# 6 Air Quality

## 6.1 Introduction

### Background

6.1.1 This chapter of the Environmental Statement (ES) has been prepared by Phlorum Limited. The chapter sets out an assessment of the likely air quality effects associated with the development of a fourth data centre block (UP4) at the Union Park Data Centre Campus. Chapter 3 of this ES provides full details of the scheme proposals.

6.1.2 The Union Park Data Centre Campus (hereafter referred to as “the Site”) is located within Union Park, Land at Bulls Bridge Industrial Estate, Hayes (UB3 4QQ). The Site is located within the administrative boundary of the London Borough of Hillingdon (LBH), who is responsible for managing air quality locally.

6.1.3 Land-use in the vicinity of the Site is predominantly industrial and commercial. However, residential uses are located in proximity to the Site, along Nestles Avenue, North Hyde Gardens and North Hyde Road.

6.1.4 LBH, the local planning authority, has declared an Air Quality Management Area (AQMA); the Hillingdon AQMA which encompasses the southern two thirds of the borough. This AQMA was declared in 2003 due to exceedances of the UK Air Quality Standard (AQS) for annual mean concentrations of nitrogen dioxide ($NO_2$).

6.1.5 The Site, which is located within the Hillingdon AQMA, is also located within an Air Quality Focus Area (AQFA), which is an area in which elevated concentrations of $NO_2$ are found in conjunction with high levels of human exposure.

6.1.6 The main sources of pollution in the vicinity of the Site are vehicles travelling on the local road network, primarily the A312 The Parkway. Heathrow Airport and the M4 motorway are also significant contributors to air pollution in the region.

6.1.7 Within the Union Park Data Centre Campus and adjacent to the Site are three data centre blocks permitted under two separate planning permissions; the original planning permission (reference: 75111/APP/2020/1955) which permits three data centre buildings (known as UP1, UP2 and UP3) and the Slot-In planning permission (reference: 75111/APP/2022/1007) which permits the three energy centres incorporating generators (known as EC1, EC2 and EC3). The locations of these developments are displayed in Figure 2.1 – Site Location Plan. The 42 No. standby generators permitted within these energy centres are the principal sources of emissions at these developments.

6.1.8 The key sources of emissions to air associated with the Proposed Development are 14 No. 3.2MWe *Rolls Royce MTU DS4000 20V4000 G94LF* standby generators, which are required to meet the electrical demand for the fourth data centre block in the event of an emergency power outage. These 14 No. generators are additional generators proposed as part of EC4, to serve UP4. These generators can operate using Hydrotreated Vegetable Oil (HVO), which gives rise to reduced emissions relative to the typical use of diesel, as such HVO is the fuel of choice.

6.1.9 The design for UP4 is being progressed in accordance with the designs for UP1, UP2 and UP3 to ensure that the emissions-related conditions imposed on those data centre developments (by Conditions 22, 23, 24 and 25 of permission 75111/APP/2020/1955) are also met by this proposed facility.

6.1.10 Including the Proposed Development at the Site, collectively, there could be up to 56 No. generators on the wider Union Park Data Centre campus. It is understood that during Testing and Maintenance, it is unlikely that more than 14 No. generators would be in operation at any one time across the Campus.

### Scope

6.1.11 The chapter details the methodology followed, a review of the baseline conditions in the defined study area, and the results of the assessment.

6.1.12 This chapter evaluates potential air quality effects associated with the Proposed Development and the operation of generators at the Site, and across the wider Union Park Data Centre campus, under routine testing and maintenance and under a highly improbable 24-hour grid failure scenario. The assessment focuses on emissions and subsequent concentrations of nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$ and $PM_{2.5}$).

6.1.13 Unplanned emergency generator use is to be assessed despite the Union Park Data Centre Campus benefitting from a direct connection to the National Grid Extra High Voltage transmission system without an intermediate distribution network operator. Therefore, the data centre campus has an extremely reliable grid connection (99.999605% availability) and consequently, the likelihood of a power outage in any one year is less than 0.0004%. In the highly improbable event of a worst-case campus-wide outage, a total of 48 generators could operate simultaneously.

6.1.14 Between the 20th and 21st of March 2025, an electrical fire at the North Hyde substation which serves the local area, the Union Park Data Centre Campus and Heathrow Airport, destroyed one of the 275/66 kV NG transformers. This led to a power outage at the Union Park Data Centre Campus, and the associated standby generators were in operation for up to 18 hours. It is important to note that despite the extremity and rarity of the event that led to the power outage, the standby generators still did not operate for 24 hours, demonstrating how conservative the grid failure assessment scenario is.

6.1.15 The Site pertains to UP4 only. UP1 has been in operation since 2024, so is considered within the Current Baseline section of this ES Chapter. UP2 and UP3 are permitted and currently in construction, so are considered within the Cumulative effects section of this ES Chapter.

6.1.16 Table 6.1 provides further details regarding the standby generators on campus, demonstrating that the redundancy designed in the system means that no more than 48 No. generators to be installed on the campus will operate during a major power outage.

**Table 6.1 Union Park Data Centre Campus Generators**

| Operator | Energy Centre | No. of Gens | Gen Set and Engine Model | Gen Rating (MWe) | Gen Rating (MWth) | Total Rating (MWth) | Redundancy | No. of Gens running during a power outage (absolute worst case) |
|---|---|---|---|---|---|---|---|---|
| A | EC1 | 14 | Rolls Royce | 3,200 | 8.01 | 112.12 | N+2 | 12 |

| Operator | Energy Centre | No. of Gens | Gen Set and Engine Model | Gen Rating (MWe) | Gen Rating (MWth) | Total Rating (MWth) | Redundancy | No. of Gens running during a power outage (absolute worst case) |
|---|---|---|---|---|---|---|---|---|
| | | | MTU DS4000 20V4000 G94LF | | | | | |
| | EC2 | 14 | Rolls Royce MTU DS4000 20V4000 G94LF | 3,200 | 8.01 | 112.12 | N+2 | 12 |
| B | EC3 | 14 | Rolls Royce MTU DS4000 20V4000 G94LF | 3,200 | 8.01 | 112.12 | N+2 | 12 |
| | EC4 | 14 | Rolls Royce MTU DS4000 20V4000 G94LF | 3,200 | 8.01 | 112.12 | N+2 | 12 |

6.1.17 The planning permission for UP3 included 14 No. generators, which is what has been assessed in the Cumulative effects section of this ES Chapter. However, it is worth noting that realistically, due to the Applicant's approach to improving sustainability throughout design development, UP3 will only include 12 No. generators, meaning the total rating will be 96.11 MWth and there would be no more than 11 No. generators operating in a power outage.

6.1.18 This chapter of the ES also identifies likely air quality effects associated with emissions of dust during the construction phase of the proposed development, and outlines mitigation to reduce the risk of such effects occurring.

## Legislation, Policy and Guidance

### *UK Air Quality Standards and Objectives*

6.1.19 The UK Air Quality Strategy sets Air Quality Standard (AQS) concentrations for a number of key pollutants that are to be achieved at sensitive receptor locations across the UK by corresponding "air quality objective" (AQO) dates. The sensitive locations at which the standards and objectives apply are those where the population are reasonably expected to be exposed to said pollutants over a particular averaging period.

6.1.20 For those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to compare concentrations against the standards are areas of residential housing. It is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time.

6.1.21 Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to the pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time.

6.1.22 The objectives adopted in the UK are based on the Air Quality (England) Regulations 2000[1], as amended, for the purpose of Local Air Quality Management (LAQM). These Air Quality Regulations have been adopted into UK law from the limit values required by European Union Daughter Directives on air quality. The annual mean AQS for $PM_{2.5}$ was amended from 25 $\mu g.m^{-3}$ to 20 $\mu g.m^{-3}$ under *The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020*[2]*.* The Mayor of London has further set a $PM_{2.5}$ target of 10 $\mu g.m^{-3}$ to be achieved by 2030[3].

6.1.23 A summary of the AQSs and AQOs relevant to this assessment are included in Table 6.2, below.

**Table 6.2 UK Air Quality Standards and Objectives**

| Pollutant | Averaging Period | Air Quality Standard ($\mu g.m^{-3}$) | Air Quality Objective |
|---|---|---|---|
| Nitrogen dioxide ($NO_2$) | 1-Hour | 200 | Not to be exceeded more than 18-times per year |
| | Annual | 40 | Annual mean concentration of 40 $\mu g.m^{-3}$ |
| Particulate matter ($PM_{10}$) | 24-Hour | 50 | Not to be exceeded more than 35-times per year |
| | Annual | 40 | Annual mean concentration of 40 $\mu g.m^{-3}$ |
| Particulate matter ($PM_{2.5}$) | Annual | 20 | Annual mean concentration of 20 $\mu g.m^{-3}$ |
| | Annual | 10 | Annual mean concentration of 10 $\mu g.m^{-3}$ to be achieved by 2030 |

## Planning Policy

6.1.24 Full details of the Planning Policy considered and referred to within this ES Chapter are provided in Appendix 6.1. The below list summarises which policy documents have been considered:

- National Planning Policy Framework (NPPF)[4]
- National Planning Practice Guidance (PPG)[5]
- The London Plan[6]

[1] The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043.
[2] The Environment (Miscellaneous Amendment) (EU Exit) Regulations 2020.
[3] Mayor of London (2018). London Environment Strategy.
[4] Ministry of Housing, Communities & Local Government. (2024). *National Planning Policy Framework.*
[5] Planning Practice Guidance (PPG) 32. (2024). *Air Quality*.
[6] Greater London Authority. (2021). *The London Plan*.

- LBH Local Plan Part 1[7]
- LBH Local Plan Part 2[8]
- Greater London Authority (GLA) Non-road Mobile Machinery Practical Guide[9]
- LBH Air Quality Action Plan[10]

**Guidance**

6.1.25 The London Local Air Quality Management Technical Guidance (LLAQM.TG (19))[11] and DEFRA Local Air Quality Management Technical Guidance (LAQM.TG(22))[12] were followed in carrying out this assessment.

6.1.26 The latest Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) guidance on *Planning for Air Quality*[13] was also referred to for the operational phase assessment. The criteria used to describe impacts at individual receptors were derived from this guidance and are included in Table 6.12.

6.1.27 For the assessment of emissions from the standby generators, DEFRA's guidance on assessing air emissions for environmental permitting[14], the Environment Agency's (EA's) guidance on assessing impacts on limited hour operations[15] and the EA's guidance on modelling specified generators[16] were considered. Although the EA's guidance documents are intended specifically for Environmental Permitting Applications, as these documents provide the assessor with a prescriptive methodology for assessing short-term air quality impacts from generators, it is considered appropriate to consider this guidance throughout the assessment.

6.1.28 The IAQM's latest *Guidance on the Assessment of Dust from Demolition and Construction*[17] was also used to assess the risk of dust emissions during the construction phase of the proposed development. This guidance has also been referred to, in conjunction with the Greater London Authority's (GLA) *The Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance*[18] in recommending mitigation to minimise the risk of dust soiling impacts during the development's construction.

6.1.29 The GLA's London Plan Guidance on *Air Quality Neutral*[19] and *Air Quality Positive*[20] have been referred to in undertaking the air quality neutral assessment and producing air quality positive statement.

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[7] LBH (2012). Local Plan: Part 1 – Strategic Policies.
[8] LBH (2012). Local Plan: Part 1 – Strategic Policies.
[9] Greater London Authority. (2024). Non-Road Mobile Machinery Practical Guide.
[10] LBH (2019). Air Quality Action Plan 2019-2024.
[11] Mayor of London (2019). Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, London Local Air Quality Management, Technical Guidance (LLAQM. TG(19)).
[12] DEFRA. (2022). Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management, Technical Guidance LAQM. TG(22).
[13] Environmental Protection UK & Institute of Air Quality Management. (2017). L*and-Use Planning & Development Control: Planning For Air Quality*.
[14] DEFRA (2023) Air emissions risk assessment for your environmental permit. Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
[15] Air Quality Modelling & Assessment Unit (AQMAU). (2016). Diesel generator short term $NO_2$ impact assessment.
[16] Environment Agency (2023) Specified generators: dispersion modelling assessment.
[17] Institute of Air Quality Management. (2024). *Guidance on the Assessment of Dust from Demolition and Construction* (Version 2.2).
[18] Greater London Authority. (2014). The Control of Dust and Emissions During Construction and Demolition.
[19] Greater London Authority (2023). London Plan Guidance: Air Quality Neutral.
[20] Greater London Authority (2023). London Plan Guidance: Air Quality Positive.

## 6.2 Assessment Methodology

### Scoping

6.2.1 A formal EIA Scoping Request has not been made to LBH. However, Phlorum Limited produced an Air Quality Scoping Note (Ref: 13528A (AQ) V3) on the 28th of November 2024, which was reviewed by LBH in December 2024. The report set out the proposed scope of the air quality assessment in full, and detailed which elements would be scoped in or out of this ES Chapter. The below list summarises what is included in, and excluded from, this assessment.

Scoped In:

- Construction dust emissions are considered within a Risk Assessment, to determine the level of dust mitigation required to reduce significant effects;
- Detailed pollutant ($NO_2$, $PM_{10}$ and $PM_{2.5}$) dispersion modelling is undertaken to consider emissions from the Development's standby generators;
- Cumulative impacts with the adjacent data centre planning permissions are considered fully and quantitatively;
- An Air Quality Neutral Assessment/ Statement is provided, in accordance with GLA guidance[19]; and
- An Air Quality Positive Statement is provided, with reference to GLA guidance[20] and in accordance with LBH's expectations surrounding 'Damage Cost' calculations. The assessment method adheres to the approach agreed between the Applicant and LBH for the adjacent data centre planning application (Ref: 75111/APP/2022).

Scoped Out:

- Road traffic emissions from vehicles generated by the Development, on the basis that flows are expected to be minimal. The same approach was taken for the adjacent data centre planning application (Ref: 75111/APP/2022); and
- Operational Phase air quality impacts on sensitive statutory ecological receptors have been scoped out, based on the distance of the nearest receptors from the Site and in line with the agreed approach taken previously for the adjacent data centre planning application (Ref: 75111/APP/2022).
- Operational phase air quality impacts with respect to the daily mean $PM_{10}$ AQS, as described in Table 6.2, have been scoped out on the basis that these standby generators are only anticipated to operate for a few hours per year, so it is almost statistically impossible for exceedances of this AQS to occur as a result of the Proposed Development.

***Scoping Response***

6.2.2 LBH provided comments on the proposed scope of assessment, to support an EIA Technical Workshop which was held on the 11th of December 2024 between LBH and the Applicant. These comments, the responses from the Applicant's Planning Consultant and EIA Coordinator (Savills), and confirmation of how Phlorum has addressed the comments in this assessment are provided in Table 6.3, below. It is important to note that LBH replied to Savills' response by confirming that "*all the comments have been well received and accepted*", so it is understood that the assessment scope has been approved.

**Table 6.3 Scoping Consultation Correspondence**

| LBH comments on Phlorum's scoping note | Savills' response to LBH | How this is addressed in the assessment |
|---|---|---|
| *"Scenario to be modelled: With development - accounting for worst case scenario of 24 hours of grid failure, based on diesel data specifications as per manufacturers, backed up by any existing HVO evidence of NOx and PM2.5 emissions for similar spec gen sets. Include in the same model set up total annual emissions for the testing and maintenance regime. Please note that whereas the testing only accounts for 7 hours per year, as technical problems will inevitably occur (especially as the gen sets get older) more maintenance/fixing actions will occur and that needs to be factored in the model set up (please use an annual average calculated over a likely number of hours required for maintenance (different from testing) over the 30 years life of the units".* | *"We propose to model the following "with development model" as the worst-case scenario with 24 hours of grid failure and the full annual testing regime of 7 hours +1.1% (7.7hrs per generator per year). This is based on a review of our last 5 years of annual reports to the EA from two campuses which indicated that actual planned annual maintenance and testing typically takes 1.1% longer than anticipated due to problems identified during testing. Please note this average is seen after the sets are 3-5 years old. Some of the Applicant's sets are more than 15 years old and there is no sign of deviation from this average after 5 years. This is due to the high levels of maintenance carried out and the low running hours of the sets. We will therefore conservatively model 7.7hrs per set per year over the life of the sets. We will assume diesel is the fuel source for this modelling, although our practice will be to run sustainably sourced HVO."* | The assessment adds 1.1% of hours onto the total number of annual testing regime hours.<br><br>It is assumed that the generators will operate on diesel fuel, for conservatism in the assessment.<br><br>A 24-hour grid failure scenario is considered, despite the adjacent permitted developments only needing to consider a 4-hour grid failure scenario within the associated Air Quality Assessments. |
| *"Scenario to be modelled: cumulative scenario - please include the above together with traffic emissions of the opening year, the other site data centre units (i.e. Blocks 1 to 3) as well as all the significant sources of pollution in the area (e.g. Tarmac Hayes Asphalt Plant, FM Conway - Heathrow Asphalt & Recycling Plant, Heathrow Asphalt, etc).* | *"We propose to model the following "cumulative model" as the cumulative scenario. It will consist of the "with development model" described above, the other data centres on the Union Park sites (Blocks 1, 2 and 3) and background emissions data which by its very nature will include the traffic and other significant sources of pollution. For the avoidance of doubt we will not be modelling emissions arising from Tarmac/FM Conway etc as we have no control or information over their operations or any emissions data from them.* | Vehicle emissions on the surrounding road network are addressed in the Current Baseline section of this ES through the consideration of 2025 LAEI estimates, as outlined in the Scoping Note. Emissions from nearby asphalt plants are not modelled, but emissions from these sources, as well as other local sources, will be detected by local monitoring data, which has been fully reviewed in the Current Baseline section of this ES. |

| LBH comments on Phlorum's scoping note | Savills' response to LBH | How this is addressed in the assessment |
|---|---|---|
| *"Please note that whereas to ascertain worst case impact on ambient air quality the 24hours is used, to calculate the level of mitigation required using Damage Cost Toolkit only a couple of hours of grid outage per year will be considered for consistency with other planning applications"* | *"Noted"* | A 2-hour grid outage scenario is considered in the 'Damage Cost' calculation. |
| *"On the scenarios above, please reflect the SCR non-operational phase up to 20 minutes for each event (Testing for each event, Maintenance for each event, and outage)."* | *"The SCRs are designed to be fully operational within 15 mins of generator start. Commissioning of the generators sets on UP1 (the same design and specification for UP4) demonstrated that the SCR consistently operated as designed with a lag of less than 15 mins (As reported in the Technical Note provided to discharge Condition 25 of the UP1 permission). We will therefore model a 15min lag for all generator runs."* | This assessment has assumed a 20-minute 'warm-up' period for conservatism, and to ensure the methodology adheres to that considered in the planning application for the adjacent data centres, as well as their associated Permit Applications. |
| *"Significance Criteria - Please note that LBH does not use either the EA Process contribution approach (which is used for their permitting purposes nor the IAQM significance criteria (which is outdated and does not take into account WHO targets and London Plan and DEFRA PM2.5 requirements) - none of them take location into consideration in relation to Focus Areas. I attach significance criteria for PM2.5 developed by LBH for use in the EIA for ambient air quality, for NO2 please adjust the 2017 IAQM planning guidance to reflect 10ug/m3 annual mean target (WHO, 2021) and not 40 as previously assumed."* | *"As requested we will use an annual mean significance threshold of 10 µg/m$^3$ for $PM_{2.5}$ and 20 µg/m$^3$ for $NO_2$."* | The WHO 2021 guideline target for $NO_2$ is an annual mean of 10 µg.m$^{-3}$, and it is this value that is cited in LBH's draft significance criteria guidance. Therefore, it is assumed that reference to 20 *µg.m*$^{-3}$ is a typing error, and the expectation is that the assessment should consider a concentration of 10 µg.m$^{-3}$.<br><br>This is a marked reduction on the legally binding and widely accepted UK AQS referred to in Table 6.2, and one that DEFRA does not anticipate will be achieved even in "background locations" in the local area for decades more (see Future Baseline section for more details).<br><br>With this in mind, it is deemed reasonable to maintain consideration of the 40 µg.m$^{-3}$ annual mean $NO_2$ UK AQS in this |

| LBH comments on Phlorum's scoping note | Savills' response to LBH | How this is addressed in the assessment |
|---|---|---|
| | | assessment. However, a sensitivity test against LBH's recommended criteria has been undertaken in Appendix 6.2, with results acknowledged in the main body of this ES Chapter, for completeness.<br><br>For clarity, a 10 µg.m$^{-3}$ annual mean $PM_{2.5.}$ threshold has been considered in this ES Chapter, noting that this is supported by the Mayer of London's 2030 target[3]. |
| *"Please note that whereas the impact on ambient air quality is part of the EIA and standard LBH air quality assessment, the Borough bases their mitigation requirements on the calculation of total NOx and PM2.5 emissions (assuming all PM as PM2.5) using DEFRA's Damage Cost toolkit (please use their tool for consistency with other planning applications)."* | *"Noted"* | The 'Damage Cost' assessment will use the latest available Damage Cost toolkit, provided by DEFRA. |

## Summary of Methodology

6.2.3 With the exception of the methodological deviations discussed already in this ES Chapter (above), the assessment methodology adheres to that described within Phlorum's Air Quality Technical Scoping Note (Ref: 13528A (AQ) V3). The Scoping Note should be referred to for full methodological details, alongside Appendix 6.3.

6.2.4 In circumstances where the Scoping Note does not provide full details of a particular methodological aspect, these details have been provided below.

### *Meteorological Data and Surface Characteristics*

6.2.5 Detailed, hourly sequential, meteorological data are used by the model to determine pollutant transportation and levels of dilution by the wind and vertical air movements. Meteorological data used in the model were obtained from London Heathrow Airport as it was considered to provide the most representative data of similar conditions to the site. Five years (2019-2023) of meteorological data were used in this assessment, with each wind rose displayed in Figure 6.1. Meteorological data were provided by APS Ltd.

6.2.6 The surface roughness applied to the dispersion and meteorological site was 1.5m and 0.5m, respectively. The Minimum Monin-Obukhov length is used to help describe the stability of the atmosphere. In urban areas where there are multiple sources of heat, the air is less stable. For this model, a Minimum Monin-Obukhov length of 100m was used for the Site, which is representative of large conurbations such as London. Sensitivity testing was undertaken as part of the planning submissions for the adjacent data centres (Ref: 75111/APP/2022), which determined that these sensible modelling assumptions led to the most conservative model results.

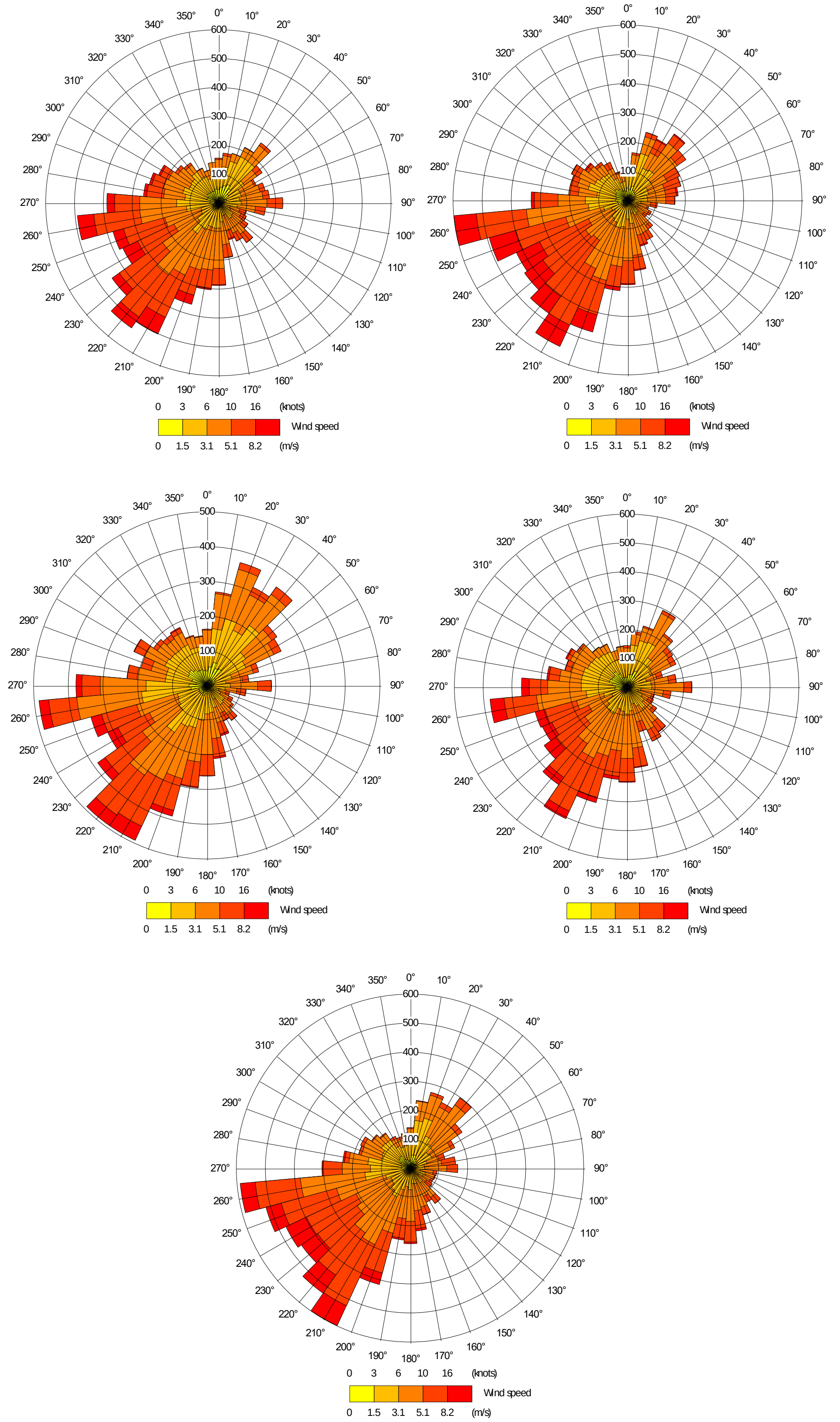


**Figure 6.1 Wind Roses for Heathrow Airport (2019-2023)**

### *Buildings and Terrain*

6.2.7 Buildings can have significant effects on the dispersion of pollutants and can increase ground level concentrations. The energy centre and data centre buildings for all four data centres (UP1, UP2, UP3, UP4, EC1, EC2, EC3 and EC4) were included in the model, so building downwash effects could be considered. When compared to the height of the proposed stacks (see Appendix 6.3 for stack locations and heights), all other buildings in the vicinity of the site were considered short enough or far enough away to be excluded from the dispersion model. The building details, alongside a summary of other model inputs, are included in Appendix 6.3.

6.2.8 Terrain can influence the dispersion of pollutants in the local area. However, ADMS-6 user guidance[21] suggests terrain effects should only be modelled where the gradient exceeds 1:10. The local area is flat and as such, the impact of complex terrain has not been modelled.

### *Modelled Emission Rates*

6.2.9 Table 4.1 of the Scoping Note details the model inputs for all Energy Centre generators across the Union Park Data Centre campus (at EC1, EC2, EC3 and EC4), which have been derived from the manufacturer's datasheet (20V4000G94LF). The generators are to be fitted with selective catalytic reduction (SCR) technology and the manufacturer has warranted that an emission concentration of 95 mg $NO_X.m^{-3}$ (5% $O_2$) shall be achieved.

6.2.10 Input parameters for $NO_X$ have been time-weighted to account for the provision of SCR in the generators. As previously stated, the assessment assumes the emissions during the first 20-minutes of every generator operation are completely unabated, which is conservative. A summary of these time-weighted parameters is provided in Table 6.4 below.

6.2.11 Also within this table are the emission rates modelled for $PM_{10}$ and $PM_{2.5}$. It has been assumed that 100% of all PM is emitted as both $PM_{10}$ and $PM_{2.5}$, which is an absolute worst-case assumption.

6.2.12 Table 6.4 is of relevance to the modelling of both UP4 (this Application) and UP3 (an adjacent committed Data Centre development which is to be considered cumulatively within this assessment), as both data centres share the same testing regime.

**Table 6.4 Time-Weighted Pollutant Emission Rates for UP3 and UP4**

| Generator Scenario | Scenario Details | Pollutant | Emission Rate ($g.s^{-1}$) |
|---|---|---|---|
| Monthly Testing | Generators run simultaneously off-load for 15 minutes. | $NO_X$ | 0.209 |
| | | $PM_{10}$ | 0.005 |
| | | $PM_{2.5}$ | 0.005 |
| Quarterly Testing | Generators run simultaneously at 80% load for an hour. | $NO_X$ | 1.473 |
| | | $PM_{10}$ | 0.021 |
| | | $PM_{2.5}$ | 0.021 |
| Annual Testing | Generators run independently at 100% load for 2 hours. | $NO_X$ | 1.214 |
| | | $PM_{10}$ | 0.018 |
| | | $PM_{2.5}$ | 0.018 |

[21] CERC (2023). ADMS 6 User Guide.

| Generator Scenario | Scenario Details | Pollutant | Emission Rate (g.s$^{-1}$) |
|---|---|---|---|
| 24-hour Grid Failure | Generators run simultaneously at 100% load for 24 hours. | $NO_X$ | 0.325 |
| | | $PM_{10}$ | 0.018 |
| | | $PM_{2.5}$ | 0.018 |

6.2.13 For reference and comparative purposes, Table 6.5 below details the emission rates at UP1 and UP2. UP1 is currently operational, so is considered with the Current Baseline section of this ES Chapter. Like UP3, UP2 is an adjacent committed Data Centre development which is to be considered in the Cumulative effects section of this assessment. Both UP1 and UP2 will be run by the same operator, hence them having the same testing regimes.

**Table 6.5 Time-Weighted Pollutant Emission Rates for UP1 and UP2**

| Generator Scenario | Scenario Details | Pollutant | Emission Rate (g.s$^{-1}$) |
|---|---|---|---|
| Fortnightly Testing | Generators run independently at 25% load for 30 minutes. | $NO_X$ | 0.697 |
| | | $PM_{10}$ | 0.041 |
| | | $PM_{2.5}$ | 0.041 |
| Quarterly Testing | Generators run independently at 25% load for an hour. | $NO_X$ | 0.383 |
| | | $PM_{10}$ | 0.041 |
| | | $PM_{2.5}$ | 0.041 |
| Bi-Annual Testing | Generators run independently at 100% load for 1.5 hours. | $NO_X$ | 1.537 |
| | | $PM_{10}$ | 0.018 |
| | | $PM_{2.5}$ | 0.018 |
| 24-hour Grid Failure | Generators run simultaneously at 100% load for 24 hours. | $NO_X$ | 0.325 |
| | | $PM_{10}$ | 0.018 |
| | | $PM_{2.5}$ | 0.018 |

***Modelling of Long- and Short-Term Concentrations***

6.2.14 To calculate the long-term process contribution, the modelled output, which is based on the model running for every hour in the year, was scaled down to account for the actual number of standby generators operating at one time and the hours of operation per year.

6.2.15 With regard to short-term impacts, it is normal to assess against the hourly mean $NO_2$ AQS by considering the 99.79$^{th}$ percentile concentration, which represents the 19$^{th}$ highest predicted concentration in a year (8760 hours). As the hourly mean $NO_2$ AQS is not to be exceeded more than 18 times per annum, identifying the 19$^{th}$ highest concentration can determine the likelihood of a pollutant source causing an exceeding of this AQS. However, where there are fewer hours of operation in a year, this percentile becomes unrealistic, so consideration should be given to the limited hours of operation of these standby generators, using hypergeometric distribution statistics.

6.2.16 Table 6.4 and Table 6.5 show that none of the testing regimes at any of the modelled data centres could lead to exceedances of the hourly $NO_2$ AQS on their own. UP1 and UP2 standby generators are expected to operate for no more than 17 hours per year (+1.1% for added maintenance time over a prolonged period), while UP3 and UP4 standby generators only operate for 7 hours per year (+1.1% for added maintenance time over a prolonged period). Only a prolonged grid failure which causes the generators to operate for more than 18 hours could theoretically cause an exceedance of the AQS on its own, and the probability of a prolonged grid failure has already been described in this ES as extremely unlikely.

6.2.17 Nonetheless, it is appreciated that each energy centre's testing regime could contribute to some hourly exceedances (e.g. 2 out of an allowable 18 per year) of the short-term $NO_2$ AQS. Such exceedances will be considered additively in the assessment to identify whether each of the four testing regimes, alongside an unlikely prolonged grid failure and giving due consideration to baseline air quality, could cumulatively lead to a total of 19 or more exceedances of the AQS.

6.2.18 For the purposes of this assessment, a probability threshold of 5% (Monte Carlo simulations are accounted for, where necessary) has been considered as an indicator of 'unlikely exceedance'; this is considered to be equivalent to a probable 1 in 20 year event, and is an approach advocated by EA guidance[15].

***Modelled Receptors***

6.2.19 Model receptors were positioned at the façades of discrete receptors closest to the source of pollution (i.e. the proposed stack positions and relevant roads), in all directions. All receptors were modelled at "breathing height", which is by convention 1.5m above ground level, plus the relevant floor height, if receptors are at elevated floor levels. Details of modelled receptors are included in Table 6.6, below.

**Table 6.6 Modelled Receptors**

| Receptor ID | Location/ Description | Receptor Heights (m) | UK Grid Reference | |
|---|---|---|---|---|
| | | | X | Y |
| R1 | Commercial Unit – Nestle Site | 1.5, 4.5 | 510328 | 179200 |
| R2 | Commercial Unit – Nestle Site | 1.5, 4.5 | 510204 | 179266 |
| R3 | Residential Unit – Nestle Site | 1.5, 4.5, 23, 30, 35 | 510144 | 179311 |
| R4 | Residential Unit – Nestle Site | 1.5, 4.5, 23, 30, 35 | 510093 | 179262 |
| R5 | Guru Nanak School | 1.5, 4.5 | 511216 | 180007 |
| R6 | Commercial Unit | 1.5, 4.5 | 510346 | 179446 |
| R7 | Hillingdon Mosque | 1.5, 4.5 | 510237 | 179460 |
| R8 | Commercial Unit – Tarmac Site | 1.5, 4.5 | 510561 | 179467 |
| R9 | Commercial Unit | 1.5, 4.5 | 510609 | 179172 |
| R10 | Commercial Unit | 1.5, 4.5 | 510684 | 179316 |
| R11 | Residential Dwelling – Copperdale Rd | 1.5, 4.5 | 510336 | 179714 |
| R12 | Residential Dwelling – Chalfont Rd | 1.5, 4.5 | 510015 | 179619 |
| R13 | Commercial Unit – Nestle Site | 1.5, 4.5 | 510253 | 179055 |
| R14 | Residential Dwelling – Nestle Avenue | 1.5, 4.5 | 510273 | 178955 |
| R15 | Residential Dwelling – Nestle Avenue | 1.5, 4.5 | 510099 | 179023 |
| R16 | Residential Dwelling – Brent Road | 1.5, 4.5 | 511169 | 179247 |
| R17 | Residential Dwelling – Brent Road | 1.5, 4.5 | 511164 | 179114 |

| Receptor ID | Location/ Description | Receptor Heights (m) | UK Grid Reference | |
|---|---|---|---|---|
| | | | X | Y |
| R18 | Residential Unit – Nestle Site | 1.5, 4.5, 23, 30, 35 | 510172 | 179143 |
| R19 | UP1 – Reception | 1.5, 4.5 | 510515 | 179230 |
| R20 | UP3 – Reception | 1.5, 4.5 | 510379 | 179229 |
| R21 | Residential Unit – Nestle Site | 1.5, 4.5, 23, 30, 35 | 510091 | 179352 |
| R22 | Residential Dwelling – Grand Union Canal Walk | 1.5, 4.5 | 510683 | 179108 |

6.2.20 A grid of receptor points was also modelled to characterise the pattern of dispersion of pollutants across the local area at heights of 1.5m and 35m. The modelled grids originated at UK Grid Reference 509900, 178440, with 80 × 86 grid points (20m spacing) used to produce the contour plots shown in Figures 6.7 to 6.12.

### Predicting Effects

#### *Receptors and Receptor Sensitivity*

Demolition and Construction

6.2.21 The IAQM's construction dust guidance[17] outlines types of receptors, both human and ecological which can be defined as High, Medium and Low Sensitivity, in terms of potential dust related impacts.

6.2.22 *High* sensitivity human receptors include uses where users would reasonably expect to enjoy a high level of amenity, or where the aesthetics or value of their property would be diminished by dust soiling. Examples include residential dwellings, schools, nurseries, hospitals, children's playgrounds, car showrooms and long-term car parks.

6.2.23 *Medium* sensitivity human receptors include uses where users would expect to enjoy a reasonable level of amenity, but not the same level of amenity as in their home and locations where people or property would not be expected to be present continuously for extended periods of time. Examples include parks and places of work.

6.2.24 *Low* sensitivity human receptors include uses where the enjoyment of amenity would not reasonably be expected, or locations where people or property would only be present for limited periods of time. Examples include playing fields, farmland, footpaths, short-term car parks and roads.

Nuisance Dust Soiling

6.2.25 Where there 10 or more highly sensitive human receptors (i.e. residences, school pupils, nursery children, hospitals or car showrooms) within 20m of the Site boundary, the overall sensitivity of the local area in terms of nuisance dust soiling effects can be defined as High Sensitivity. An area can also be defined as High Sensitivity in terms of nuisance dust soiling effects if there are more than 100 highly sensitive receptors located within 50m of the Site boundary. Where there are between 1 and 10 highly sensitive receptors located within 20m of the Site boundary, the sensitivity of an area to nuisance dust soiling effects can be defined as *Medium*. The sensitivity of an area to nuisance dust soiling effects can also be defined as

*Medium* where there are between 10 and 100 high sensitivity receptors within 50m of the Site boundary, more than 100 high sensitivity receptors within 100m of the Site boundary, or more than 1 *Medium* sensitivity receptor within 20m. In all other circumstances, the local area would be considered of *Low* sensitivity to nuisance dust soiling effects.

Human Health Effects

6.2.26 Table 3 of the IAQM's Construction Dust Guidance[17] provides the criteria for an area to be considered as *High*, *Medium*, or *Low Sensitivity* for $PM_{10}$ related human health effects. This Table has been reproduced in Table 6.7, below.

**Table 6.7 Sensitivity of the Area to Dust Related Human Health Impacts**

| Receptor Sensitivity | Annual Mean $PM_{10}$ Concentration | No. of Receptors | Distance from the Source | | | |
|---|---|---|---|---|---|---|
| | | | <20m | <50m | <100m | <250m |
| High | >32 µg.m$^{-3}$ | >100 | High | High | High | Medium |
| | | 10 to 100 | High | High | Medium | Low |
| | | 1 to 10 | High | Medium | Low | Low |
| | >28-32 µg.m$^{-3}$ | >100 | High | High | Medium | Low |
| | | 10 to 100 | High | Medium | Low | Low |
| | | 1 to 10 | High | Medium | Low | Low |
| | >24-28 µg.m$^{-3}$ | >100 | High | Medium | Low | Low |
| | | 10 to 100 | High | Medium | Low | Low |
| | | 1 to 10 | Medium | Low | Low | Low |
| | <24 µg.m$^{-3}$ | >100 | Medium | Low | Low | Low |
| | | 10 to 100 | Low | Low | Low | Low |
| | | 1 to 10 | Low | Low | Low | Low |
| Medium | >32 µg.m$^{-3}$ | >10 | High | Medium | Low | Low |
| | | 1 to 10 | Medium | Low | Low | Low |
| | >28-32 µg.m$^{-3}$ | >10 | Medium | Low | Low | Low |
| | | 1 to 10 | Low | Low | Low | Low |
| | >24-28 µg.m$^{-3}$ | >10 | Low | Low | Low | Low |
| | | 1 to 10 | Low | Low | Low | Low |
| | <24 µg.m$^{-3}$ | >10 | Low | Low | Low | Low |
| | | 1 to 10 | Low | Low | Low | Low |
| Low | - | >1 | Low | Low | Low | Low |

Ecological Effects

6.2.27 *High Sensitivity* ecological receptors include locations with an international or national designation, where the designated ecological features may be affected by dust soiling, or locations where there is a community of particularly dust sensitive species. Examples include Special Areas of Conservation (SACs) designated for acid heathlands.

6.2.28 *Medium Sensitivity* ecological receptors include locations where there are particularly important plant species, but where its dust sensitivity us uncertain or unknown, or locations with national designations where features may be affected by dust deposition. Examples include Sites of Special Scientific Interest (SSSI) with dust sensitive features.

6.2.29 *Low Sensitivity* receptors include local designations where features may be affected by dust deposition, such as Local Nature Reserves (LNRs) with dust sensitive features.

6.2.30 Table 4 of the IAQM guidance provides the criteria for an area to be defined as *High*, *Medium*, or *Low Sensitivity* for demolition and construction phase ecological impacts. This table has been reproduced in Table 6.8.

**Table 6.8 Sensitivity of the Area to Dust Related Ecological Impacts**

| Receptors Sensitivity | Distance from the Source | |
|---|---|---|
| | <20m | <50m |
| High | High Sensitivity | Medium Sensitivity |
| Medium | Medium Sensitivity | Low Sensitivity |
| Low | Low Sensitivity | Low Sensitivity |

<u>Operational Phase</u>

6.2.31 DEFRA's LAQM.TG(22)[12] and the GLA's LLAQM.TG(19)[11] both explain that receptors of air quality are those which have the potential to experience significant adverse health effects from it. The UK Air Quality Standards displayed in Table 6.2 are understood to represent the levels at which significant health effects could occur, with the specific standards and objectives implemented to define the concentrations that should not be exceeded.

6.2.32 The sensitive locations at which the standards and objectives apply are those where the population are reasonably expected to be exposed to these key pollutants over the particular averaging period. For those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to compare concentrations against the standards are areas of residential housing. It is reasonable to expect that people living in their homes could be exposed to pollutants over an annual period.

6.2.33 Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether their exposure to the pollution could be over an annual period). For shorter averaging periods of between 15 minutes, one hour or one day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time.

6.2.34 Within this ES Chapter, all receptors where the Air Quality Objectives apply are considered to be of *High* sensitivity. Annual mean AQOs apply at modelled receptors R3, R4, R5, R11, R12, R14, R15, R16, R17, R18, R21 and R22, as listed in Table 6.6. Hourly mean AQOs apply at all modelled receptors listed in Table 6.6.

### *Magnitude of Impact*

6.2.35 Magnitude of impact, based on the change that the Proposed Development would have upon the receptor, is considered within the range of high, medium, low, and negligible. Consideration is given to scale, duration of impact/effect (e.g. for construction, short-term for 1-2 years, medium-term for 3-5 years, long-term for 5 years and greater, and permanent, dependent upon project timeframes) and extent of the Proposed Development.

<u>Demolition and Construction</u>

6.2.36 Following the IAQM guidance, the first step in assessing the risk of impacts is to define the potential dust emission magnitude. This is defined in the guidance document as ‘Negligible’, ‘Small’ (i.e. Low), ‘Medium’ or ‘Large’ (i.e. High) for each of the construction stages. The second step is to define the sensitivity of the area around the construction site, which is undertaken according to the criteria described in the above *Receptors and Receptor Sensitivity* section.

6.2.37 When the sensitivity of the area and dust emission magnitude for each phase has been defined, the risk of dust effects can be determined. The IAQM guidance provides a risk of effects matrix for each construction stage. These dust impact risk matrices have been reproduced in Table 6.9, Table 6.10, and Table 6.11 below.

**Table 6.9 Matrix for Determining the Risk of Dust Effects for Demolition Stage**

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

**Table 6.10 Matrix for Determining the Risk of Dust Effects for Earthworks and Construction Stages**

| Sensitivity of 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 Risk |

**Table 6.11 Matrix for Determining the Risk of Dust Effects for Trackout**

| Sensitivity of 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 Risk |

6.2.38 Demolition and construction phase impacts are considered to be short-term, as it is unlikely that the construction phase will last longer than 2 years, and the geographical extent of impacts are restricted to 250m from the Site boundary, as recommended in IAQM guidance[13]. Any increase in dust emissions is considered to be ‘Adverse’, as this will result in a worsening of air quality.

Operational Phase

6.2.39 The annual mean significance criteria for the operational phase assessment have been derived from the EPUK & IAQM guidance. The guidance provides a descriptive means to communicate the numerical output of detailed modelling. The significance of effect of changes in long term average $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations is derived from both the magnitude of change at a highly sensitive receptor and the ambient concentration at that receptor. The effect can either be 'adverse' or 'beneficial' and have a significance of 'negligible', 'slight', 'moderate' or 'substantial'. This is summarised in the matrix included in Table 6.12 below.

**Table 6.12 EPUK & IAQM Operational Phase Significance Criteria against the Annual Mean AQSs**

| Long-Term Average Concentration at Receptor in Assessment Year | Changes in concentration relative to AQS | | | | |
|---|---|---|---|---|---|
| | <0.5% | 0.5 – 1.5% | 1.5 – 5.5% | 5.5 – 10% | >10% |
| 75% or less of AQS | Negligible | Negligible | Negligible | Minor | Moderate |
| 76-94% of AQS | Negligible | Negligible | Minor | Moderate | Moderate |
| 95-102% of AQS | Negligible | Minor | Moderate | Moderate | Major |
| 103-109% of AQS | Negligible | Moderate | Moderate | Major | Major |
| 110% or more of AQS | Negligible | Moderate | Major | Major | Major |

6.2.40 The impacts are considered to be permanent, due to the likely duration of the Proposed Development's operation, and the geographical extent of impacts are unlimited, but impacts will decrease substantially with increased distance from the Site. Any increase in air pollutant emissions is considered to be 'Adverse', as this will result in a worsening of air quality.

***Categorising Likely Significant Effects***

6.2.41 The predicted level of effect considers both the magnitude of impact and the sensitivity of the receptor to come to a professional judgement of how significant this effect is.

Demolition and Construction

6.2.42 Guidance from the IAQM states that, with an appropriate level of dust related embedded mitigation in place, the effects of construction dust will be 'Negligible' and therefore 'not significant'. As such, the assessment focuses on determining the appropriate level of mitigation to ensure that residual effects can be 'not significant'. The recommended mitigation can then be secured within a Construction Environment Management Plan, via Planning Condition.

Operational Phase

Categorising Effects against Annual Mean AQSs

6.2.43 The IAQM impact descriptors are not, of themselves, a definitive guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. All receptors modelled within this assessment are considered to be highly sensitive to air pollution. Whilst it may be that there are 'minor', 'moderate' or 'major' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances. The assessment of overall significance is based on professional judgement. The reasons for reaching a position on overall significance should be clear and set out logically, and take into consideration factors such as:

- The existing and future air quality in the absence of the Proposed Development;
- The extent of current and future population exposure to the predicted impacts;
- The spatial and temporal extent of any impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

6.2.44 If the overall effect is judged by the assessor to be ‘moderately adverse’ or worse, it is considered reasonable to expect the effect to be significant.

Categorising Effects against the Hourly Mean $NO_2$ AQS

6.2.45 Whilst the IAQM’s impact descriptors provide a means to consider the significance of effects against annual mean AQSs, they are not deemed suitable for the consideration of effects against the hourly mean objective for $NO_2$, where exceedances of 200 µg.m$^{-3}$ are permitted for up to 18 times per year, and where a generator is operating for a limited number of hours. The IAQM does state that 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 prominent local sources*.”

6.2.46 Where an assessment has incorporated sufficient measures to ensure its methodology tends towards conservatism, it is generally accepted (i.e. the accepted approach by LBH for the assessment of the adjacent data centres) that the results of that assessment can be considered ‘not significant’ where there are less than 19 breaches of the hourly $NO_2$ AQS predicted. For the reasons described in Table 6.14, this assessment is certainly considered to tend towards conservatism.

6.2.47 Nonetheless, it is appreciated that a development which causes 18 out of an allowable 18 exceedances should by no means be considered to have a ‘Negligible’ impact on local air quality, given that the development would be increasing the overall probability of the AQS being exceeded cumulatively with other pollutant sources. To this end, and in the absence of specific guidance, the assessment ascribes relevant EIA impact terminology to specific numbers of exceedances of the hourly $NO_2$ AQS, as presented in Table 6.13, below.

**Table 6.13 Operational Phase Significance Criteria against the Hourly $NO_2$ AQS**

| Total Hourly Exceedances at Receptor in Assessment Year (out of an allowable 18) | Changes in exceedances relative to AQS | | | | | |
|---|---|---|---|---|---|---|
| | <5.5% (less than 1) | 5.5 - 16.5% (1 to 3) | 16.5 - 33% (4 to 6) | 33 - 66% (7 to 12) | 66% - 100% (13 to 18) | >100% (more than 18) |
| 33% or less of AQS (6 of less hourly exceedances) | Negligible | Negligible | Minor | Moderate | Major | Major |
| 34-66% of AQS (7 – 12 hourly exceedances) | Negligible | Minor | Moderate | Major | Major | Major |
| 67-83% of AQS (13 – 15 hourly exceedances) | Negligible | Moderate | Major | Major | Major | Major |

| Total Hourly Exceedances at Receptor in Assessment Year (out of an allowable 18) | Changes in exceedances relative to AQS | | | | | |
|---|---|---|---|---|---|---|
| | <5.5% (less than 1) | 5.5 - 16.5% (1 to 3) | 16.5 - 33% (4 to 6) | 33 - 66% (7 to 12) | 66% - 100% (13 to 18) | >100% (more than 18) |
| 84-100% of AQS (16 – 18 hourly exceedances) | Negligible | Major | Major | Major | Major | Major |
| 101% or more of AQS (more than 18 exceedances) | Negligible | Major | Major | Major | Major | Major |

6.2.48 Whilst it may be that there are ‘minor’, ‘moderate’ or ‘major’ impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances. The assessment of overall significance is based on professional judgement. The reasons for reaching a position on overall significance should be clear and set out logically, and take into consideration factors such as:

- The existing and future air quality in the absence of the Proposed Development;
- The extent of current and future population exposure to the predicted impacts;
- The spatial and temporal extent of any impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

6.2.49 If the overall effect is judged by the assessor to be ‘moderately adverse’ or worse, it is considered reasonable to expect the effect to be significant.

### Consultation

6.2.50 No further consultation, beyond that described in the Scoping Response section of this ES, has been undertaken.

### Assumptions and Limitations

6.2.51 There are a number of inherent uncertainties associated with the modelling process, including:

- Model uncertainty – due to model formulations;
- Data uncertainty – due to inaccuracies in input data, including emissions estimates, background estimates and meteorology; and
- Variability – randomness of measurements used.

6.2.52 Using a validated air quality model such as ADMS-6 reduces the modelling uncertainty.

6.2.53 The choices of the practitioner throughout the air quality assessment process are also essential to the management of uncertainty, including the decision to bias the predicted impact towards a worst-case estimate or a central estimate. This assessment has used inputs tending towards ‘worst-case’, where appropriate, to provide a conservative and robust assessment.

6.2.54 Table 6.14 below summarises the approach to minimising the uncertainty in the conclusions drawn.

**Table 6.14 Summary of conservative methods used in assessment**

| Source of Uncertainty | Approach | Comments |
|---|---|---|
| Future Background Concentrations | It has been assumed that there will be no improvement in background conditions from the 2025 predictions. | Given the measures being undertaken across the UK to reduce emissions across all sectors, these inputs are considered to be conservative. |
| Meteorological Data | The model has been run with 5 years of meteorological data to account for potential differences in meteorology from year to year. The maximum concentration from 5 years' worth of data, at each receptor or grid point was used in the analysis, increasing the probability that worst-case meteorological conditions are identified. | This is the recommended approach for Environmental Permitting. |
| Length of possible Grid Failure | An Emergency Grid Failure scenario has been modelled in which the failure lasts for a full 24-hour period. | Noting the reliability of the grid (99.999605% availability), grid failures are highly unlikely. As such, it is reasonable to consider a 24-hour outage to be a highly conservative modelling assumption. To emphasise how unlikely it is that a power outage could last for 24 hours or more, power was restored in less than 18 hours following the recent North-Hyde substation fire (dated 21/03/2025). |
| $NO_X$ to $NO_2$ Conversion factors | The EA's recommended conversion factor of 35% was used for short-term $NO_2$. | The Air Quality Modelling and Assessment Unit (AQMAU) suggest that within 500m of a pollutant source, the conversion factor is likely to be closer to 15%. All modelled receptors are within 500m of the site, yet a factor of 35% has been used. |
| Surface Roughness and Minimum Monin Obukhov Length | Sensitivity testing exploring the impact of surface roughness ranging between 1.5m or 1.0m and MO between 30m and 100m was undertaken, with values being chosen on the basis of | Environmental Permitting guidance recommends carrying out sensitivity tests to explore the impact of varying uncertain parameters. |

| Source of Uncertainty | Approach | Comments |
|---|---|---|
| | those that led to the most conservative outputs. | |
| Particulate Matter emissions | It has been assumed that 100% of all PM is emitted as both $PM_{10}$ and $PM_{2.5}$, which is an absolute worst-case assumption. | The generator manufacturers specification sheet does not specify the proportions of PM which would be emitted as $PM_{10}$ and $PM_{2.5}$. Realistically, their proportions (especially that of $PM_{2.5}$) would be substantially less than 100% of all PM emissions. |
| The duration of unabated $NO_X$ emissions during generator operations | It has been assumed that $NO_X$ emissions during the first 20 minutes of a generator's operations will be unabated. | The SCRs are designed to be fully operational within 15 mins of generator start. Commissioning of the generators sets on UP1 (the same design and specification for UP4) demonstrated that the SCR consistently operated as designed with a lag of less than 15 mins (As reported in the Technical Note provided to discharge Condition 25 of the UP1 permission). |

## 6.3 Baseline conditions

6.3.1 This chapter is intended to establish prevailing air quality conditions in the vicinity of the site. The baseline conditions referred to in this section reflect the fact that UP1 is currently operational.

6.3.2 Baseline air quality conditions in the vicinity of the site are established through the compilation and review of appropriately sourced background concentration estimates and local monitoring data.

6.3.3 DEFRA provides estimated background concentrations of the UKAQS pollutants at the UK Air Information Resource (UK-AIR) website[22]. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km$^2$ National Grid square locations across the UK. At the time of writing, the most recent background maps were from November 2024 and based on monitoring data from 2021.

6.3.4 Being background concentrations, the UK-AIR data are intended to represent a homogenous mixture of all emissions sources within the general area of a particular grid square location. Concentrations of pollutants at various sensitive receptor locations can, therefore, be calculated

[22] DEFRA: UK-AIR. www.uk-air.DEFRA.gov.uk

by modelling the emissions from a nearby pollution source, such as a busy road, and then adding this to the appropriate UK-AIR background datum.

6.3.5 LBH's automatic and non-automatic monitoring data are also considered an appropriate source for establishing baseline air quality; the most recent available data from LBH's air quality annual status report for 2024[23] have been reviewed.

6.3.6 The London Atmospheric Emissions Inventory (LAEI) also provides modelled ground level concentrations of annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ at a 20m grid resolution across Greater London, for 2025[24]. These data have also been reviewed.

## Current Baseline

### *UK-AIR Background Pollution*

6.3.7 UK-AIR predicted background pollution concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ for 2025 are presented in Table 6.15, below. These data were taken from the central grid square location closest to the site (i.e. grid reference: 510500, 179500).

**Table 6.15 UK-AIR 2025 Projected Annual Mean Background Pollutant Concentrations**

| Pollutant | Predicted Annual Mean Concentration ($\mu g.m^{-3}$) | Air Quality Standard/ Target ($\mu g.m^{-3}$) |
|---|---|---|
| $NO_2$ | 18.3 | 40 |
| $PM_{10}$ | 14.3 | 40 |
| $PM_{2.5}$ | 8.3 | 10 |

6.3.8 The data show that in 2025, annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations are predicted to be below the AQSs used in this assessment by approximately 54%, 64% and 17%, respectively. Therefore, annual mean background concentrations are likely to be below the respective AQSs in the vicinity of the Site.

### *Local Sources of Monitoring Data*

6.3.9 Local air quality monitoring is considered an appropriate source of data for the purposes of describing baseline air quality. Figure 6.2 below displays the locations of LBH's closest monitoring sites to the Site.

[23] LBH (2024) 2024 Air Quality Annual Status Report
[24] London Atmospheric Emissions Inventory (LAEI). (2023). https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2025

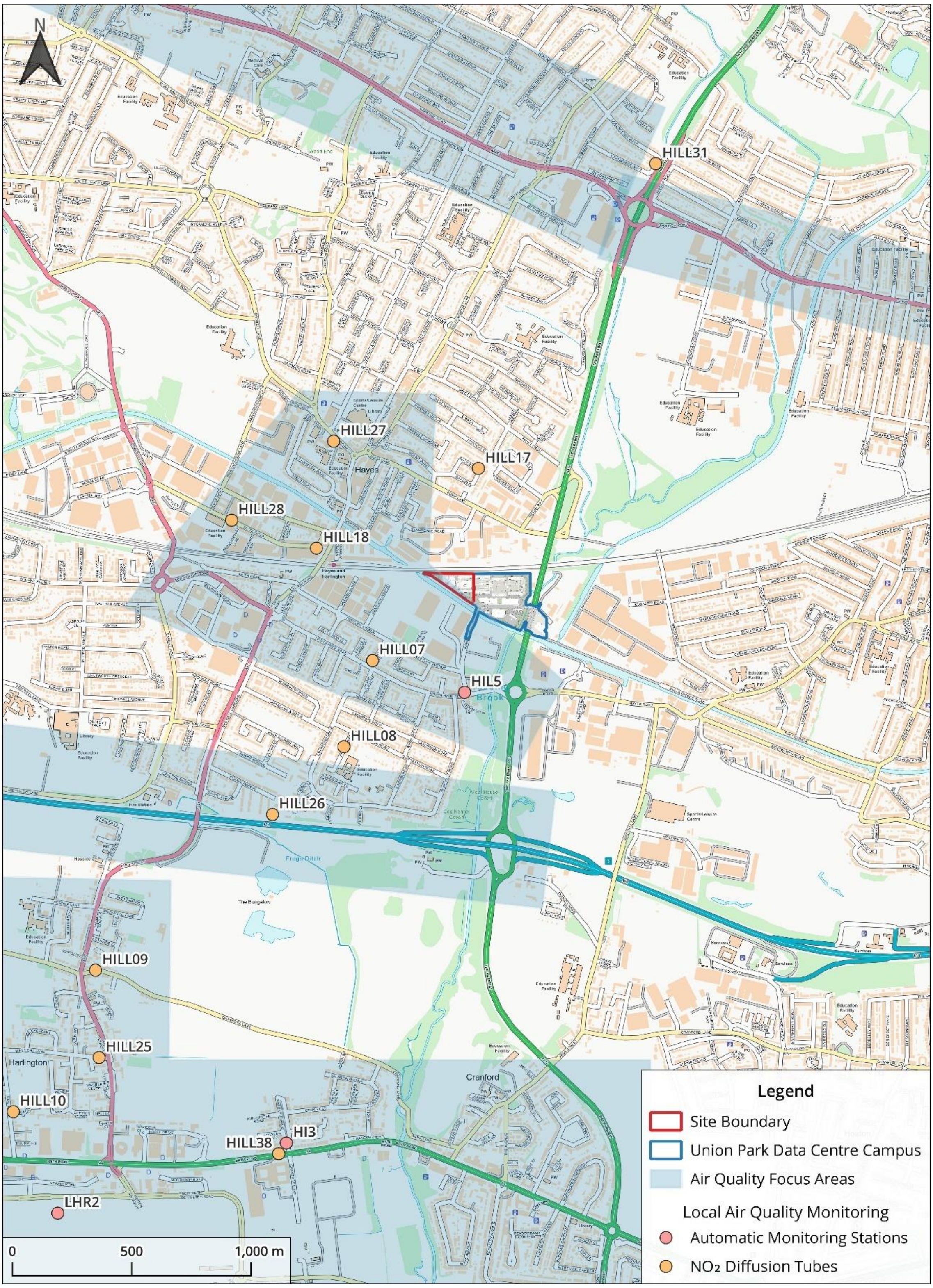


**Figure 6.2 Local Air Quality Monitoring Sites**

Automatic Monitoring

6.3.10 LBH currently undertakes automatic (continuous) monitoring at 11 sites across the Borough. The most recent available data for $NO_2$, $PM_{10}$ and $PM_{2.5}$ from the monitoring sites located within 2.5km of the application site are included in Table 6.16, Table 6.17 and Table 6.18, respectively.

**Table 6.16 $NO_2$ monitoring data from nearby LBH automatic monitors**

| Monitor | Type | Distance from Site (km) | Annual Mean $NO_2$ Concentration (µg.m$^{-3}$) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2017 | 2018 | 2019 | 2022 | 2023 |
| HIL5 | R | 0.4 | **47.0** | **43.0** | **41.0** | 34.0 | 34.0 |
| HI3 | R | 2.1 | 35.0 | 35.0 | 33.0 | 29.0 | 27.0 |
| HRL | A | 2.3 | 32.0 | 30.0 | 31.0 | 24.0 | 22.0 |

*Note: "R" = Roadside; "A" = Airport. Exceedances of long-term AQS shown in **Bold**. Data from 2020 and 2021 were not considered, noting that air quality during this period was heavily influenced by the COVID-19 pandemic and associated lockdowns*.

6.3.11 The data in Table 6.16 show that between 2017 and 2023 and within 2.5km of the application site, annual mean concentrations of $NO_2$ at HIL5 – a roadside site adjacent to the A437 – exceeded the 40 µg.m$^{-3}$ AQS. However, after 2019 there have been no recorded exceedances at this monitoring site. There is strong evidence of a downward trend in measured annual mean $NO_2$ concentrations in the above dataset; this is particularly evident following on from the COVID-19 outbreak and associated lockdowns.

6.3.12 According to Table I of LBH's ASR, there has been no exceedances of the short-term (hourly) AQS for $NO_2$ in recent years. Since 2018, none of the three nearest monitoring sites has recorded a single hour (out of an allowable 18) in exceedance of the 200 µg.m$^{-3}$ AQS.

6.3.13 Table 6.17 includes the most recent annual mean $PM_{10}$ results from the same automatic monitoring sites.

**Table 6.17 $PM_{10}$ monitoring data from nearby LBH automatic monitors**

| Monitor | Type | Distance from Site (km) | Annual Mean $PM_{10}$ Concentration (µg.m$^{-3}$) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2017 | 2018 | 2019 | 2022 | 2023 |
| HIL5 | R | 0.4 | 27.0 | 30.0 | 28.0 | 30.0 | 27.0 |
| HI3 | R | 2.1 | 19.0 | 24.0 | 24.0 | 22.0 | 26.0 |
| HRL | A | 2.3 | 15.0 | 15.0 | 15.0 | 13.0 | 12.0 |

*Note: "R" = Roadside; "A" = Airport. Data from 2020 and 2021 were not considered, noting that air quality during this period was heavily influenced by the COVID-19 pandemic and associated lockdowns*.

6.3.14 The data in Table 6.17 show that annual mean $PM_{10}$ concentrations have been well below the 40 µg.m$^{-3}$ AQS at all sites, between 2017 and 2023, within 2.5km of the site. The highest concentration in 2023 was measured at HIL5, where a concentration 32.5% below the 40 µg.m$^{-3}$ AQS was recorded.

6.3.15 It is also relevant to note that no exceedance of the short-term (daily mean) AQS was recorded between 2017 and 2023 at any other the presented monitoring stations.

6.3.16 Table 6.18 includes the most recent annual mean $PM_{2.5}$ results from the closest automatic monitoring site stationed in LBH.

**Table 6.18 $PM_{2.5}$ monitoring data from nearby LBH automatic monitors**

| Monitor | Type | Distance from Site (km) | Annual Mean $PM_{2.5}$ Concentration ($\mu g.m^{-3}$) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2017 | 2018 | 2019 | 2022 | 2023 |
| HRL | A | 2.3 | 9.0 | 9.0 | 10.0 | 8.0 | 7.0 |

*Note: "A" = Airport. Data from 2020 and 2021 were not considered, noting that air quality during this period was heavily influenced by the COVID-19 pandemic and associated lockdowns*.

6.3.17 The data in Table 6.18 show that annual mean $PM_{2.5}$ concentrations have been equal to or below LBH's 10 $\mu g.m^{-3}$ AQS/ target at HRL, between 2017 and 2023. In 2023, a concentration 30% below the 10 $\mu g.m^{-3}$ AQS/ target was recorded.

Diffusion Tube Monitoring

6.3.18 LBH operates an extensive non-automatic, $NO_2$ diffusion tube monitoring network across the area. The most recent available monitoring data for diffusion tubes located within 2.5km of the site are included in Table 6.19.

**Table 6.19 $NO_2$ monitoring data from nearby LBH diffusion tubes**

| Monitor | Type | Distance from Site (km) | Annual Mean $NO_2$ Concentration ($\mu g.m^{-3}$) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2017 | 2018 | 2019 | 2022 | 2023 |
| HILL07 | R | 0.4 | **43.3** | 37.7 | 36.9 | 30.5 | 28.8 |
| HILL17 | UB | 0.4 | 32.7 | 31.0 | 31.6 | 24.1 | 22.6 |
| HILL18 | R | 0.6 | **49.0** | 38.5 | 37.4 | 28.3 | 25.7 |
| HILL27 | R | 0.8 | 33.8 | 32.5 | 33.2 | 26.8 | 26.9 |
| HILL08 | R | 0.8 | 33.4 | 33.9 | 33.9 | 26.7 | 25.9 |
| HILL26 | R | 1.0 | **51.5** | **42.0** | 40.0 | 29.2 | 27.7 |
| HILL28 | R | 1.0 | 35.7 | 31.7 | 31.7 | 27.1 | 21.4 |
| HD208 | UB | 1.4 | 27.3 | 30.8 | 26.5 | - | - |
| HILL09 | R | 2.0 | 39.4 | 37.2 | 24.1 | 28.8 | 26.7 |
| HILL25 | UB | 2.5 | **45.6** | 39.3 | 38.7 | 32.8 | 30.2 |

*Note: "R" = Roadside; "UB" = Urban Background. Exceedances of long-term AQS shown in **Bold**. Data from 2020 and 2021 were not considered, noting that air quality during this period was heavily influenced by the COVID-19 pandemic and associated lockdowns*.

6.3.19 The data in Table 6.19 indicate that annual mean $NO_2$ concentrations in the vicinity of the application site were generally below the 40 $\mu g.m^{-3}$ AQS, with only tube (HILL26) recording exceedances of the AQS beyond 2017.

6.3.20 The nearest background monitor to the Site is located approximately 0.4km to the north (HILL17). The most recent (2023) result was below the AQS by 43.5%.

***London Atmospheric Emissions Inventory***

6.3.21 The LAEI provides 2025 modelled ground level concentrations of annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ at a 20m grid resolution across Greater London. The model predictions consider background concentrations, plus contributions from major local pollutant sources, such as main roads.

6.3.22 Figure 6.3, Figure 6.4 and Figure 6.5, below present the LAEI 2025 annual mean baseline concentrations for $NO_2$, $PM_{10}$ and $PM_{2.5}$, respectively. The annual mean pollutant contributions from the existing data centre at UP1 have been included in these figures, but the process contributions are too minimal (less than 0.15 $\mu g.m^{-3}$) for them to be visible in the figures.

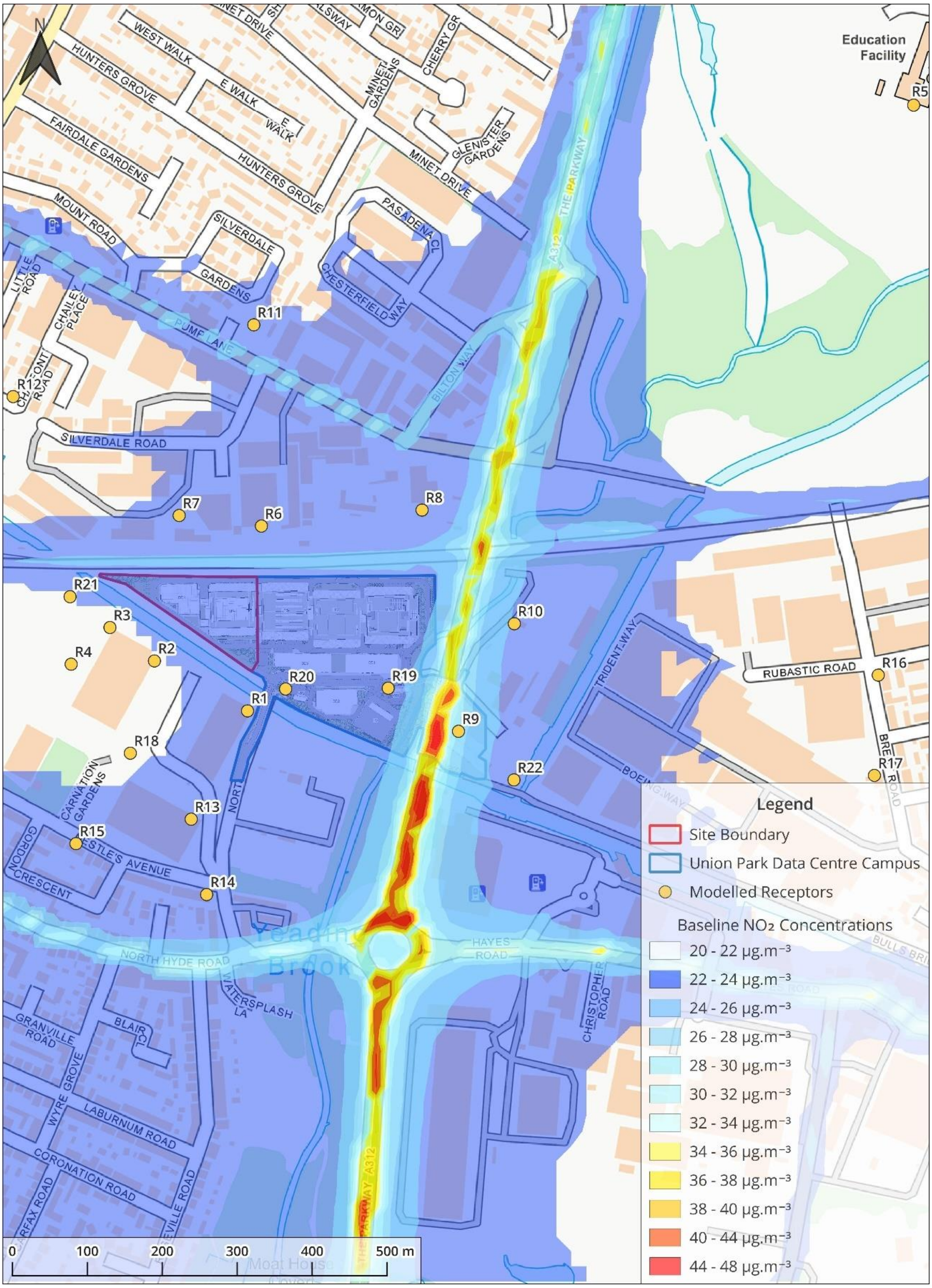


**Figure 6.3 LAEI 2025 $NO_2$ Concentration Contours**

6.3.23 Figure 6.3 shows that the arterial road network is predicted by the LAEI to be the major source of $NO_2$ pollution in the local area. Exceedances of the annual mean AQS are predicted along A312 The Parkway. The concentrations predicted by the LAEI are greater than the background concentrations predicted by UK-AIR and similar to those predicted at local monitoring stations, providing confidence that the 2025 estimates are likely to be reasonable.

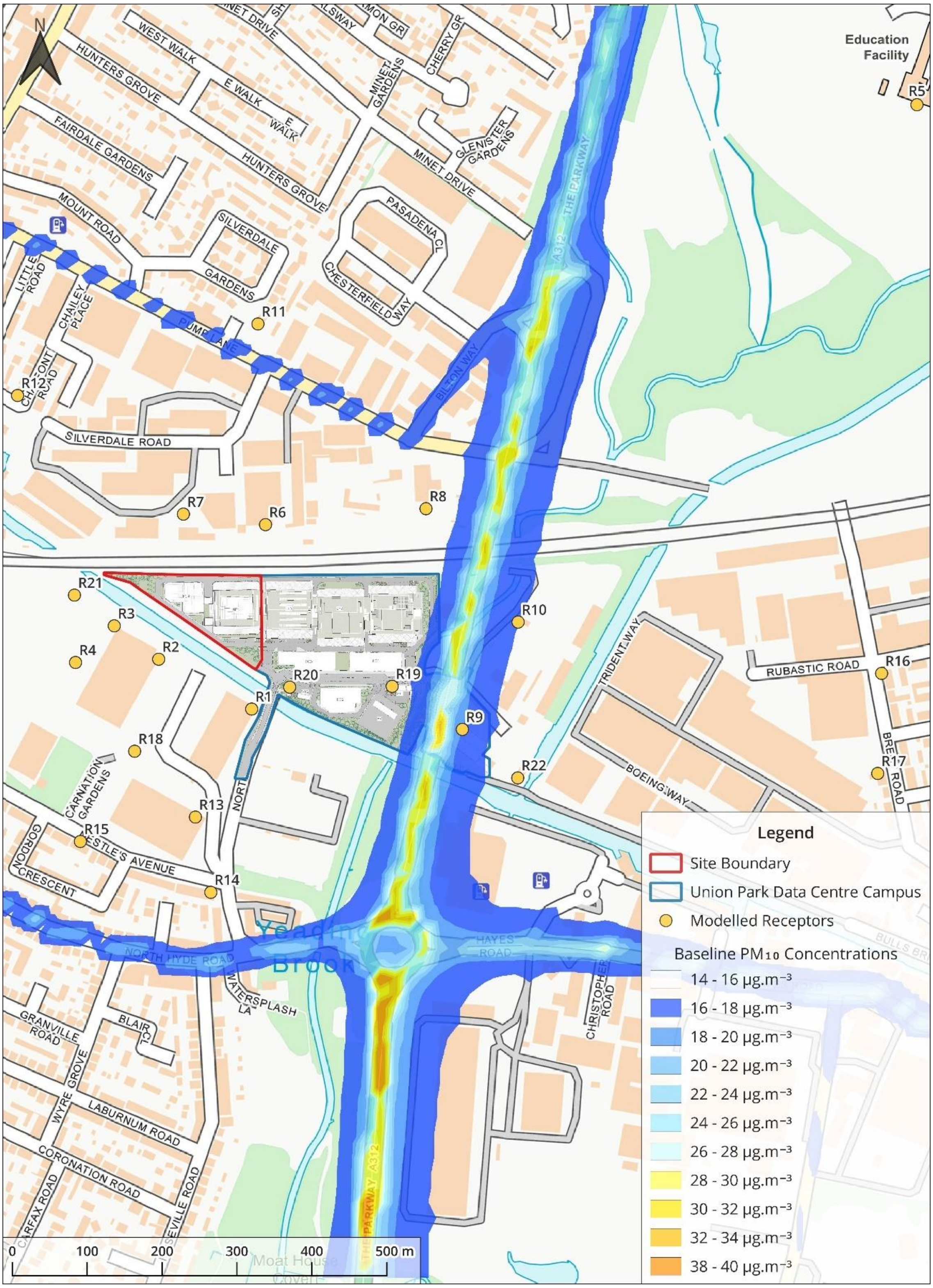


**Figure 6.4 LAEI 2025 $PM_{10}$ Concentration Contours**

6.3.24 Figure 6.4 shows that the arterial road network is predicted by the LAEI to be the major source of $PM_{10}$ pollution in the local area. Exceedances of the annual mean AQS are not predicted but are close to it along A312 The Parkway. The concentrations predicted by the LAEI are greater than the background concentrations predicted by UK-AIR and similar to those predicted at local monitoring stations, providing confidence that the 2025 estimates are likely to be reasonable.


**Figure 6.5 LAEI 2025 $PM_{2.5}$ Concentration Contours**

6.3.25 Figure 6.5 shows that the arterial road network is predicted by the LAEI to be the major source of $PM_{2.5}$ pollution in the local area. Exceedances of the annual mean target are predicted along several roads. The concentrations predicted by the LAEI are greater than the background concentrations predicted by UK-AIR and similar to those predicted at local monitoring stations, providing confidence that the 2025 estimates are likely to be reasonable.

### Future Baseline

6.3.26 UK-AIR predicted background pollution concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ are available through to the year 2040. Concentrations for a selection of future years are presented in Table 6.20, below. These data were taken from the central grid square location closest to the site (i.e. grid reference: 510500, 179500).

**Table 6.20 UK-AIR Projected Annual Mean Background Pollutant Concentrations in Future Years**

| Pollutant | Predicted Annual Mean Concentration ($\mu g.m^{-3}$) | | | | Air Quality Standard ($\mu g.m^{-3}$) |
|---|---|---|---|---|---|
| | 2026 | 2030 | 2035 | 2040 | |
| $NO_2$ | 17.8 | 16.2 | 15.2 | 14.9 | 40 |
| $PM_{10}$ | 14.2 | 13.9 | 13.7 | 13.5 | 40 |
| $PM_{2.5}$ | 8.2 | 7.9 | 7.7 | 7.5 | 10 |

6.3.27 Concentrations of all pollutants are predicted to decline each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles (Figure 6.3, Figure 6.4 and Figure 6.5 depict the substantial pollutant contributions from road traffic in the local area), but also due to London, UK national and international plans to reduce emissions across all sectors.

6.3.28 Consequently, the decision to assume no improvement in baseline concentrations from 2025 onwards (as mentioned in Table 6.14) is considered to be a highly conservative assumption.

6.3.29 The data show that in 2040, $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations are predicted to be below the AQSs used in this assessment by approximately 63%, 66% and 25%, respectively. Therefore, annual mean background concentrations are likely to continue to be below the respective AQSs in the vicinity of the Site.

6.3.30 It is important to acknowledge that LBH has requested a revised annual mean $NO_2$ exceedance threshold of 10 $\mu g.m^{-3}$. The data in Table 6.20 suggest that even at background locations (i.e. noting that concentrations close to pollutant sources would be markedly higher) annual mean $NO_2$ concentrations are predicted in 2040 to be well in exceedance of this recommended threshold, and this would likely remain the case for several years beyond 2040. For this reason, it was not deemed appropriate to consider the impacts of the Proposed Development against LBH's recommended threshold. For completeness, however, the results have been assessed against this threshold in a sensitivity test presented in Appendix 6.2.

### Baseline Concentrations at Modelled Receptors

6.3.31 The baseline concentrations of annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ used in this assessment are presented in Table 6.21, below.

**Table 6.21 Baseline Concentrations used in this assessment**

| Receptor ID | Annual Mean Concentrations (µg.m$^{-3}$) | | |
|---|---|---|---|
| | $NO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| R1 | 22.24 | 14.56 | 9.34 |
| R2 | 22.00 | 14.45 | 9.28 |
| R3 | 21.97 | 14.44 | 9.26 |
| R4 | 21.89 | 14.39 | 9.24 |
| R5 | 20.42 | 14.26 | 9.15 |
| R6 | 22.42 | 14.64 | 9.38 |
| R7 | 22.16 | 14.57 | 9.34 |
| R8 | 23.13 | 15.26 | 9.61 |
| R9 | 30.38 | 19.43 | 10.97 |
| R10 | 24.05 | 16.22 | 9.89 |
| R11 | 22.15 | 14.76 | 9.42 |
| R12 | 21.73 | 14.56 | 9.28 |
| R13 | 22.22 | 14.50 | 9.31 |
| R14 | 22.69 | 14.75 | 9.40 |
| R15 | 22.31 | 14.52 | 9.30 |
| R16 | 21.44 | 14.60 | 9.31 |
| R17 | 21.22 | 14.39 | 9.24 |
| R18 | 22.03 | 14.41 | 9.26 |
| R19 | 23.79 | 15.61 | 9.72 |
| R20 | 22.45 | 14.70 | 9.40 |
| R21 | 22.05 | 14.44 | 9.26 |
| R22 | 23.48 | 15.49 | 9.65 |

6.3.32 The baseline concentrations presented in Table 6.21 are the summation of the 2025 LAEI concentration predictions and concentration contributions from UP1's testing and maintenance regime (17 hours per annum + 1.1%), noting that UP1 is currently fully operational.

6.3.33 Hourly mean $NO_2$ baseline concentrations are predicted to be twice the annual mean concentrations; this is a commonly applied approach and one which was used for the adjacent data centre application (Ref: 75111/APP/2022/1007). Consequently, and based on the hourly monitoring data described in paragraph 6.3.12, it is considered reasonable to expect that no modelled receptor location is currently exposed to any breaches of the 200 µg.m$^{-3}$ hourly $NO_2$ threshold (0 exceedances out of an allowable 18). The maximum predicted hourly mean process contribution from the routine operation of the EC1 standby generators is only 40 µg.m$^{-3}$, predicted at receptor R19, so the combination of UP1 and LAEI data is still predicted to lead to 0 breaches of the AQS concentration.

## 6.4 Inherent design mitigation

### *Construction Phase*

6.4.1 Best practice mitigation measures will need to be implemented, commensurate to the risk levels identified in this ES Chapter, to ensure no residual dust effects during the construction phase. A Construction Environment Management Plan (CEMP) will be produced and submitted as part of the planning application and the dust mitigation measures outlined in this ES Chapter will form an inherent part of this. The recommended dust mitigation measures can be secured via Planning Condition(s).

***Operational Phase***

6.4.2 Selective catalytic reduction (SCR) systems are to be installed on the standby generators to achieve a $NO_X$ emission concentration of 95 $mg.Nm^{-3}$ (at 5% $O_2$). This was a limit imposed by LBH for the permitted adjacent data centre application (Ref: 75111/APP/2022/1007) and the operator has committed significant investment to achieve the same emissions reductions at the Proposed Development. The manufacturer warranted that an emission concentration of 95 mg $NO_X.Nm^{-3}$ (at 5% $O_2$) shall be achieved, and this was demonstrated during the emissions monitoring of EC1 during commissioning, as witnessed by the EA.

6.4.3 This assessment has assumed that the Proposed Development's standby generators will also be able to achieve this emission concentration.

## 6.5 Potential effects prior to additional mitigation

### Construction Phase

6.5.1 The demolition and construction of the Proposed Development will involve a number of activities that could produce polluting emissions to air; particularly emissions of dust. Therefore, the risk of dust effects on local receptors during the demolition and construction phase of the proposed development has been assessed following the latest IAQM guidance.

6.5.2 Estimates for the dust emission magnitudes for demolition, earthworks, construction, and trackout (discussed below) are based on the professional experience of Phlorum's consultants, information provided by the applicant's design team, and Google Earth imagery.

***Dust Emission Magnitude***

Demolition

6.5.3 The existing building at the Site will be demolished to make way for the proposed development.

6.5.4 Regarding existing structures to be demolished, the IAQM guidance states that where the total volume of building(s) to be demolished is between 12,000$m^3$ and 75,000$m^3$, and where the height of existing building(s) to be demolished is between 6m and 12m above ground level, the dust emission magnitude for demolition activities can be defined as *Medium*.

6.5.5 The volume of the existing building to be demolished is approximately 40,000$m^3$ and this building is up to 12m in height above ground level, thereby falling within the IAQM's *Medium* dust emission magnitude category.

6.5.6 Is it not anticipated that any on-site crushing will be required during demolition activities and therefore, the overall dust emission magnitude for the demolition stage is defined as *Medium* in-line with IAQM guidance.

Earthworks

6.5.7 The IAQM guidance states that where the area of a site is below 18,000$m^2$ and fewer than 5 heavy earth moving-vehicles are to operate on-site at any one time, the dust emission magnitude for earthworks activities can be defined as *Small*.

6.5.8 The total area of the site is approximately 12,600$m^2$, thereby falling within the IAQM's *Small* dust emission magnitude category. Additionally, it is estimated, using professional judgement, that fewer than 5 heavy earth moving-vehicles would operate on-site at any one time. Therefore, the overall dust emission magnitude for the earthworks stage is defined as *Small* in-line with IAQM guidance.

<u>Construction</u>

6.5.9 According to the IAQM guidance, the dust emission magnitude for the construction stage can be defined as *Large* where the volume of new buildings to be constructed exceeds 75,000m$^3$, or where on-site concrete batching or sandblasting is to be undertaken.

6.5.10 Whilst it is not anticipated that on-site concrete batching or sandblasting would be required, the total volume of new buildings to be constructed at the site is expected to exceed 75,000m$^3$, and therefore the dust emission magnitude for the construction stage is defined as *Large*.

<u>Trackout</u>

6.5.11 Construction traffic, when travelling over soiled road surfaces, has the potential to generate dust emissions and to also add soil to the local road network. During dry weather, soiled roads can lead to dust being emitted due to physical and turbulent effects of vehicles.

6.5.12 The IAQM guidance states that where the number of HDV movements to be generated per day is below 20 and less than 50m of unpaved road surface(s) is to be used by vehicles accessing the site, the potential dust emission magnitude for the trackout phase can be defined as *Small*.

6.5.13 It is anticipated that fewer than 20 HDVs would access the site per day during construction and there will be no use of unpaved road surfaces. Therefore, the overall dust emission magnitude for the trackout phase is defined as *Small*.

<u>Dust Emission Magnitude Summary</u>

6.5.14 A summary of the overall dust emission magnitudes for the demolition, earthworks, construction and trackout stages is provided in Table 6.22Table 6.22, below.

**Table 6.22 Dust Emission Magnitude Summary**

| Stage | Dust Emission Magnitude |
|---|---|
| Demolition | Medium |
| Earthworks | Small |
| Construction | Large |
| Trackout | Small |

***Area Sensitivity***

6.5.15 Having established the dust emission magnitudes for each phase above, the sensitivity of the area around the site must be considered to establish the significance of demolition and construction dust effects. The impact of dust emissions from the sources discussed above have the potential to cause an annoyance to human receptors living in the local area. Within distances of 20m of the construction site, there is a high risk of dust impacts regardless of the prevailing wind direction. Up to 100m from the construction site, there may still be a high risk, particularly if the receptor is downwind of the source.

6.5.16 With the exponential decline in levels of dust with distance from the dust generating activities, it is considered that for receptors more than 250m from the site boundary, the risk of dust effects is Negligible. Furthermore, the risks at over 100m only have the potential to be significant in certain weather conditions, e.g. downwind of the source during dry periods.

6.5.17 The approximate number of *High* and *Medium* sensitivity human receptors within 250m of the site is detailed in Table 6.23Table 6.23, below, and displayed in Figure 6.6.

**Table 6.23 Number of Human Receptors within 250m of the Site**

| Distance to Site (m) | Number of Receptors | Receptor Details |
|---|---|---|
| ***High Sensitivity*** | | |
| <20m | - | - |
| <50m | >10 | Residences within Maya House |
| <100m | >100 | Residences within Maya House and in blocks off Fairline Avenue |
| <250m | >500 | Residences in the surrounding area |
| ***Medium Sensitivity*** | | |
| <20m | 1 | UP3 within Union Park Campus |
| <50m | 3 | Commercial / Industrial units within Argent Trade Park |
| <100m | 14 | Commercial / Industrial units within Segro Park and Argent Trade Park |
| <250m | 40 | Commercial / Industrial units in the surrounding area |

Dust Soiling Effects

6.5.18 As presented in Table 6.23 and displayed in Figure 6.6, there are more than 10 but fewer than 100 high sensitivity human receptors within 50m of the site boundary; namely residences within Maya House and other residential blocks forming part of the Former Nestle Factory Development (ref: 1331/APP/2019/1666). Therefore, the sensitivity of the area in terms of dust soiling effects on people and property can be defined as *Medium*.

Human Health Effects

6.5.19 As indicated by the UK-AIR projections in Table 6.15 and by the LAEI projections in Figure 6.4, concentrations of $PM_{10}$ within 250m of the site are generally below 24 µg.m$^{-3}$, which represents the IAQM threshold for an area to be considered *Low Sensitivity* for $PM_{10}$ related human health effects providing that there are fewer than 100 *High Sensitivity* receptors within 20m of the site.

6.5.20 As evidenced by Table 6.23 and Figure 6.6, there are fewer than 100 *High Sensitivity* receptors within 20m of the site, and therefore, the sensitivity of the area in terms of $PM_{10}$ related human health impacts is defined as *Low.*

Ecological Effects

6.5.21 Review of the MAGIC website, which incorporates Natural England's interactive maps, has identified no statutory ecological receptors within 50m of the site, or within 50m of roads to be used by construction traffic, up to 250m from the site entrance. The closest statutory ecological site is the Yeading Meadows National Nature Reserve (NNR) and Local Nature Reserve (LNR), which is located approximately 2.5km north of the site. Therefore, based on distance alone, the demolition and construction phase of the proposed development is expected to have a *Negligible* impact on ecological receptors.

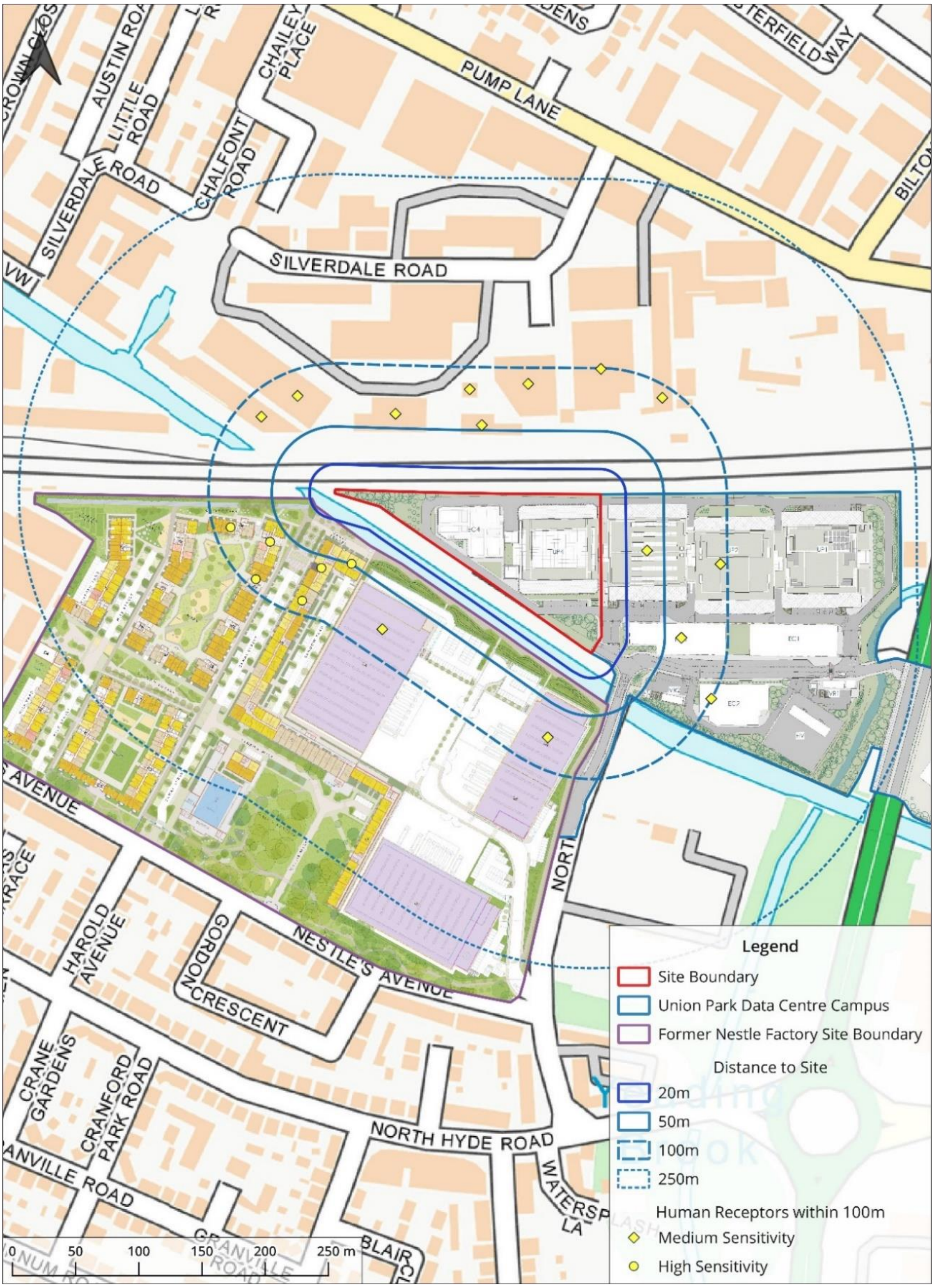


**Figure 6.6 Construction Phase**

***Risk of Impacts***

6.5.22 Having established the potential dust emission magnitudes for each stage of construction and the sensitivity of the local area in terms of dust soiling effects on people and property, human health effects and ecological effects, the dust impact risk from each construction phase can be determined. These are summarised in Table 6.24, below.

**Table 6.24 Dust Impact Risks for Each Construction Stage**

| Stage | Dust Impact Risk | | |
|---|---|---|---|
| | Dust Soiling Effects | $PM_{10}$ Health Effects | Ecological Effects |
| Demolition | Medium Risk | Low Risk | Negligible |
| Earthworks | Low Risk | Negligible | Negligible |
| Construction | Medium Risk | Low Risk | Negligible |
| Trackout | Low Risk | Negligible | Negligible |

6.5.23 Overall, the demolition and construction phase of the proposed development is considered to present *Medium Risk* in terms of dust soiling (nuisance) effects, a *Low Risk* for $PM_{10}$ health effects, and *Negligible Risk* for ecological effects, in the absence of mitigation.

## Operational Phase

6.5.24 The Proposed Development (UP4) has the potential to impact local air quality during its operation through the release of standby generator emissions during planned testing and, whilst very unlikely, during unplanned power outages.

***Testing and Maintenance***

6.5.25 For the assessment of annual mean impacts, the cumulative emissions generated by each of the three testing regime scenarios (monthly testing, quarterly testing and annual testing, as presented in Table 6.4) are considered, to reflect the combined influence of all planned testing and maintenance on local air quality.

6.5.26 For the assessment of hourly mean $NO_2$ impacts, the number of breaches of the hourly AQS caused by each of the three testing scenarios are tallied to estimate the maximum likely number of breaches (out of an allowable 18) caused by the whole testing regime, in a year. Results are equivalent to a predicted 1 in 20-year event (i.e. the 95% confidence interval).

6.5.27 Table 6.25 below shows the predicted impacts of the Proposed Development's testing regime (+1.1% of hours to account for additional likely maintenance activities) on annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations. Modelled receptors not included in the below table represent locations where the annual mean AQS should not apply, according to relevant guidance.

**Table 6.25 Predicted annual mean concentrations with Proposed Development following routine testing and maintenance**

| Receptor ID | Annual Mean Concentrations ($\mu g.m^{-3}$) | | | Air Quality Impact | |
|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| $NO_2$ | | | | | |
| R3 | 21.97 | 0.047 | 22.02 | 0.12 | Negligible |
| R4 | 21.89 | 0.022 | 21.91 | 0.05 | Negligible |
| R5 | 20.42 | 0.002 | 20.43 | 0.00 | Negligible |
| R11 | 22.15 | 0.011 | 22.16 | 0.03 | Negligible |
| R12 | 21.73 | 0.020 | 21.75 | 0.05 | Negligible |
| R14 | 22.69 | 0.004 | 22.70 | 0.01 | Negligible |

| Receptor ID | Annual Mean Concentrations (µg.m$^{-3}$) | | | Air Quality Impact | |
|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| R15 | 22.31 | 0.009 | 22.32 | 0.02 | Negligible |
| R16 | 21.44 | 0.002 | 21.45 | 0.01 | Negligible |
| R17 | 21.22 | 0.002 | 21.23 | 0.00 | Negligible |
| R18 | 22.03 | 0.020 | 22.05 | 0.05 | Negligible |
| R21 | 22.05 | 0.019 | 22.07 | 0.05 | Negligible |
| R22 | 23.48 | 0.003 | 23.49 | 0.01 | Negligible |
| $PM_{10}$ | | | | | |
| R3 | 14.44 | 0.001 | 14.44 | 0.003 | Negligible |
| R4 | 14.39 | 0.000 | 14.39 | 0.001 | Negligible |
| R5 | 14.26 | 0.000 | 14.26 | 0.000 | Negligible |
| R11 | 14.76 | 0.000 | 14.76 | 0.001 | Negligible |
| R12 | 14.56 | 0.000 | 14.56 | 0.001 | Negligible |
| R14 | 14.75 | 0.000 | 14.75 | 0.000 | Negligible |
| R15 | 14.52 | 0.000 | 14.52 | 0.000 | Negligible |
| R16 | 14.60 | 0.000 | 14.60 | 0.000 | Negligible |
| R17 | 14.39 | 0.000 | 14.39 | 0.000 | Negligible |
| R18 | 14.41 | 0.000 | 14.41 | 0.001 | Negligible |
| R21 | 14.44 | 0.000 | 14.45 | 0.001 | Negligible |
| R22 | 15.49 | 0.000 | 15.49 | 0.000 | Negligible |
| $PM_{2.5}$ | | | | | |
| R3 | 9.27 | 0.001 | 9.27 | 0.01 | Negligible |
| R4 | 9.24 | 0.001 | 9.24 | 0.01 | Negligible |
| R5 | 9.15 | 0.000 | 9.15 | 0.00 | Negligible |
| R11 | 9.42 | 0.001 | 9.42 | 0.01 | Negligible |
| R12 | 9.28 | 0.001 | 9.28 | 0.01 | Negligible |
| R14 | 9.40 | 0.002 | 9.40 | 0.02 | Negligible |
| R15 | 9.31 | 0.001 | 9.31 | 0.01 | Negligible |
| R16 | 9.31 | 0.001 | 9.31 | 0.01 | Negligible |
| R17 | 9.24 | 0.001 | 9.24 | 0.01 | Negligible |
| R18 | 9.26 | 0.001 | 9.26 | 0.01 | Negligible |
| R21 | 9.26 | 0.001 | 9.26 | 0.01 | Negligible |
| R22 | 9.65 | 0.002 | 9.65 | 0.02 | Negligible |

*Note: Any discrepancies due to rounding. Baseline concentrations include process contributions from UP1's testing and maintenance regime.*

6.5.28 Table 6.25 shows that annual mean concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ are all predicted to be below the relevant AQSs of 40 µg.m$^{-3}$, 40 µg.m$^{-3}$ and 10 µg.m$^{-3}$, respectively. Additionally, all annual mean air quality impacts caused by the operation of the standby generators at UP4 are predicted to be 'Negligible', with reference to EPUK and IAQM impact descriptors, which is not significant.

6.5.29 The largest process contribution is predicted at Receptor R3 (a residential unit at the former Nestle Site), where an annual mean $NO_2$ increase of 0.047 $\mu g.m^{-3}$ was modelled; this is just 0.12% of the AQS.

6.5.30 Figure 6.7, below, displays the annual mean $NO_2$ process contribution from the testing and maintenance regime of UP4's generators, at ground level. Discrepancies between Figure 6.7 and Table 6.25 are due to some receptors being present at heights other than ground level.

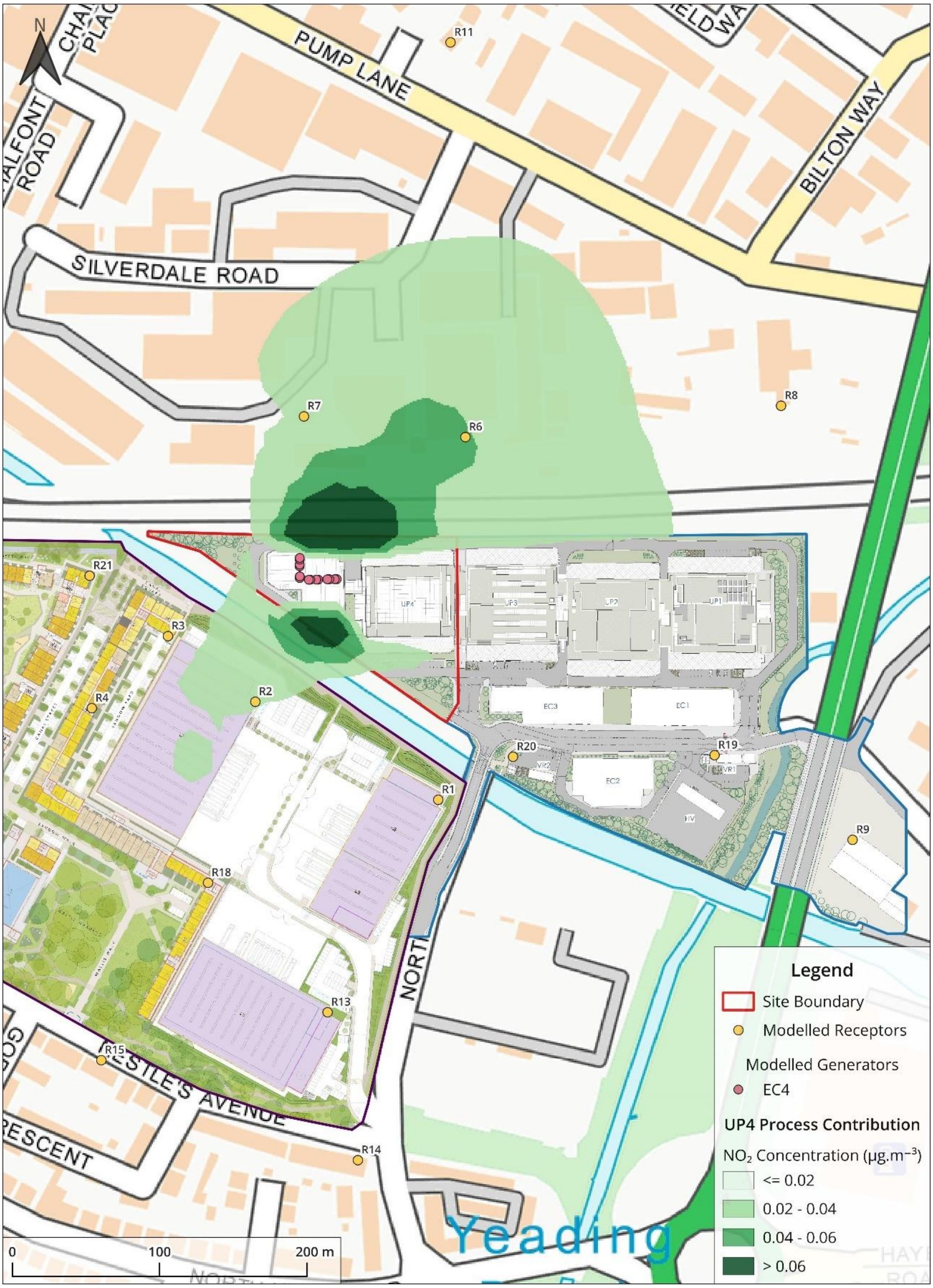


**Figure 6.7 UP4 Annual Mean $NO_2$ Process Contribution – Testing and Maintenance**

6.5.31 Appendix 6.2 displays the above results against LBH's proposed annual mean $NO_2$ target of 10 μg.m$^{-3}$. Even against this stringent threshold, all impacts are considered to be 'Negligible', which is not significant.

6.5.32 Table 6.26 below shows the predicted impacts of the Proposed Development's testing regime (+1.1% of hours to account for additional likely maintenance activities) on the hourly mean $NO_2$ AQS.

**Table 6.26 Predicted hourly mean concentrations with Proposed Development following routine testing and maintenance**

| Receptor ID | Predicted Baseline Concentration | Baseline Exceedances (out of an allowable 18) | Maximum Concentration with UP4 | UP4 Exceedances (out of an allowable 18) | Air Quality Impacts | |
|---|---|---|---|---|---|---|
| | | | | | Total Exceedances (out of an allowable 18) | Probability of Exceeding AQS |
| R1 | 62 | 0 | 185 | 0 | 0 | < 5% |
| R2 | 52 | 0 | 311 | 1 | 1 | < 5% |
| R3 | 52 | 0 | 615 | 2 | 2 | < 5% |
| R4 | 49 | 0 | 272 | 1 | 1 | < 5% |
| R5 | 43 | 0 | 54 | 0 | 0 | < 5% |
| R6 | 60 | 0 | 298 | 2 | 2 | < 5% |
| R7 | 52 | 0 | 243 | 1 | 1 | < 5% |
| R8 | 57 | 0 | 128 | 0 | 0 | < 5% |
| R9 | 78 | 0 | 126 | 0 | 0 | < 5% |
| R10 | 63 | 0 | 107 | 0 | 0 | < 5% |
| R11 | 48 | 0 | 118 | 0 | 0 | < 5% |
| R12 | 46 | 0 | 119 | 0 | 0 | < 5% |
| R13 | 52 | 0 | 130 | 0 | 0 | < 5% |
| R14 | 52 | 0 | 103 | 0 | 0 | < 5% |
| R15 | 49 | 0 | 125 | 0 | 0 | < 5% |
| R16 | 46 | 0 | 64 | 0 | 0 | < 5% |
| R17 | 45 | 0 | 64 | 0 | 0 | < 5% |
| R18 | 51 | 0 | 224 | 1 | 1 | < 5% |
| R19 | 87 | 0 | 182 | 0 | 0 | < 5% |
| R20 | 66 | 0 | 197 | 0 | 0 | < 5% |
| R21 | 49 | 0 | 284 | 1 | 1 | < 5% |
| R22 | 56 | 0 | 93 | 0 | 0 | < 5% |

*Note: The "Maximum Concentrations with UP4" have been calculated using hypergeometric distribution statistics, to estimate the absolute maximum (at the 95% confidence interval) across a 20-year period, caused by routine testing and maintenance. The percentiles used in this case were the 99.79$^{th}$, 98.33$^{rd}$ and 99.79$^{th}$ percentiles for monthly, quarterly and annual testing regimes, respectively. 1 breach of the AQS at these percentiles were identified during monthly and quarterly tests, so the 95.38$^{th}$ and 86.53$^{rd}$ percentiles were then used to determine the likelihood of these tests causing 2 breaches of the AQS, and so on, until no further breaches were predicted.*

6.5.33 Table 6.26 shows that hourly mean concentrations of $NO_2$ could exceed the short-term AQS of 200 µg.m$^{-3}$ at some modelled receptor locations. At Receptors R3 and R6, 2 breaches of the AQS are predicted, due to the EC4 generators' testing and maintenance regime.

6.5.34 It is anticipated that baseline conditions are not leading to any breaches of the AQS at any of the modelled receptor locations. As such, when combined with the contributions from UP4, no receptor is anticipated to experience more than 2 breaches of the hourly mean AQS per year, out of an allowable 18. Consequently, the probability of the Proposed Development causing more than 18 exceedances is minimal, and its impacts on hourly mean $NO_2$ concentrations can be considered 'Negligible' according to Table 6.13, which is not significant.

6.5.35 Figure 6.8, below, displays the predicted number of exceedances of the hourly $NO_2$ AQS caused by the testing and maintenance regime of UP4's generators, at ground level. Discrepancies between Figure 6.8 and Table 6.26 are due to some receptors being present at heights other than ground level.

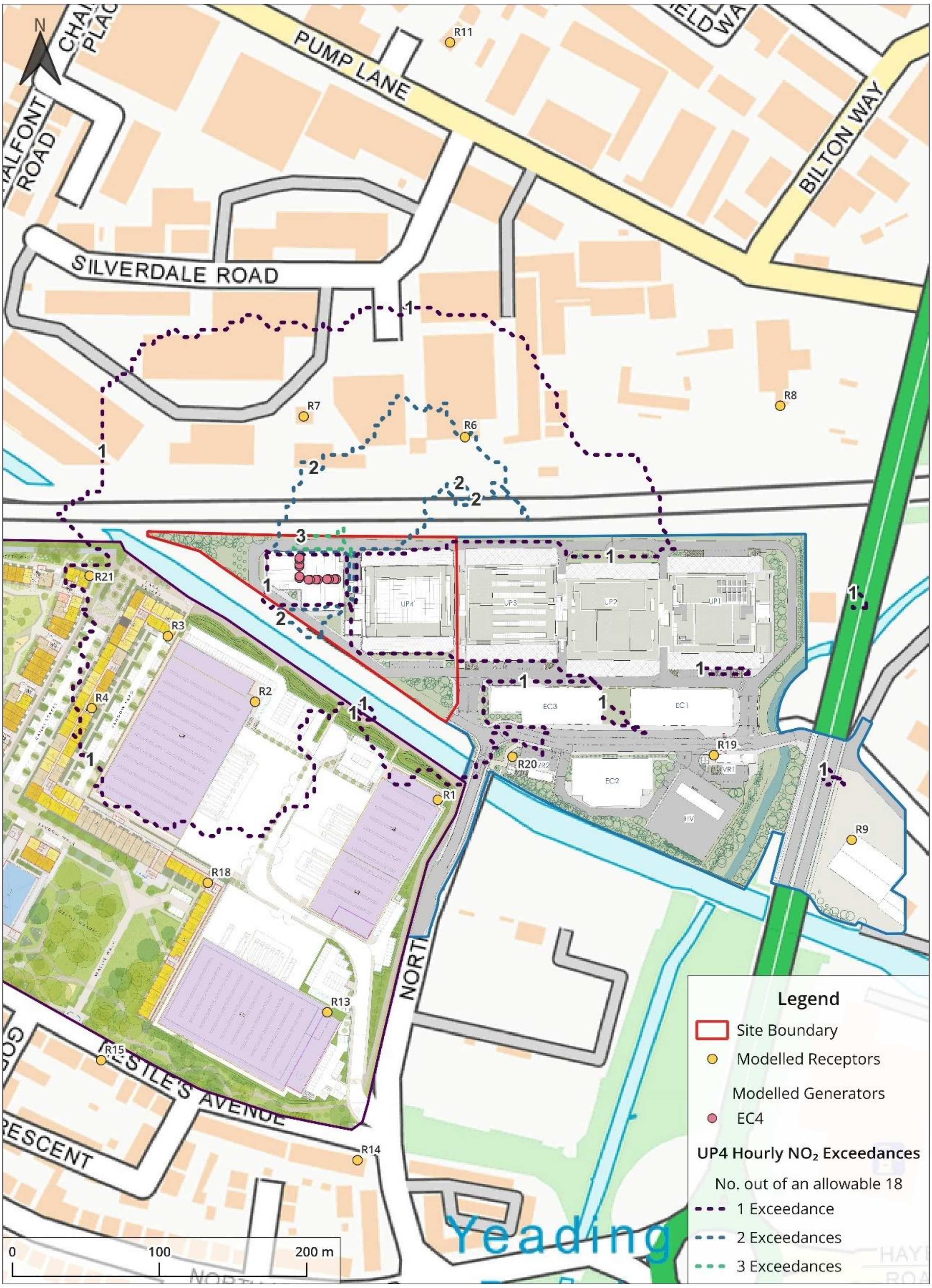


**Figure 6.8 UP4 No. of Hourly $NO_2$ AQS Exceedances at Ground Level – Testing and Maintenance**

6.5.36 Figure 6.9, below, displays the predicted number of exceedances of the hourly $NO_2$ AQS caused by the testing and maintenance regime of UP4's generators, at a height of 35m above ground level. Discrepancies between Figure 6.9 and Table 6.26 are due to some receptors being present at heights other than ground level.

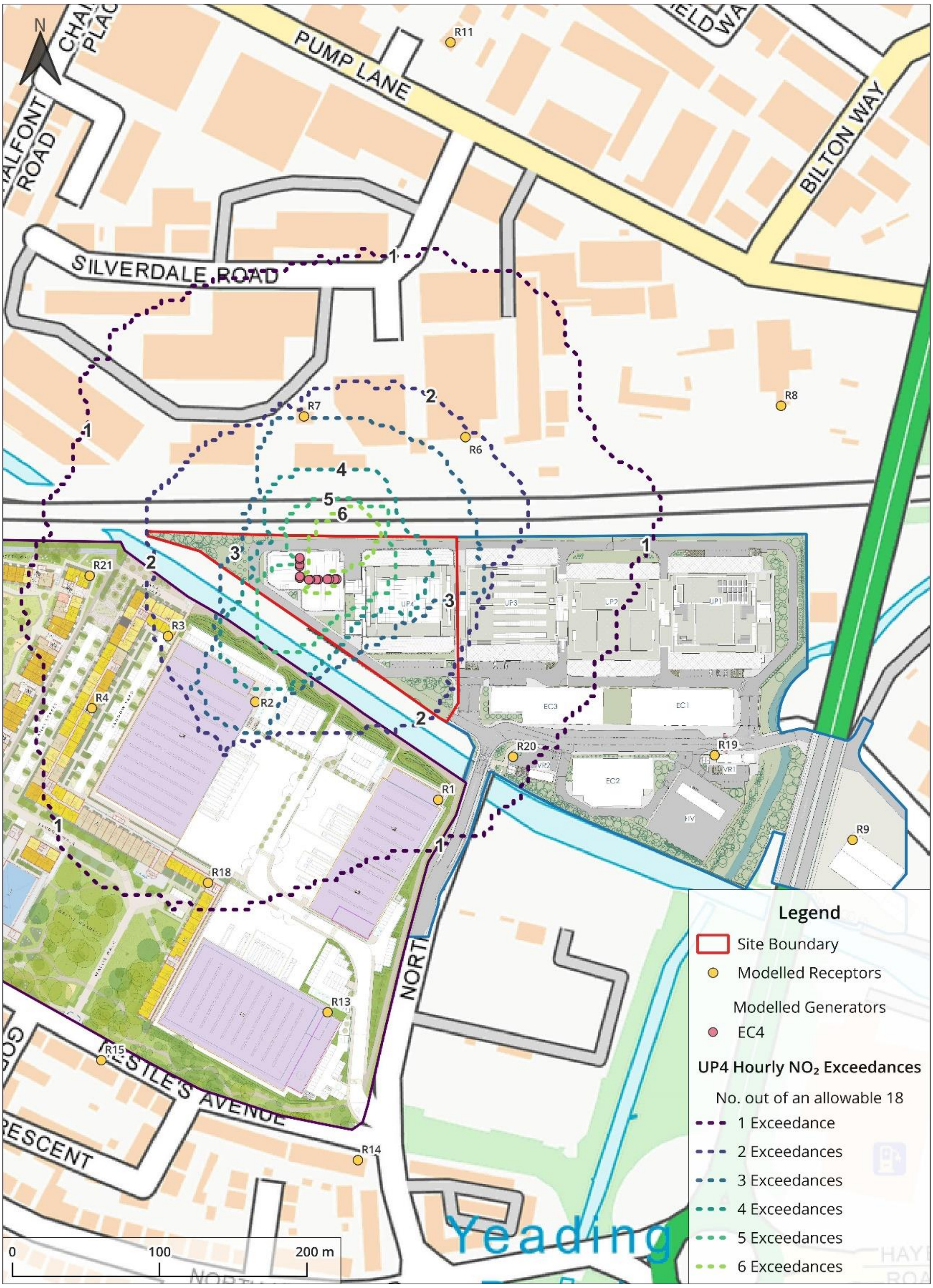


**Figure 6.9 UP4 No. of Hourly $NO_2$ AQS Exceedances at 35m – Testing and Maintenance**

***Power Outage Scenario***

6.5.37 For the assessment of annual mean impacts, the emissions generated during a 24-hour power outage are added to the annual mean contributions from UP4's testing regime (regime presented in Table 6.4 and results shown in Table 6.25), to reflect the combined influence of planned testing and maintenance on local air quality, with an additional 24-hour power outage.

6.5.38 For the assessment of hourly mean $NO_2$ impacts, the number of breaches of the hourly AQS caused by the power outage is added to those caused during UP4's testing regime to estimate the maximum likely number of breaches (out of an allowable 18) caused by the Proposed Development in a year, following a power outage. Results are equivalent to a predicted 1 in 20-year event (i.e. the 95% confidence interval).

6.5.39 Table 6.27 below shows the predicted impacts of a 24-hour power outage at the Proposed Development on annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations. Modelled receptors not included in the below table represent locations where the annual mean AQS should not apply, according to relevant guidance.

**Table 6.27 Predicted annual mean concentrations with Proposed Development including a 24-hour power outage**

| Receptor ID | Annual Mean Concentrations ($\mu g.m^{-3}$) | | | Air Quality Impact | |
|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| **$NO_2$** | | | | | |
| R3 | 21.98 | 0.088 | 22.07 | 0.22 | Negligible |
| R4 | 21.90 | 0.041 | 21.94 | 0.10 | Negligible |
| R5 | 20.43 | 0.004 | 20.43 | 0.01 | Negligible |
| R11 | 22.15 | 0.021 | 22.17 | 0.05 | Negligible |
| R12 | 21.73 | 0.025 | 21.76 | 0.06 | Negligible |
| R14 | 22.70 | 0.007 | 22.71 | 0.02 | Negligible |
| R15 | 22.31 | 0.017 | 22.33 | 0.04 | Negligible |
| R16 | 21.45 | 0.004 | 21.45 | 0.01 | Negligible |
| R17 | 21.23 | 0.003 | 21.23 | 0.01 | Negligible |
| R18 | 22.04 | 0.038 | 22.07 | 0.09 | Negligible |
| R21 | 22.06 | 0.036 | 22.09 | 0.09 | Negligible |
| R22 | 23.49 | 0.006 | 23.50 | 0.01 | Negligible |
| **$PM_{10}$** | | | | | |
| R3 | 14.44 | 0.004 | 14.44 | 0.009 | Negligible |
| R4 | 14.39 | 0.004 | 14.39 | 0.009 | Negligible |
| R5 | 14.26 | 0.002 | 14.26 | 0.004 | Negligible |
| R11 | 14.76 | 0.001 | 14.76 | 0.001 | Negligible |
| R12 | 14.56 | 0.001 | 14.56 | 0.003 | Negligible |
| R14 | 14.75 | 0.001 | 14.75 | 0.001 | Negligible |
| R15 | 14.52 | 0.001 | 14.52 | 0.001 | Negligible |
| R16 | 14.60 | 0.001 | 14.61 | 0.002 | Negligible |
| R17 | 14.39 | 0.000 | 14.39 | 0.000 | Negligible |
| R18 | 14.41 | 0.002 | 14.42 | 0.004 | Negligible |

| Receptor ID | Annual Mean Concentrations ($\mu g.m^{-3}$) | | | Air Quality Impact | |
|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| R21 | 14.45 | 0.001 | 14.45 | 0.002 | Negligible |
| R22 | 15.49 | 0.001 | 15.49 | 0.003 | Negligible |
| $PM_{2.5}$ | | | | | |
| R3 | 9.27 | 0.003 | 9.27 | 0.03 | Negligible |
| R4 | 9.24 | 0.004 | 9.24 | 0.04 | Negligible |
| R5 | 9.15 | 0.002 | 9.15 | 0.02 | Negligible |
| R11 | 9.42 | 0.001 | 9.42 | 0.01 | Negligible |
| R12 | 9.28 | 0.002 | 9.29 | 0.02 | Negligible |
| R14 | 9.40 | 0.002 | 9.40 | 0.02 | Negligible |
| R15 | 9.31 | 0.001 | 9.31 | 0.01 | Negligible |
| R16 | 9.31 | 0.001 | 9.31 | 0.01 | Negligible |
| R17 | 9.24 | 0.001 | 9.24 | 0.01 | Negligible |
| R18 | 9.26 | 0.003 | 9.27 | 0.03 | Negligible |
| R21 | 9.27 | 0.001 | 9.27 | 0.01 | Negligible |
| R22 | 9.65 | 0.003 | 9.66 | 0.03 | Negligible |

*Note: Any discrepancies due to rounding. "Baseline Concentration" results include 24-hours' worth of power outages at UP1.*

6.5.40 Table 6.27 shows that annual mean concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ are all predicted to be below the relevant AQSs of 40 $\mu g.m^{-3}$, 40 $\mu g.m^{-3}$ and 10 $\mu g.m^{-3}$, respectively. Additionally, all annual mean air quality impacts caused by the operation of the standby generators at UP4, even after a 24-hour power outage, are predicted to be 'Negligible', with reference to EPUK and IAQM impact descriptors, which is not significant.

6.5.41 The largest process contribution is predicted at Receptor R3 (a residential unit at the former Nestle Site), where an annual mean $NO_2$ increase of 0.088 $\mu g.m^{-3}$ modelled; this is just 0.22% of the AQS.

6.5.42 Figure 6.10, below, displays the annual mean $NO_2$ process contribution from the testing and maintenance regime of UP4's generators, at ground level. Discrepancies between Figure 6.10 and Table 6.27 are due to some receptors being present at heights other than ground level.


**Figure 6.10 UP4 Annual Mean $NO_2$ Process Contribution – Power Outage**

6.5.43 Appendix 6.2 displays the above results against LBH's proposed annual mean $NO_2$ target of 10 µg.m$^{-3}$. Even against this stringent threshold, the majority of impacts are considered to be 'Negligible', which is not significant. Receptor R3 is predicted to experience a 'Moderately Adverse' impact, which is attributable to existing high baseline concentrations, rather than due to UP4 causing large increases in annual mean $NO_2$ concentrations. With this in mind, and noting that the impact is only predicted to occur at Receptor R3, it is considered reasonable to suggest that the Proposed Development is not causing a significantly adverse air quality impact, overall.

6.5.44 Table 6.28 below shows the predicted impacts of a 24 hour power outage at the Proposed Development on the hourly mean $NO_2$ AQS.

**Table 6.28 Predicted hourly mean concentrations with Proposed Development following a 24-hour power outage**

| Receptor ID | Predicted Baseline Concentration | Baseline Exceedances (out of an allowable 18) | Maximum Concentration with UP4 | UP4 Exceedances (out of an allowable 18) | Air Quality Impacts | |
|---|---|---|---|---|---|---|
| | | | | | Total Exceedances (out of an allowable 18) | Probability of Exceeding AQS |
| R1 | 93 | 0 | 93 | 0 | 0 | < 5% |
| R2 | 66 | 0 | 101 | 0 | 1 | < 5% |
| R3 | 75 | 0 | 202 | 1 | 3 | < 5% |
| R4 | 64 | 0 | 106 | 0 | 1 | < 5% |
| R5 | 47 | 0 | 51 | 0 | 0 | < 5% |
| R6 | 90 | 0 | 93 | 0 | 2 | < 5% |
| R7 | 69 | 0 | 85 | 0 | 1 | < 5% |
| R8 | 78 | 0 | 78 | 0 | 0 | < 5% |
| R9 | 110 | 0 | 120 | 0 | 0 | < 5% |
| R10 | 85 | 0 | 89 | 0 | 0 | < 5% |
| R11 | 58 | 0 | 61 | 0 | 0 | < 5% |
| R12 | 54 | 0 | 71 | 0 | 0 | < 5% |
| R13 | 68 | 0 | 68 | 0 | 0 | < 5% |
| R14 | 64 | 0 | 64 | 0 | 0 | < 5% |
| R15 | 60 | 0 | 63 | 0 | 0 | < 5% |
| R16 | 52 | 0 | 58 | 0 | 0 | < 5% |
| R17 | 52 | 0 | 58 | 0 | 0 | < 5% |
| R18 | 70 | 0 | 87 | 0 | 1 | < 5% |
| R19 | 113 | 0 | 130 | 0 | 0 | < 5% |
| R20 | 105 | 0 | 105 | 0 | 0 | < 5% |
| R21 | 61 | 0 | 128 | 0 | 1 | < 5% |
| R22 | 75 | 0 | 84 | 0 | 0 | < 5% |

*Note: The "Maximum Concentrations with UP4" have been calculated using hypergeometric distribution statistics, to estimate the absolute maximum (at the 95% confidence interval) across a 20-year period, caused by a 24-hr power outage. The percentile used in this case was the 99.91$^{st}$ percentile. Where 1 breach of the AQS at this percentile was identified, the 99.09$^{th}$ percentile was then used to determine the likelihood of the testing regime causing 2 breaches of the AQS, and so on, until no further breaches were predicted.*

6.5.45 Table 6.28 shows that hourly mean concentrations of $NO_2$ could exceed the short-term AQS of 200 µg.m$^{-3}$ once at Receptor R3, during a 24-hour power outage.

6.5.46 The results in Table 6.26 estimated that baseline air quality, UP1's testing regime and UP4's testing regime could collectively cause up to 2 breaches of the hourly mean AQS in a year. As such, when the results of Table 6.28 are added (i.e. with the contributions from a power outage at UP1 and UP4), receptors are anticipated to experience up to 3 breaches of the hourly mean AQS per year, out of an allowable 18. Consequently, the probability of the Proposed Development causing more than 18 exceedances is minimal, and its impacts on hourly mean $NO_2$ concentrations can be considered 'Negligible', which is not significant.

6.5.47 Figure 6.11, below, displays the predicted number of exceedances of the hourly $NO_2$ AQS caused after a 24-hour power outage at UP4's generators, at ground level. Discrepancies between Figure 6.11 and Table 6.28 are due to some receptors being present at heights other than ground level.

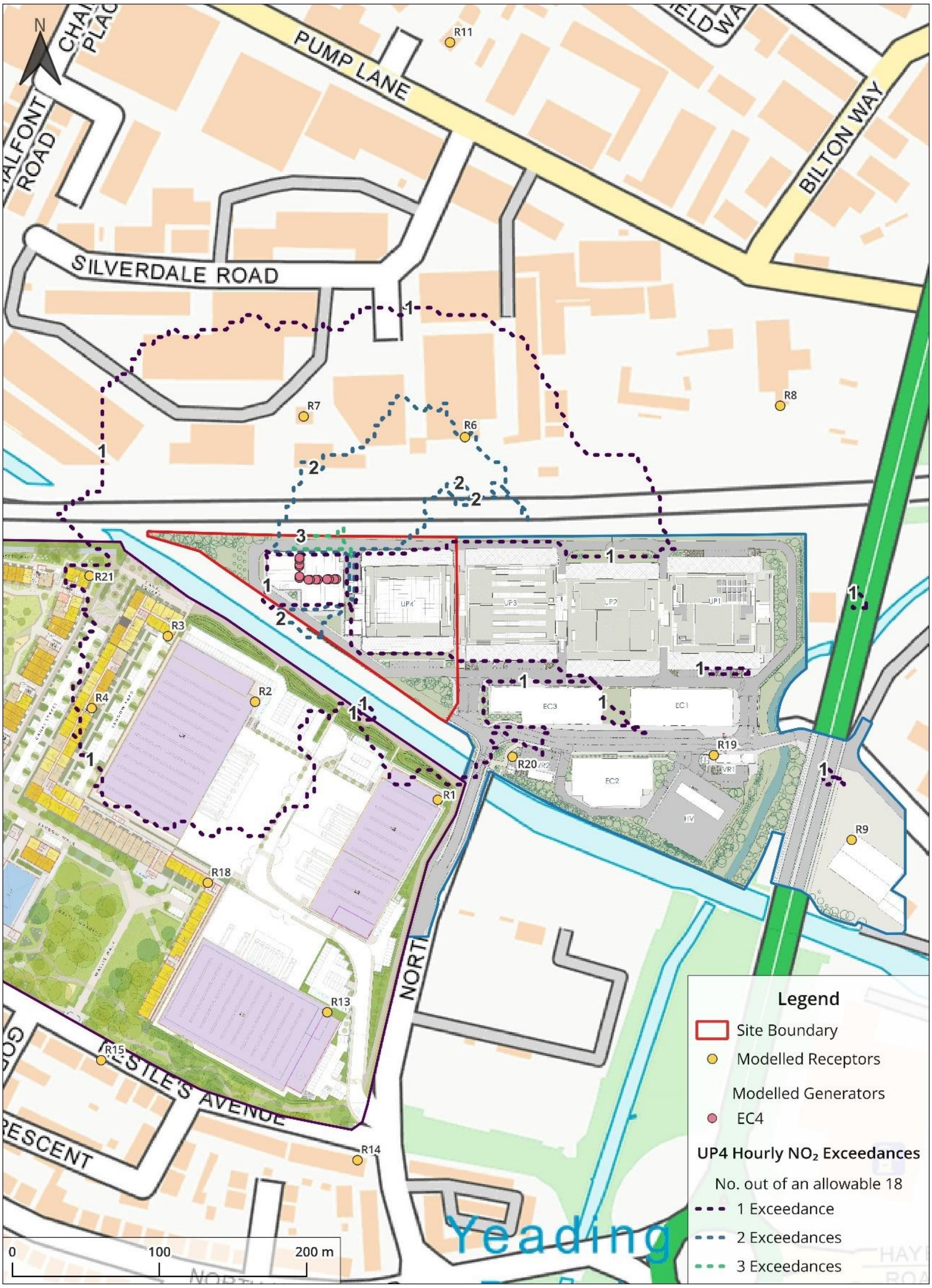


**Figure 6.11 UP4 No. of Hourly $NO_2$ AQS Exceedances at Ground Level – after Power Outage**

6.5.48 Figure 6.12, below, displays the predicted number of exceedances of the hourly $NO_2$ AQS after a 24-hour power outage at UP4's generators, at a height of 35m above ground level.

Discrepancies between Figure 6.12 and Table 6.28 are due to some receptors being present at heights other than ground level.

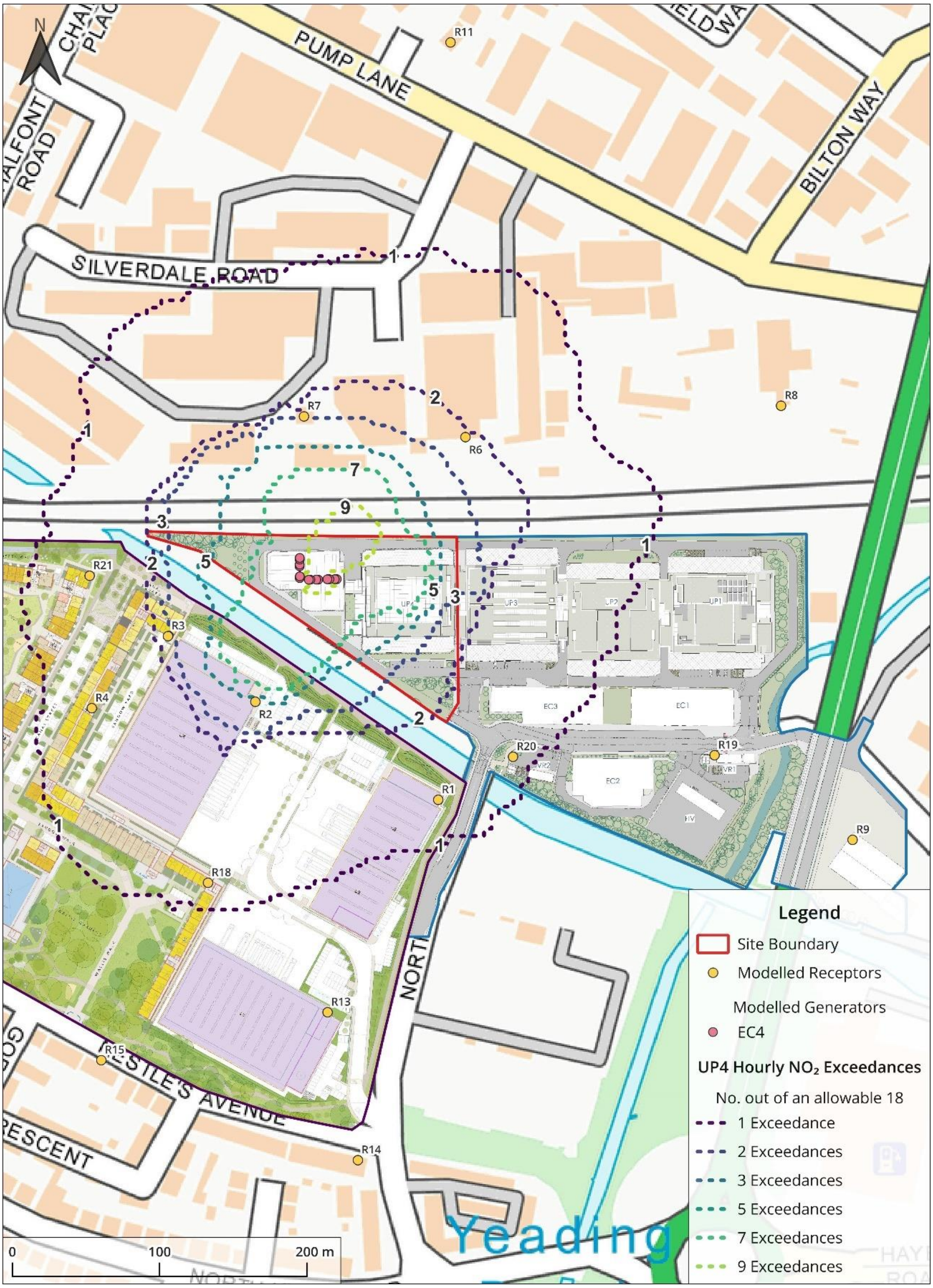


**Figure 6.12 UP4 No. of Hourly $NO_2$ AQS Exceedances at 35m – after Power Outage**

## 6.6 Additional Mitigation

### Construction Phase

6.6.1 The mitigation measures recommended in Appendix 6.5 will be included in the associated CEMP and can be secured via Planning Condition(s). Following the implementation of these measures, which are considered Inherent to the design of the Proposed Development, all construction-related air quality impacts are considered to be 'Negligible', which is not significant. As such, no Additional Mitigation is considered necessary.

### Operational Phase

***Air Quality Neutral***

6.6.2 London Plan[6] Policy SI1 stipulates the need for all developments to be at least 'Air Quality Neutral'. An Air Quality Neutral Assessment compares the expected emissions from both traffic generation and building emissions with benchmarked emissions for particular land-use classes. Emissions from buildings and transport are generally treated separately, with the intent that each should attain air quality neutrality.

6.6.3 The GLA's Air Quality Neutral Guidance[19] details the methodology for assessing whether a development meets Air Quality Neutral requirements and provides the necessary benchmarks to assess against. Where a development does not achieve Air Quality Neutrality, the guidance requests consideration be given to further mitigation to reduce either transport or building emissions.

<u>Transport Emissions</u>

6.6.4 Table 4.1 of the Air Quality Neutral Guidance[19] recommends benchmark trip rates for various land-use types. The Proposed Development is best considered against the 'Storage and distribution' land use, so is set a benchmark of 6.5 annual car trips.$m^{-2}$.$annum^{-1}$. The Proposed Development has a total gross internal area (GIA) of 18,910 $m^2$. As such, providing the Proposed Development does not generate more than 336 car trips per day, it is reasonable to consider it as Air Quality Neutral with respect to transport emissions.

6.6.5 The Transport Consultants for the Proposed Development have estimated a total daily trip rate of 52 vehicles. As this is well below the benchmark of 336 trips, the Proposed Development can be considered Air Quality Neutral with respect to transport emissions.

<u>Building Emissions</u>

6.6.6 Regarding emissions from standby generators, GLA's guidance states:

*"Backup plant installed for emergency and life safety power supply, such as diesel generators, may be excluded from the calculation of predicted building emissions. Normally, it would be expected that the use of these generators for anything other than an emergency and operational testing (less than 50 hours per year) would be prevented by planning condition. The NOx and particulate matter emissions of generators used for purposes other than an emergency, such as selling power into the national grid, must be included in Air Quality Neutral calculations"*.

6.6.7 The generators at the Proposed Development are installed for emergencies only and have limited runtimes, so it is reasonable to exclude the generators from the Air Quality Neutral calculations.

6.6.8 To further support this decision, GLA's guidance also states that its Air Quality Neutral policies only relate to aspects of a development which will not be controlled by an Environmental Permit. The adjacent data centres (UP1, UP2 and UP3) are all subject to Environmental Permits issued by the Environment Agency, so it is reasonable to expect that UP4 will also be subject to this.

6.6.9 It is understood that the Proposed Development will be all electric for heating and cooling, with the standby generators being the only source of on-site emissions. As such, the Proposed Development can be considered Air Quality Neutral with respect to building emissions.

6.6.10 As the Proposed Development is expected to be Air Quality Neutral with respect to both transport and building emissions, it is not considered necessary to consider additional mitigation measures. Nonetheless, it is understood that several measures will be in place to minimise transport emissions, as detailed in the submitted Travel Plan.

***Air Quality Positive***

6.6.11 In line with 'Policy DMEI 14: Air Quality' of the Local Plan[7] and the LBH AQAP[10], the Proposed Development is required to actively contribute towards the improvement of local air quality. To achieve this, LBH has requested that a damage cost calculation be undertaken to estimate the impact that emissions associated with the proposed development will have on society (e.g. adverse health outcomes). The calculated costs could then be secured via an S106 agreement, and it is expected that all funds would be spent by LBH on measures to improve local air quality.

6.6.12 The latest DEFRA guidance[25] advocates that a development's damage cost should be derived from estimates of changes in emissions of $NO_X$ and $PM_{2.5}$, over an appropriate appraisal period. Whilst it is common practice for appraisal periods to be 5 years, LBH requested a ten-year appraisal period for transport emissions for the permitted adjacent data centres (Ref: 75111/APP/2022/1007), so it is considered appropriate to assess a 10-year period here. Changes in transport and energy centre emissions were considered, and the full calculation is set out in Appendix 6.4.

6.6.13 The total annual building emissions from the development have been calculated based on the realistic testing schedules (+1.1% for likely additional maintenance activities), plus a 2-hour grid failure each year for the full appraisal period, as requested by LBH. The appraisal period for building emissions is 30 years, again in line with LBH's requirements of the adjacent permitted data centres.

<u>Transport Emissions Damage Cost</u>

6.6.14 The latest DEFRA guidance[25] and emissions factor toolkit (EFT v13)[26] were used to determine the total transport related emissions that would be generated by the proposed development. Full details of the calculation process are provided in Appendix 6.4.

6.6.15 The total transport-related damage costs are summarised as follows:

$NO_X$ emission 'damage' (cost, £) = £2,444 +

$PM_{2.5}$ emission 'damage' (cost, £) = £7,433

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[25] DEFRA (2023). Air Quality Appraisal: damage cost guidance. Available at https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance

[26] DEFRA (2025). Emissions Factor Toolkit v13.

TOTAL (cost, £) = **£9,877**

Standby Generator Emissions Damage Cost

6.6.16 Details of the methodology applied for the calculation of generator emissions are provided in Appendix 6.4.

6.6.17 The resultant Damage Costs (Central Present Values) over a 30-year period are presented below:

$NO_X$ emission 'damage' (cost, £) = £45,272 +

$PM_{2.5}$ emission 'damage' (cost, £) = £24,419

TOTAL (cost, £) = **£69,691**

## 6.7 Residual effects

### Construction Phase

6.7.1 The mitigation measures recommended in Appendix 6.5 will be included in the associated CEMP and can be secured via Planning Condition. Following the implementation of these measures, which are considered Inherent to the design of the Proposed Development, all construction-related air quality impacts are considered to be 'Negligible', which is not significant.

### Operational Phase

6.7.2 The need to quantitatively assess emissions from vehicle trips generated by the Proposed Development has been scoped out of this ES; an approach agreed by LBH, as additional vehicle movements associated with this Data Centre is below relevant screening criteria prescribed in IAQM guidance[13]. As such, it is reasonable to consider the air quality impacts of vehicle emissions generated by the Proposed Development to be 'Negligible', which is not significant. Further mitigation measures, in the form of a financial contribution to LBH (see the above Air Quality Positive section) and those listed in the submitted Travel Plan, are proposed. These measures will act to further reduce the Proposed Development's incremental vehicle-related impacts on air quality, further increasing the likelihood that the associated residual effects are 'Negligible', which is not significant.

6.7.3 This air quality assessment has identified that the Proposed Development's standby generators will have a 'Negligible' effect on all modelled receptors, with respect to all relevant $NO_2$, $PM_{10}$ and $PM_{2.5}$ AQSs, which is not significant. Nonetheless, further mitigation in the form of a financial contribution to LBH (see the above Air Quality Positive section) is proposed, which will further increase the likelihood that the associated residual effects are 'Negligible', which is not significant.

## 6.8 Implications of Climate Change

6.8.1 The Proposed Development will be connected to an electrical grid supply which currently has excellent reliability (99.999605% availability). Therefore, it is extremely unlikely that the Proposed Development would ever experience a prolonged power outage (requiring the use of the standby generators) in the absence of climate change impacts.

6.8.2 Between the 20th and 21st of March 2025, an electrical fire at the North Hyde substation which serves the local area, the Union Park Data Centre Campus and Heathrow Airport, destroyed one of the 275/66 kV NG transformers. This led to a power outage at the Union Park Data Centre Campus, and the associated standby generators were in operation for up to 18 hours. It is important to note that despite the extremity and rarity of the event that led to the power outage, the standby generators still operate for less than 18 hours, demonstrating the resilience of the substation in handling such events currently.

6.8.3 In January 2022, the UK Energy Research Centre provided written evidence[27] to UK Parliament regarding the resilience of the UK's electricity system to climate change. The general consensus is that climate change will lead to increased precipitation, higher average temperatures and potentially more extreme weather events across the UK. Extreme weather events that bring strong winds, prolonged heatwaves and flooding during high rainfall are all considered capable of putting pressure on electricity grid systems, which could lead to an increased probability of power outage events.

6.8.4 However, this air quality assessment has already considered a 24-hour power outage event and has predicted that air quality effects caused by the extended operation of the standby generators would be 'Negligible', which is not significant. Consequently, it is deemed reasonable to state that prolonged power outages at this Proposed Development would not pose a significant risk to local air quality and, therefore, the Proposed Development can be considered appropriately resilient to climate change from an air quality perspective.

## 6.9 Cumulative effects

### Construction Phase

6.9.1 The impact of dust generated by the Proposed Development and other cumulative schemes has the potential to have a cumulative impact where receptors are located within 250m of the Site and any other nearby construction projects. However, with the implementation of the mitigation measures already recommended within Appendix 6.5, there should be no significant cumulative dust effects, providing adjacent construction sites also implement an appropriate level of mitigation.

### Operational Phase

6.9.2 This air quality assessment has so far considered the air quality effects associated with the Proposed Development, giving due consideration to air quality emissions generated by existing pollutant sources in the local area, including UP1's standby generators on the Union Park campus.

6.9.3 However, in addition to UP1 and the Proposed Development (UP4) are two committed Data Centre developments, also located on the Union Park campus. Their locations are presented in Figure 2.1 and details of their testing regimes are shown in Table 6.4 and Table 6.5.

6.9.4 Although it is unlikely that more than a total of 14 No. generators would operate across all four energy centres at any one time, it is appreciated that each energy centre's testing regime could contribute to some hourly exceedances of the short-term $NO_2$ AQS (200 $\mu g.m^{-3}$, not to be exceeded more than 18 times per year). Such exceedances should be considered additively in the assessment to identify whether each of the four testing regimes could cumulatively lead to a total of 19 or more exceedances of the AQS.

[27] UKERC (2022). Written evidence submitted by UK Energy Research Centre. Available at https://committees.parliament.uk/writtenevidence/42389/html/

6.9.5 Their emissions will also collectively contribute to long-term increases in $NO_2$, $PM_{10}$ and $PM_{2.5}$, so a cumulative assessment of all four testing regimes against the relevant long-term AQSs should be undertaken.

6.9.6 Notwithstanding the efforts to avoid simultaneous maintenance and testing of standby generators, grid failure incidents could lead to the operation of all generators across all four energy centres at the same time. Therefore, cumulative air quality effects during grid failures should be considered, against relevant AQSs for $NO_2$ and PM.

***Testing and Maintenance***

6.9.7 For the assessment of annual mean impacts, the cumulative emissions generated by each data centre on the Union Park campus has been considered, to reflect the combined influence of all planned testing and maintenance regimes on local air quality.

6.9.8 For the assessment of hourly mean $NO_2$ impacts, the number of breaches of the hourly AQS caused by testing regimes of all four data centres were tallied to estimate the maximum likely number of breaches (out of an allowable 18) caused by the whole campuses testing regime, in a year. Results are equivalent to a predicted 1 in 20-year event (i.e. the 95% confidence interval).

6.9.9 Table 6.29 below shows the predicted impacts of the Proposed Development's testing regime (+1.1% of hours to account for additional likely maintenance activities) on annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations, cumulatively with UP2 and UP3. Modelled receptors not included in the below table represent locations where the annual mean AQS should not apply, according to relevant guidance.

**Table 6.29 Predicted annual mean concentrations with Proposed Development and cumulative Data Centre developments following routine testing and maintenance**

| Receptor ID | Annual Mean Concentrations ($\mu g.m^{-3}$) | | Air Quality Impact | | | |
|---|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | UP2 and UP3 Process Contributions | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| | $NO_2$ | | | | | |
| R3 | 21.97 | 0.047 | 0.018 | 22.04 | 0.16 | Negligible |
| R4 | 21.89 | 0.022 | 0.018 | 21.93 | 0.10 | Negligible |
| R5 | 20.42 | 0.002 | 0.008 | 20.43 | 0.02 | Negligible |
| R11 | 22.15 | 0.011 | 0.017 | 22.18 | 0.07 | Negligible |
| R12 | 21.73 | 0.020 | 0.012 | 21.76 | 0.08 | Negligible |
| R14 | 22.69 | 0.004 | 0.039 | 22.73 | 0.11 | Negligible |
| R15 | 22.31 | 0.009 | 0.020 | 22.34 | 0.07 | Negligible |
| R16 | 21.44 | 0.002 | 0.012 | 21.46 | 0.03 | Negligible |
| R17 | 21.22 | 0.002 | 0.010 | 21.24 | 0.03 | Negligible |
| R18 | 22.03 | 0.020 | 0.030 | 22.08 | 0.12 | Negligible |
| R21 | 22.05 | 0.019 | 0.013 | 22.09 | 0.08 | Negligible |
| R22 | 23.48 | 0.003 | 0.032 | 23.52 | 0.09 | Negligible |
| | $PM_{10}$ | | | | | |
| R3 | 14.44 | 0.001 | 0.001 | 14.44 | 0.005 | Negligible |

| Receptor ID | Annual Mean Concentrations (µg.m$^{-3}$) | | Air Quality Impact | | | |
|---|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | UP2 and UP3 Process Contributions | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| R4 | 14.39 | 0.000 | 0.001 | 14.39 | 0.003 | Negligible |
| R5 | 14.26 | 0.000 | 0.000 | 14.26 | 0.001 | Negligible |
| R11 | 14.76 | 0.000 | 0.001 | 14.76 | 0.003 | Negligible |
| R12 | 14.56 | 0.000 | 0.001 | 14.56 | 0.002 | Negligible |
| R14 | 14.75 | 0.000 | 0.002 | 14.75 | 0.006 | Negligible |
| R15 | 14.52 | 0.000 | 0.001 | 14.52 | 0.003 | Negligible |
| R16 | 14.60 | 0.000 | 0.001 | 14.61 | 0.002 | Negligible |
| R17 | 14.39 | 0.000 | 0.001 | 14.39 | 0.001 | Negligible |
| R18 | 14.41 | 0.000 | 0.002 | 14.41 | 0.005 | Negligible |
| R21 | 14.44 | 0.000 | 0.001 | 14.45 | 0.003 | Negligible |
| R22 | 15.49 | 0.000 | 0.002 | 15.49 | 0.005 | Negligible |
| | $PM_{2.5}$ | | | | | |
| R3 | 9.27 | 0.001 | 0.001 | 9.27 | 0.02 | Negligible |
| R4 | 9.24 | 0.001 | 0.000 | 9.24 | 0.01 | Negligible |
| R5 | 9.15 | 0.000 | 0.000 | 9.15 | 0.00 | Negligible |
| R11 | 9.42 | 0.001 | 0.000 | 9.42 | 0.01 | Negligible |
| R12 | 9.28 | 0.001 | 0.001 | 9.28 | 0.02 | Negligible |
| R14 | 9.40 | 0.002 | 0.000 | 9.40 | 0.02 | Negligible |
| R15 | 9.31 | 0.001 | 0.000 | 9.31 | 0.01 | Negligible |
| R16 | 9.31 | 0.001 | 0.000 | 9.31 | 0.01 | Negligible |
| R17 | 9.24 | 0.001 | 0.000 | 9.24 | 0.01 | Negligible |
| R18 | 9.26 | 0.001 | 0.000 | 9.27 | 0.02 | Negligible |
| R21 | 9.26 | 0.001 | 0.000 | 9.27 | 0.01 | Negligible |
| R22 | 9.65 | 0.002 | 0.000 | 9.65 | 0.02 | Negligible |

*Note: Any discrepancies due to rounding.*

6.9.10 Table 6.29 shows that annual mean concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ are all predicted to be below the relevant AQSs of 40 µg.m$^{-3}$, 40 µg.m$^{-3}$ and 10 µg.m$^{-3}$, respectively. Additionally, all annual mean air quality impacts caused by the operation of the standby generators at UP4, in-combination with standby generators emissions produced by UP2 and UP3, are predicted to be 'Negligible', with reference to EPUK and IAQM impact descriptors, which is not significant.

6.9.11 The largest process contribution is predicted at Receptor R3 (a residential unit at the former Nestle Site), where an annual mean $NO_2$ increase of 0.065 µg.m$^{-3}$ was modelled; this is just 0.16% of the AQS.

6.9.12 Table 6.30 below shows the predicted impacts of the Proposed Development's testing regime (+1.1% of hours to account for additional likely maintenance activities) on the hourly mean $NO_2$ AQS, cumulatively with UP2 and UP3.

**Table 6.30 Predicted hourly mean concentrations with Proposed Development and cumulative Data Centre developments following routine testing and maintenance**

| Receptor ID | Baseline Exceedances (out of an allowable 18) | UP4 Exceedances (out of an allowable 18) | Maximum Concentration with UP2 and UP3 | UP2 and UP3 Exceedances (out of an allowable 18) | Air Quality Impacts | |
|---|---|---|---|---|---|---|
| | | | | | Total Exceedances (out of an allowable 18) | Probability of Exceeding AQS |
| R1 | 0 | 0 | 471 | 1 | 1 | < 5% |
| R2 | 0 | 1 | 191 | 0 | 1 | < 5% |
| R3 | 0 | 2 | 142 | 0 | 2 | < 5% |
| R4 | 0 | 1 | 133 | 0 | 1 | < 5% |
| R5 | 0 | 0 | 59 | 0 | 0 | < 5% |
| R6 | 0 | 2 | 240 | 1 | 3 | < 5% |
| R7 | 0 | 1 | 174 | 0 | 1 | < 5% |
| R8 | 0 | 0 | 202 | 1 | 1 | < 5% |
| R9 | 0 | 0 | 217 | 1 | 1 | < 5% |
| R10 | 0 | 0 | 172 | 0 | 0 | < 5% |
| R11 | 0 | 0 | 103 | 0 | 0 | < 5% |
| R12 | 0 | 0 | 87 | 0 | 0 | < 5% |
| R13 | 0 | 0 | 171 | 0 | 0 | < 5% |
| R14 | 0 | 0 | 138 | 0 | 0 | < 5% |
| R15 | 0 | 0 | 119 | 0 | 0 | < 5% |
| R16 | 0 | 0 | 73 | 0 | 0 | < 5% |
| R17 | 0 | 0 | 71 | 0 | 0 | < 5% |
| R18 | 0 | 1 | 163 | 0 | 1 | < 5% |
| R19 | 0 | 0 | 338 | 1 | 1 | < 5% |
| R20 | 0 | 0 | 386 | 1 | 1 | < 5% |
| R21 | 0 | 1 | 116 | 0 | 1 | < 5% |
| R22 | 0 | 0 | 138 | 0 | 0 | < 5% |

*Note: The "Maximum Concentrations with UP2 and UP3" have been calculated using hypergeometric distribution statistics, to estimate the absolute maximum (at the 95% confidence interval) across a 20-year period, caused by routine testing and maintenance. UP3's percentiles are identical to those used for UP4, as the testing regimes are the same. UP2's percentiles are identical to those used for UP1, as the testing regimes are the same.*

6.9.13 Table 6.30 shows that hourly mean concentrations of $NO_2$ could exceed the short-term AQS of 200 µg.m$^{-3}$ at several modelled receptor locations.

6.9.14 It is anticipated that baseline conditions are not leading to any breaches of the AQS at any of the modelled receptor locations. As such, when combined with the contributions from UP2, UP3 and UP4, no receptor is anticipated to experience more than 3 breaches (at R6, a commercial unit to the north of the Site) of the hourly mean AQS per year, out of an allowable 18. Consequently, the probability of the Proposed Development causing more than 18 exceedances cumulatively with other committed developments is minimal, and its impacts on hourly mean $NO_2$ concentrations can be considered 'Negligible', which is not significant.

***Power Outage Scenario***

6.9.15 For the assessment of annual mean impacts, the emissions generated during a 24-hour power outage are added to the annual mean contributions from all Union Park campus Data Centre testing regimes, to reflect the combined influence of planned testing and maintenance on local air quality, with an additional 24-hour power outage effecting UP1, UP2, UP3 and UP4.

6.9.16 For the assessment of hourly mean $NO_2$ impacts, the number of breaches of the hourly AQS caused by the power outage is added to those caused during all Union Park campus Data Centre testing regimes to estimate the maximum likely number of breaches (out of an allowable 18) caused by the Proposed Development, cumulatively with the other Data Centres, in a year, following a power outage. Results are equivalent to a predicted 1 in 20-year event (i.e. the 95% confidence interval).

6.9.17 Table 6.31 below shows the predicted impacts of a 24-hour power outage at the Proposed Development on annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations, cumulatively with the other Data Centres on the Union Park campus. Modelled receptors not included in the below table represent locations where the annual mean AQS should not apply, according to relevant guidance.

**Table 6.31 Predicted annual mean concentrations with Proposed Development and cumulative Data Centre developments following a 24-hour power outage**

| Receptor ID | Annual Mean Concentrations ($\mu g.m^{-3}$) | | Air Quality Impact | | | |
|---|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | UP2 and UP3 Process Contributions | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| | $NO_2$ | | | | | |
| R3 | 21.98 | 0.088 | 0.027 | 22.09 | 0.29 | Negligible |
| R4 | 21.90 | 0.041 | 0.026 | 21.96 | 0.17 | Negligible |
| R5 | 20.43 | 0.004 | 0.013 | 20.44 | 0.04 | Negligible |
| R11 | 22.15 | 0.021 | 0.027 | 22.20 | 0.12 | Negligible |
| R12 | 21.73 | 0.025 | 0.017 | 21.77 | 0.10 | Negligible |
| R14 | 22.70 | 0.007 | 0.059 | 22.76 | 0.16 | Negligible |
| R15 | 22.31 | 0.017 | 0.031 | 22.36 | 0.12 | Negligible |
| R16 | 21.45 | 0.004 | 0.018 | 21.47 | 0.06 | Negligible |
| R17 | 21.23 | 0.003 | 0.015 | 21.24 | 0.05 | Negligible |
| R18 | 22.04 | 0.038 | 0.047 | 22.12 | 0.21 | Negligible |
| R21 | 22.06 | 0.036 | 0.021 | 22.11 | 0.14 | Negligible |
| R22 | 23.49 | 0.006 | 0.048 | 23.54 | 0.13 | Negligible |
| | $PM_{10}$ | | | | | |
| R3 | 14.44 | 0.004 | 0.002 | 14.44 | 0.013 | Negligible |
| R4 | 14.39 | 0.004 | 0.002 | 14.39 | 0.013 | Negligible |
| R5 | 14.26 | 0.002 | 0.001 | 14.26 | 0.007 | Negligible |
| R11 | 14.76 | 0.001 | 0.004 | 14.77 | 0.011 | Negligible |
| R12 | 14.56 | 0.001 | 0.001 | 14.56 | 0.006 | Negligible |
| R14 | 14.75 | 0.001 | 0.004 | 14.76 | 0.012 | Negligible |
| R15 | 14.52 | 0.001 | 0.003 | 14.52 | 0.008 | Negligible |
| R16 | 14.60 | 0.001 | 0.001 | 14.61 | 0.005 | Negligible |
| R17 | 14.39 | 0.000 | 0.001 | 14.39 | 0.003 | Negligible |
| R18 | 14.41 | 0.002 | 0.003 | 14.42 | 0.011 | Negligible |
| R21 | 14.45 | 0.001 | 0.006 | 14.45 | 0.017 | Negligible |

| Receptor ID | Annual Mean Concentrations (µg.m-3) | | Air Quality Impact | | | |
|---|---|---|---|---|---|---|
| | Baseline Concentration | UP4 Process Contribution | UP2 and UP3 Process Contributions | Predicted Total Concentration | Change as % of AQS | Impact Descriptor |
| R22 | 15.49 | 0.001 | 0.003 | 15.50 | 0.009 | Negligible |
| | $PM_{2.5}$ | | | | | |
| R3 | 9.27 | 0.003 | 0.002 | 9.27 | 0.05 | Negligible |
| R4 | 9.24 | 0.004 | 0.001 | 9.25 | 0.05 | Negligible |
| R5 | 9.15 | 0.002 | 0.001 | 9.15 | 0.02 | Negligible |
| R11 | 9.42 | 0.001 | 0.003 | 9.43 | 0.04 | Negligible |
| R12 | 9.28 | 0.002 | 0.001 | 9.29 | 0.03 | Negligible |
| R14 | 9.40 | 0.002 | 0.002 | 9.41 | 0.04 | Negligible |
| R15 | 9.31 | 0.001 | 0.002 | 9.31 | 0.03 | Negligible |
| R16 | 9.31 | 0.001 | 0.001 | 9.31 | 0.02 | Negligible |
| R17 | 9.24 | 0.001 | 0.001 | 9.24 | 0.01 | Negligible |
| R18 | 9.26 | 0.003 | 0.002 | 9.27 | 0.04 | Negligible |
| R21 | 9.27 | 0.001 | 0.006 | 9.27 | 0.07 | Negligible |
| R22 | 9.65 | 0.003 | 0.001 | 9.66 | 0.03 | Negligible |

*Note: Any discrepancies due to rounding. "Baseline Concentration" results include 24-hours' worth of power outages at UP1.*

6.9.18 Table 6.31 shows that annual mean concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ are all predicted to be below the relevant AQSs of 40 µg.m$^{-3}$, 40 µg.m$^{-3}$ and 10 µg.m$^{-3}$, respectively. Additionally, all annual mean air quality impacts caused by the operation of the standby generators at UP4, even after a 24-hour power outage and cumulatively with UP2 and UP3, are predicted to be 'Negligible', with reference to EPUK and IAQM impact descriptors, which is not significant.

6.9.19 The largest process contribution is predicted at Receptor R3 (a residential unit at the former Nestle Site), where an annual mean $NO_2$ increase of 0.115 µg.m$^{-3}$ was modelled; this is just 0.29% of the AQS.

6.9.20 Table 6.32 below shows the predicted impacts of a power outage at the Proposed Development on the hourly mean $NO_2$ AQS, cumulatively with the other Data Centres on the Union Park campus.

**Table 6.32 Predicted hourly mean concentrations with Proposed Development and cumulative Data Centre developments following a 24-hour power outage**

| Receptor ID | Baseline Exceedances (out of an allowable 18) | UP2, UP3 and UP4 Testing and Maintenance Exceedances (out of an allowable 18) | Maximum Concentration with all Data Centres | UP2, UP3 and UP4 Power Outage Exceedances (out of an allowable 18) | Air Quality Impacts | |
|---|---|---|---|---|---|---|
| | | | | | Total Exceedances (out of an allowable 18) | Probability of Exceeding AQS |
| R1 | 0 | 1 | 204 | 1 | 2 | < 5% |
| R2 | 0 | 1 | 123 | 0 | 1 | < 5% |

| Receptor ID | Baseline Exceedances (out of an allowable 18) | UP2, UP3 and UP4 Testing and Maintenance Exceedances (out of an allowable 18) | Maximum Concentration with all Data Centres | UP2, UP3 and UP4 Power Outage Exceedances (out of an allowable 18) | Air Quality Impacts | |
|---|---|---|---|---|---|---|
| | | | | | Total Exceedances (out of an allowable 18) | Probability of Exceeding AQS |
| R3 | 0 | 2 | 202 | 1 | 3 | < 5% |
| R4 | 0 | 1 | 111 | 0 | 1 | < 5% |
| R5 | 0 | 0 | 64 | 0 | 0 | < 5% |
| R6 | 0 | 3 | 143 | 0 | 3 | < 5% |
| R7 | 0 | 1 | 123 | 0 | 1 | < 5% |
| R8 | 0 | 1 | 124 | 0 | 1 | < 5% |
| R9 | 0 | 1 | 183 | 0 | 1 | < 5% |
| R10 | 0 | 0 | 134 | 0 | 0 | < 5% |
| R11 | 0 | 0 | 84 | 0 | 0 | < 5% |
| R12 | 0 | 0 | 93 | 0 | 0 | < 5% |
| R13 | 0 | 0 | 120 | 0 | 0 | < 5% |
| R14 | 0 | 0 | 105 | 0 | 0 | < 5% |
| R15 | 0 | 0 | 94 | 0 | 0 | < 5% |
| R16 | 0 | 0 | 72 | 0 | 0 | < 5% |
| R17 | 0 | 0 | 75 | 0 | 0 | < 5% |
| R18 | 0 | 1 | 134 | 0 | 1 | < 5% |
| R19 | 0 | 1 | 192 | 0 | 1 | < 5% |
| R20 | 0 | 1 | 163 | 0 | 1 | < 5% |
| R21 | 0 | 1 | 150 | 0 | 1 | < 5% |
| R22 | 0 | 0 | 131 | 0 | 0 | < 5% |

*Note: The "Maximum Concentrations with UP4" have been calculated using hypergeometric distribution statistics, to estimate the absolute maximum (at the 95% confidence interval) across a 20-year period, caused by a 24-hr power outage. The percentile used in this case was the 99.91$^{st}$ percentile. Where 1 breach of the AQS at this percentile was identified, the 99.09$^{th}$ percentile was then used to determine the likelihood of the testing regime causing 2 breaches of the AQS, and so on, until no further breaches are predicted.*

6.9.21 Table 6.32 shows that hourly mean concentrations of $NO_2$ could exceed the short-term AQS of 200 µg.m$^{-3}$ once at Receptors R1 and R3, during a 24-hour power outage across all four Data Centres at the Union Park campus.

6.9.22 The results in Table 6.30 estimated that baseline air quality and the testing regimes of the Union Park Data Centres could collectively cause up to 3 breaches of the hourly mean AQS in a year. When the results of Table 6.32 are added (i.e. with the contributions from a power outage at all four Data Centres), it remains that no receptor is anticipated to experience more than 3 breaches of the hourly mean AQS per year, out of an allowable 18. Consequently, the probability of the Proposed Development causing more than 18 exceedances is minimal, and its impacts on hourly mean $NO_2$ concentrations can be considered 'Negligible', which is not significant.

## 6.10 Summary

6.10.1 An air quality assessment has been carried out to consider the air quality effects associated with the Proposed Development, considering emissions of dust from demolition and construction activities, and emissions from planned and unplanned operation of the proposed standby generators.

6.10.2 The assessment followed relevant methodologies prescribed for the assessment of air quality. The air quality consultants established the base levels of existing and future air quality and set the parameters against which any significant effects were assessed.

6.10.3 The impacts of demolition and construction activities were assessed using the IAQM's risk-based approach, to consider the risk of dust emissions on statutory nuisance, human health, and ecological sites. In the absence of any mitigation, construction dust emissions were considered to present a Medium Risk of dust soiling effects during demolition and construction. This was due primarily to the scale of the development and proximity to existing residences. The demolition and construction phases were considered to present a Low Risk to $PM_{10}$ health effects. The construction phase was considered to present a Negligible Risk to ecological sites. Mitigation measures proposed to address the construction impacts are set out in Appendix 6.5 and include various measures to be included in the Construction Environmental Management Plan (CEMP). Following the implementation of these measures, it is anticipated that the proposed development's dust-related effects would be reduced to Negligible, which is not significant.

6.10.4 The operational phase of the completed development was assessed quantitatively for the predicted air quality impacts caused by the planned and unplanned operation of the Proposed Development's standby generators, using detailed atmospheric dispersion modelling. The assessment has indicated that the Proposed Development will lead to incremental increases in annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations across the local area; all annual mean increases were considered to be Negligible, which is not significant. The Proposed Development was also assessed against the hourly $NO_2$ AQS (200 $\mu g.m^{-3}$ not to be exceeded more than 18 times per year), with results indicating that no sensitive receptor in the local area would experience more than 3 breaches of this AQS (out of an allowable 18) due to the Proposed Development's operation; this is the case even if an unlikely 24-hour power outage occurred each year. As all modelled receptors are predicted to experience considerably fewer than 18 breaches of the hourly $NO_2$ AQS per year, the Proposed Development can be considered to have a Negligible impact on hourly $NO_2$ concentrations, which is not significant.

6.10.5 Cumulative effects have been considered and are deemed to have no material influence on the conclusions of insignificance drawn in this assessment.

6.10.6 Following the incorporation of suitable mitigation measures it is anticipated that there will be no significant residual effects in relation to air quality, during both the construction and operational phases of the proposed development.

6.10.7 A summary of the assessment is set out in Table 6.33.

## 6.11 References

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- [26] DEFRA (2025). Emissions Factor Toolkit v13.

- [27] UKERC (2022). Written evidence submitted by UK Energy Research Centre. Available at https://committees.parliament.uk/writtenevidence/42389/html/

### Table 6.33 Summary of effects

| Receptor | Receptor sensitivity | Description of potential impact | Proposed mitigation | Residual effect | Significant / not significant |
|---|---|---|---|---|---|
| **Construction Phase** | | | | | |
| Existing human receptors, as listed in Table 6.23. | High and Medium Sensitivity (see Table 6.23). | Dust nuisance and $PM_{10}$ health effects. | Dust mitigation as listed in Appendix 6.5, to be included in the CEMP and secured via Planning Condition. | Negligible | Not Significant |
| Existing ecological receptors, as described in Paragraph 6.5.21. | Negligible | Ecological dust effects. | Dust mitigation as listed in Appendix 6.5, to be included in the CEMP and secured via Planning Condition. | Negligible | Not Significant |
| **Operation Phase** | | | | | |
| Existing Human Receptors, as listed in Table 6.6. | High Sensitivity | Standby generator $NO_2$, $PM_{10}$ and $PM_{2.5}$ emission effects on existing receptors in the local area. | Air Quality Damage Cost financial contribution of £79,568. | Negligible | Not Significant |