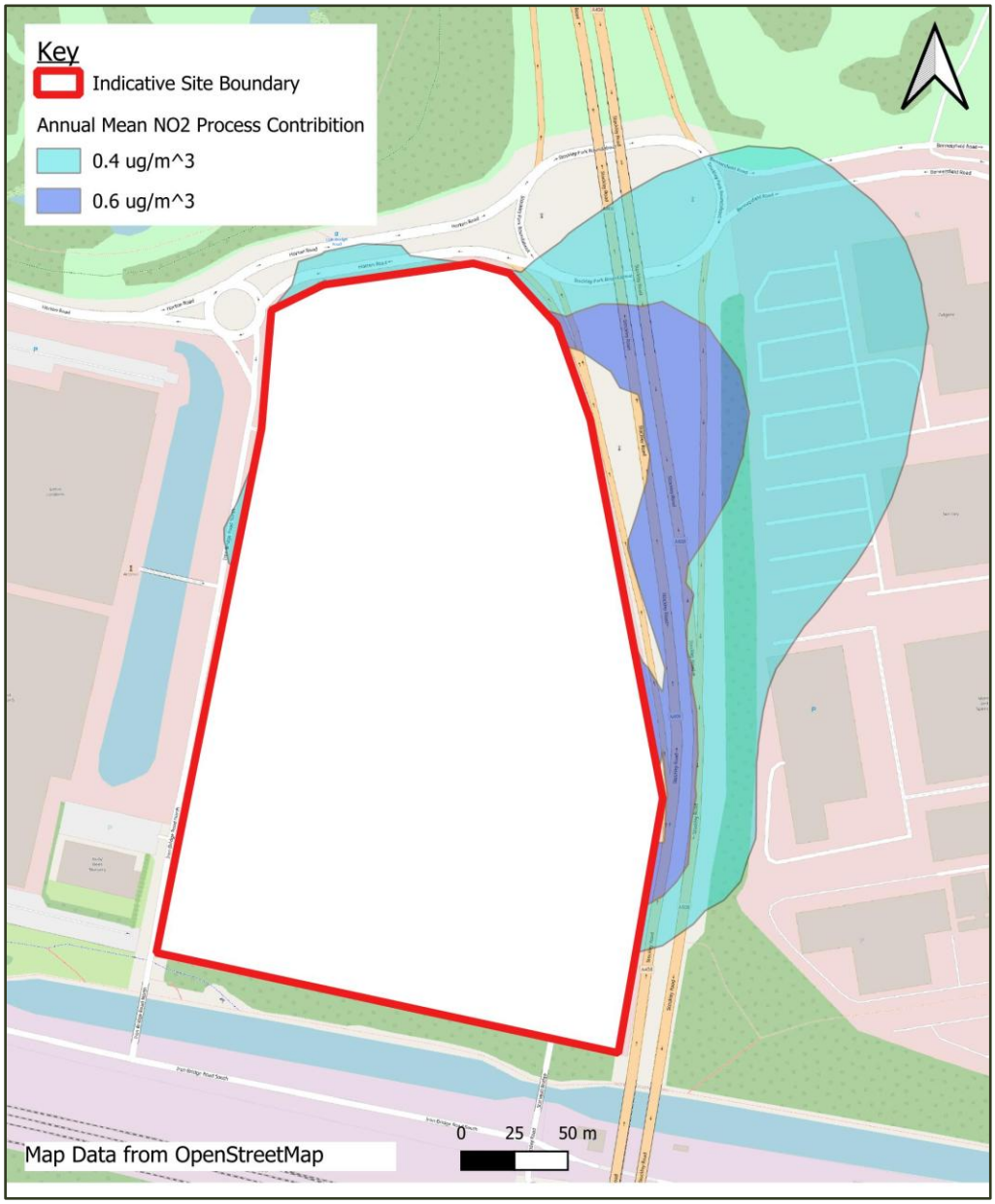


Figure 3-3: Outage Scenario - Annual Mean NO_2 Process Contribution

Figure 3-4: Outage Scenario – 1-hour Mean Probability of 'Small Impact'

4.0 Cumulative Impact Assessment Results

4.1 Testing and Maintenance Scenario

4.1.1 Annual Mean Impacts

The predicted annual mean impacts, inclusive of cumulative impact from future sources, at receptor locations relevant for 'annual mean' exposure are presented in Table 4-1 to Table 4-3, for NO_2, PM_{10} and $PM_{2.5}$ respectively.

The PEC increases slightly with the cumulative impact from future sources compared to the PEC with the present baseline but does not exceed the AQAL at any of the modelled receptor locations (note that the PM_{10} and $PM_{2.5}$ increases are below the reported decimal places). The impacts can be described as negligible at all relevant receptors, and therefore the cumulative effect can be considered 'not significant'.

Table 4-1: Annual Mean NO_2 Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	0.09	0.2%	30.7	76.7%	Negligible
DR2	0.04	0.1%	30.3	75.8%	Negligible
DR3	0.04	0.1%	30.3	75.8%	Negligible
GR1	0.07	0.2%	30.5	76.3%	Negligible
GR2	0.03	0.1%	30.3	75.7%	Negligible
GR3	0.04	0.1%	30.3	75.8%	Negligible
GR4	0.07	0.2%	30.4	76.1%	Negligible
GR5	0.06	0.1%	30.6	76.5%	Negligible
GR6	0.04	0.1%	31.0	77.4%	Negligible
GR7	0.04	0.1%	31.0	77.4%	Negligible
Table note: a) Inclusive of cumulative impact from potential *future* sources					

Table 4-2: Annual Mean PM_{10} Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	13.0	32.5%	Negligible
DR2	<0.01	<0.1%	13.0	32.5%	Negligible
DR3	<0.01	<0.1%	13.0	32.5%	Negligible
GR1	<0.01	<0.1%	13.0	32.5%	Negligible
GR2	<0.01	<0.1%	13.0	32.5%	Negligible
GR3	<0.01	<0.1%	13.0	32.5%	Negligible
GR4	<0.01	<0.1%	13.0	32.5%	Negligible
GR5	<0.01	<0.1%	13.0	32.5%	Negligible
GR6	<0.01	<0.1%	13.0	32.5%	Negligible

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
GR7	<0.01	<0.1%	13.0	32.5%	Negligible
Table note: a) Inclusive of cumulative impact from potential *future* sources					

Table 4-3: Annual Mean $PM_{2.5}$ Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	7.0	70.0%	Negligible
DR2	<0.01	<0.1%	7.0	70.1%	Negligible
DR3	<0.01	<0.1%	7.0	70.1%	Negligible
GR1	<0.01	<0.1%	7.0	70.1%	Negligible
GR2	<0.01	<0.1%	7.0	70.1%	Negligible
GR3	<0.01	<0.1%	7.0	70.1%	Negligible
GR4	<0.01	<0.1%	7.0	70.1%	Negligible
GR5	<0.01	<0.1%	7.0	70.1%	Negligible
GR6	<0.01	<0.1%	7.0	70.2%	Negligible
GR7	<0.01	<0.1%	7.0	70.2%	Negligible
Table note: a) Inclusive of cumulative impact from potential *future* sources					

4.1.2 1-Hour Mean Nitrogen Dioxide Impacts

The predicted risk of 1-hour mean NO_2 impacts are presented in Table 4-4, inclusive of cumulative impact from future sources. The probability of impacts being greater than 'small' (i.e. 20% of the AQAL) is less than 1% and therefore considered 'highly unlikely'. Therefore, effects on air quality are considered 'not significant''.

Table 4-4: Risk of Exceedances of 1-hour mean NO_2 AQAL

ID	DC01 and DC02 Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor	Cumulative Impact Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor
DR1	<1%	Highly Unlikely	<1%	Highly Unlikely
DR2	<1%	Highly Unlikely	<1%	Highly Unlikely
DR3	<1%	Highly Unlikely	<1%	Highly Unlikely
DR4	<1%	Highly Unlikely	<1%	Highly Unlikely
DR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR1	<1%	Highly Unlikely	<1%	Highly Unlikely
GR2	<1%	Highly Unlikely	<1%	Highly Unlikely
GR3	<1%	Highly Unlikely	<1%	Highly Unlikely
GR4	<1%	Highly Unlikely	<1%	Highly Unlikely
GR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR6	<1%	Highly Unlikely	<1%	Highly Unlikely

ID	DC01 and DC02 Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor	Cumulative Impact Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor
GR7	<1%	Highly Unlikely	<1%	Highly Unlikely

4.1.3 24-Hour Mean PM_{10} Impacts

The predicted risk of 24-hour mean PM_{10} impacts are presented in Table 4-5, inclusive of cumulative impact from future sources. The probability of impacts being greater than 'small' (i.e. 20% of the AQAL) is less than 1% and therefore considered 'highly unlikely'. Therefore, effects on air quality are considered 'not significant''.

Table 4-5: Risk of Exceedances of 24-hour mean PM_{10} AQAL

ID	DC01 and DC02 Probability of PC > 'Small' (>10µg/m^3)	Impact Risk Descriptor	Cumulative Impact Probability of PC > 'Small' (>10µg/m^3)	Impact Risk Descriptor
DR1	<1%	Highly Unlikely	<1%	Highly Unlikely
DR2	<1%	Highly Unlikely	<1%	Highly Unlikely
DR3	<1%	Highly Unlikely	<1%	Highly Unlikely
DR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR1	<1%	Highly Unlikely	<1%	Highly Unlikely
GR2	<1%	Highly Unlikely	<1%	Highly Unlikely
GR3	<1%	Highly Unlikely	<1%	Highly Unlikely
GR4	<1%	Highly Unlikely	<1%	Highly Unlikely
GR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR6	<1%	Highly Unlikely	<1%	Highly Unlikely
GR7	<1%	Highly Unlikely	<1%	Highly Unlikely

4.2 Outage Scenario

4.2.1 Annual Mean Impacts

The predicted annual mean impacts as a result of a 24-hour outage, inclusive of cumulative impact from future sources, and maintenance and testing, at receptor locations relevant for 'annual mean' exposure are presented in Table 4-6 to Table 4-8, for NO_2, PM_{10} and $PM_{2.5}$ respectively.

The PEC increases slightly with the cumulative impact from future sources compared to the PEC with the present baseline but does not exceed the AQAL at any of the modelled receptor locations (note that the PM_{10} and $PM_{2.5}$ increases are below the reported decimal places). The impacts can be described as negligible at all relevant receptors, and therefore the cumulative effect can be considered 'not significant'.

Table 4-6: Annual Mean NO_2 Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	0.25	0.6%	31.6	79.0%	Negligible

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR2	0.07	0.2%	30.7	76.7%	Negligible
DR3	0.07	0.2%	30.7	76.7%	Negligible
GR1	0.16	0.4%	30.8	77.0%	Negligible
GR2	0.05	0.1%	30.5	76.2%	Negligible
GR3	0.08	0.2%	30.5	76.3%	Negligible
GR4	0.13	0.3%	30.7	76.7%	Negligible
GR5	0.11	0.3%	30.7	76.8%	Negligible
GR6	0.08	0.2%	31.1	77.8%	Negligible
GR7	0.06	0.2%	31.1	77.7%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

Table 4-7: Annual Mean PM_{10} Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	13.0	32.5%	Negligible
DR2	<0.01	<0.1%	13.0	32.5%	Negligible
DR3	<0.01	<0.1%	13.0	32.5%	Negligible
GR1	<0.01	<0.1%	13.0	32.5%	Negligible
GR2	<0.01	<0.1%	13.0	32.5%	Negligible
GR3	<0.01	<0.1%	13.0	32.5%	Negligible
GR4	<0.01	<0.1%	13.0	32.5%	Negligible
GR5	<0.01	<0.1%	13.0	32.5%	Negligible
GR6	<0.01	<0.1%	13.0	32.5%	Negligible
GR7	<0.01	<0.1%	13.0	32.5%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

Table 4-8: Annual Mean $PM_{2.5}$ Impacts

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
DR1	<0.01	<0.1%	7.0	70.1%	Negligible
DR2	<0.01	<0.1%	7.0	70.1%	Negligible
DR3	<0.01	<0.1%	7.0	70.1%	Negligible
GR1	<0.01	<0.1%	7.0	70.1%	Negligible
GR2	<0.01	<0.1%	7.0	70.1%	Negligible
GR3	<0.01	<0.1%	7.0	70.1%	Negligible
GR4	<0.01	<0.1%	7.0	70.1%	Negligible
GR5	<0.01	<0.1%	7.0	70.1%	Negligible

ID	Max. PC (µg/m^3)	PC % of AQAL	Max. PEC [(a)] (µg/m^3)	PEC % of AQAL	Impact Descriptor
GR6	<0.01	<0.1%	7.0	70.2%	Negligible
GR7	<0.01	<0.1%	7.0	70.2%	Negligible
Table note: a) Inclusive of current cumulative impact from *existing* sources					

4.2.2 1-Hour Mean Nitrogen Dioxide Impacts

The predicted risk of 1-hour mean NO_2 impacts are presented in Table 4-9, inclusive of cumulative impact from future sources. The probability of impacts being greater than 'small' (i.e. 20% of the AQAL) is less than 1% and therefore considered 'highly unlikely'. Therefore, effects on air quality are considered 'not significant'.

Table 4-9: Risk of Exceedances of 1-hour mean NO_2 AQAL

ID	DC01 and DC02 Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor	Cumulative Impact Probability of PC > 'Small' (>40µg/m^3)	Impact Risk Descriptor
DR1	<1%	Highly Unlikely	<1%	Highly Unlikely
DR2	<1%	Highly Unlikely	<1%	Highly Unlikely
DR3	<1%	Highly Unlikely	<1%	Highly Unlikely
DR4	<1%	Highly Unlikely	<1%	Highly Unlikely
DR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR1	<1%	Highly Unlikely	<1%	Highly Unlikely
GR2	<1%	Highly Unlikely	<1%	Highly Unlikely
GR3	<1%	Highly Unlikely	<1%	Highly Unlikely
GR4	<1%	Highly Unlikely	<1%	Highly Unlikely
GR5	<1%	Highly Unlikely	<1%	Highly Unlikely
GR6	<1%	Highly Unlikely	<1%	Highly Unlikely
GR7	<1%	Highly Unlikely	<1%	Highly Unlikely

4.2.3 24-Hour Mean PM_{10} Impacts

In the context of the 24 outage hours considered, it is not statistically possible to exceed the AQAL (i.e. 50µg/m^3 as a 24-hour mean not to be exceeded more than 35 times a calendar year). Therefore, effects on air quality are considered 'not significant'.

5.0 Air Quality Positive Matrix

Table 5-1: Air Quality Positive Matrix

Measure	Summary of the measure	Reason for undertaking measure	Expected benefits	Assessment Methods	Reporting	How this measure will be secured
Beter design and reducing exposure						
Back-up generator flue heights	The Site's Back-up generator flues discharge at 12.5m above ground with no structures above them.	Ensure compliance with AQALs and minimise impacts on local receptors	Optimised dispersion and minimise impacts on local receptors	Detailed dispersion modelling	Quantitative	Planning condition and Environmental Permit Condition
Exterior building massing and design	Minimal changes to overall building massing and design	Prevent creation of street canyons.	Maintain effective dispersion of traffic pollution on Stockley Road	Qualitative review.	n/a	Planning condition.
Building emissions						
Back-up generator NOx abatement	Provision of SCR NOx abatement	The proposed development would be capable of meeting AQALs with provision of back-up generators without SCR, meeting the minimum Environment Agency regulatory requirements of 2000 mg/Nm^3	The back-up generators will be provided SCR NOx abatement reducing emissions to 250 mg/Nm3 (at 5% O2) which goes beyond the minimum regulatory requirement	Detailed dispersion modelling	Quantitative	Planning condition and Environmental Permit Condition
Back-up generator - Minimisation of testing hours	To meet the definition of 'back-up' plant under the Medium Combustion Plant Directive the maximum limit to testing is 50 hours per year. The proposed routine	To minimise annual emissions from the site.	Reduction in annual mean concentrations in surrounding area.	Detailed dispersion modelling	Quantitative	Planning condition and Environmental Permit Condition

Measure	Summary of the measure	Reason for undertaking measure	Expected benefits	Assessment Methods	Reporting	How this measure will be secured
	testing and maintenance plan is less than half this with a planned 19 hours per year					
Hydrotreated Vegetable Oil (HVO)	Back-up generators capable of using HVO.	HVO is a more sustainable option reducing global climate impacts and results in lower NOx and PM emissions.	Improvement in air quality in surrounding area over limiting to just diesel.	Emissions testing results.	Quantitative	Allowance for use in Planning condition and Environmental Permit Condition
Transport emissions						
Change of Use	Change of use from a logistics hub to a data centre.	Reduction to vehicle generated pollutant emissions from the Proposed Development.	Reduction in road transport emissions versus currently consented use.	Transport Assessment	Qualitative	Planning condition
Travel Plan	The core travel plan commitments will include the following: • Car sharing promotion • EV uptake • Shift Pattern management • Staff travel surveys annually • Travel information updates for all staff	To limit vehicle generated pollutant emissions from the Proposed Development.	Reduction in road transport emissions versus no travel plan.	Travel Plan Audit	Qualitative	Planning condition
Innovation and Futureproofing						

Measure	Summary of the measure	Reason for undertaking measure	Expected benefits	Assessment Methods	Reporting	How this measure will be secured
Engage with LBH on S106 refund (DCC)	Proportion of S106 payment to be refunded if emissions fall below DCC threshold.	Incentivise reduction in emissions.	Reduction in pollutant emissions.	Annual reporting.	Quantitative	Planning condition

6.0 Damage Cost Calculation

6.1 Testing Schedule

The testing schedule comprises of:

- Monthly generator by generator testing (as set out in Figure 6-1); and
- Quarterly Data Hall Block tests where multiple generators operate to support the power load of a Data Hall (2-hours duration, a total of 8 hours per year per generator) e.g. Data Hall blocks would be tested one at a time, i.e. 5 generators at once in DC01 or 6 generators at once in DC02 at 100% load).

Proposed Testing Schedule (Detailed Monthly Plan)

Month	Test Type	Load	Duration	Scheduling Notes
1	Cold Start + 50% Load	50%	60 minutes	All generators tested monthly
2	Cold Start + 50% Load	50%	60 minutes	Same as Month 1
3	On-load Performance Test	75–100%	60 minutes	Sustained load testing per quarter. Staggered over 3–4 weeks
4	Off-load Start Test	Off-load	15–30 minutes	Monthly offload testing
5	Off-load Start Test	Off-load	15–30 minutes	Monthly offload testing
6	On-load Performance Test	75–100%	60 minutes	Sustained load testing per quarter. Staggered over 3–4 weeks
7	Cold Start + 50% Load	50%	60 minutes	Same as Month 1
8	Off-load Start Test	Off-load	15–30 minutes	Monthly offload testing
9	On-load Performance Test	75–100%	60 minutes	Sustained load testing per quarter. Staggered over 3–4 weeks
10	Cold Start + 50% Load	50%	60 minutes	Same as Month 1
11	Off-load Start Test	Off-load	15–30 minutes	Monthly offload testing
12	Annual Full Service Load Test	100%	120 minutes	Annual extended load test on individual engines. Includes full OEM service

Figure 6-1: Generator by Generator Testing

6.2 Annual Emission Calculation

The annual emission calculation is set out in Table 6-1.

Table 6-1: Annual Emission Calculation Results

Test	Emission Rate Load Applied	Emission Rate SCR Status	Hours per Genset (32 gensets in total)	NOx Emission per genset @ loading (g/s)	NOx (tpa)	PM Emission per genset @ loading (g/s)	PM (tpa)
Off load Start Test (15 to 30 minutes)	10%	No SCR	2	0.949	0.22	0.016	0.004
Cold Start + 50%	50%	Time-weighted Warm-up	4	1.038	0.48	0.039	0.018
On-Load Performance Test (75% - 100% Load) and 1st Hour of Annual Full Service Test (100% Load)	100%	Time-weighted Warm-up	4	2.571	1.18	0.012	0.006
Second Hour of Annual Full Service	100%	Full SCR	1	0.677	0.08	0.012	0.001
Data Hall Block Tests 1st Hour	100%	Time-weighted Warm-up	4	2.571	1.18	0.012	0.006
Data Hall Block Tests 2nd Hr	100%	100% Load Full SCR	4	0.677	0.31	0.012	0.006
Total					3.46		0.04

6.3 Damage Cost Calculation Inputs and Results

The DCC inputs and assumptions are as follows:

- Damage costs have been calculated over a 30 year period as requested by LBH. A start year of 2027 has been assumed. This period aligns with the Air Quality Neutral Guidance requirement and is consistent with other Data Centre DCCs undertaken for LBH; and
- The damage costs '£ per tonne of pollutant per annum' have been based upon the Part A Category matrix – Category 3 'Stack height is less than or equal to 50m' and 'Average population density (persons per km squared) more than 1000'.
- Annual NO_x and $PM_{2.5}$ emissions have been entered as presented in Table 6-1.

The DCC results are set out in Table 6-2.

Table 6-2: Damage Cost Calculation Results

NO_x Damage Costs (£)	$PM_{2.5}$ Damage Costs (£)	Total Damage Costs (£)
818,980	69,333	888,312

7.0 Emissions Management Plan (Draft)

7.1 Monitoring

The operator shall, unless otherwise agreed in writing by the Environment Agency, undertake the monitoring specified in Table 7-1.

The operator shall maintain records of all monitoring required including records of the taking and analysis of samples, instrument measurements (periodic and continual), calibrations, examinations, tests and surveys and any assessment or evaluation made on the basis of such data.

Table 7-1: Emissions Monitoring

Source	Parameter	Frequency of Assessment	Monitoring Standard
All back-up generators	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	Every 1500 hours of operation or once every five years (whichever comes first).	In line with web guide 'Monitoring stack emissions: low risk MCPs and specified generators' Published 16 February 2021 (formerly known as TGN M5)

7.2 Reporting Performance Parameters

Reports on the performance of the activities over the previous year shall be collated each year. The report(s) shall include:

- a review of the results of the monitoring and assessment conducted in accordance Table 7-1; and
- the annual performance parameters set out in Table 7-2.

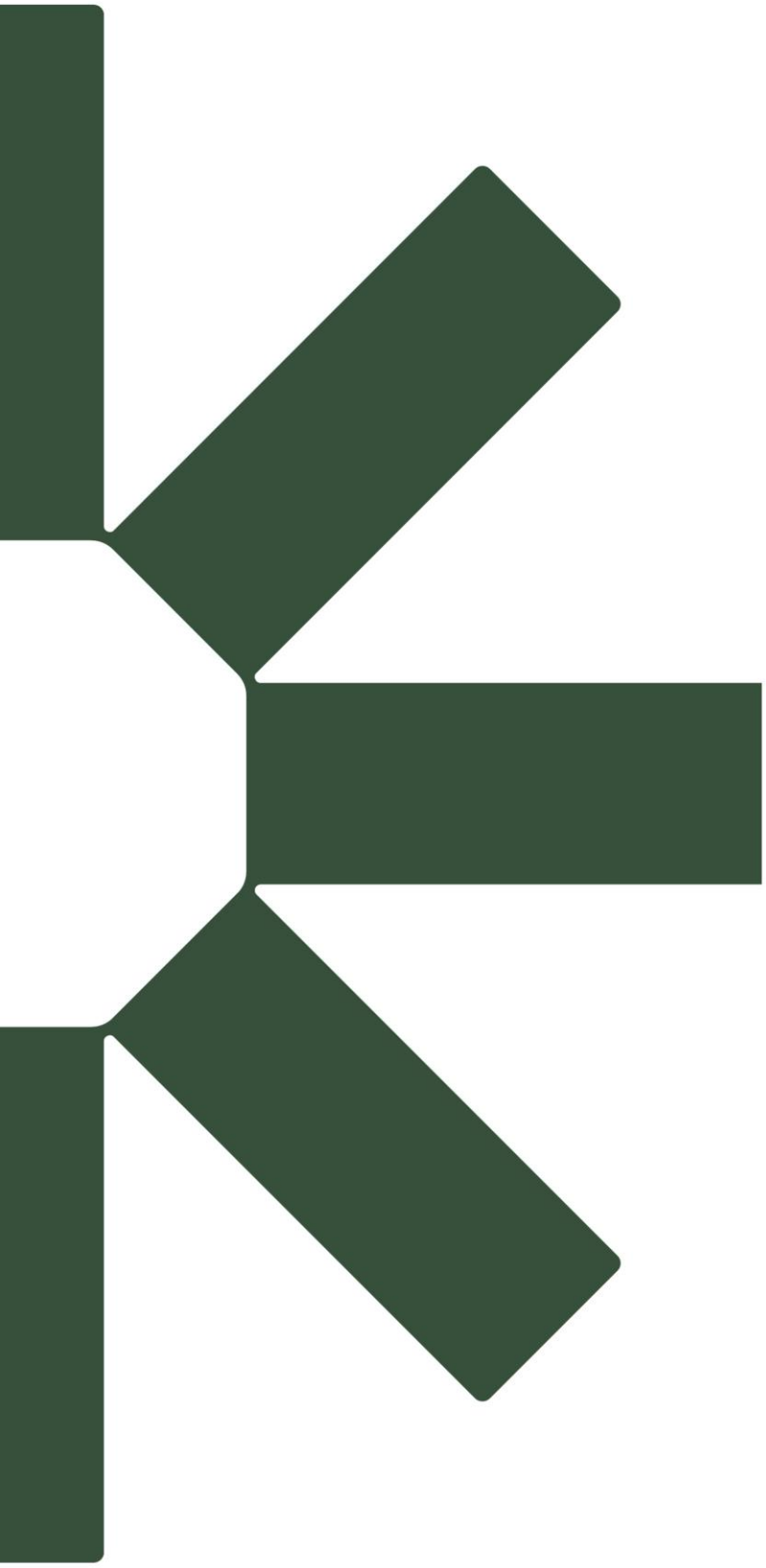
Every 5 years, an emissions report for the preceding 5-years will be compiled and emissions evaluated against the design parameters (NOx emission rates (Table 2-1) and operating hours (Section 6.1)) set out in this Appendix.

Table 7-2: Reporting Performance Parameters

Parameter	Frequency of Report	Units
Generator operation for testing and maintenance	Annually	• Total hours for the site (hours), • Total hours per generator (hours), • Total number of runs per generator (quantity) • Number of minutes per run (minutes)
Generator operation during emergency scenario	Annually	• Total number of runs (quantity) • Duration of runs (hours)
Generator Operation (combined testing/maintenance and emergency)	Every 5 years	Annual emissions (tonnes per annum) calculation, based upon Table 7-2 monitoring data.

7.3 Best Available Technique Review

Every 10 years from commencement of operation of the Data Centre, the Applicant will undertake a BAT Review, i.e. an evaluation of commercially available technologies in back-up power provision and appropriate measures that could be taken to prevent, or where that is not practicable, to minimise pollution.



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