HOARE LEA

Hampstead Generator Installation.

Client:	Fleet Street LLC
Date:	24 June 2024
File ref:	3422537-HLE-RP-AQ-Generator Technical Note-Rev02.docx

Hampstead Generator Installation Air Quality Technical Note.

1. Introduction.

This Air Quality Design Note has been prepared on behalf of Fleet Street LLC to assess the air quality impacts from one proposed backup generator at the residential development (the 'Development') located in Hampstead, London (the 'Site') on local air quality both at the Development and in the surrounding area.

The Site is located within the London Borough of Camden (LBoC) administrative area at the approximate National Grid Reference (NGR): X 526570 Y 185410. The location of the Site is shown in Figure 1.

This proposed backup generator will provide backup power to the Development if there were to be a power failure at the Site. Moreover, this Air Quality Technical Note has assumed that the backup generator will use diesel fuel as a worst-case scenario.

This Air Quality Technical Note references the relevant national, regional, and local policy requirements and guidance with regard to combustion emissions, reviews the baseline air quality for the Site, reviews the proposed backup generator design and quantitatively assesses, using dispersion modelling, the potential for significant effects of backup generator on the existing air quality.

1.1 Site Context

Site is adjacent to Fitzjohn's Avenue to the west with residential and educational properties directly to the north and south of the Site. The A502 (Rosslyn Hill) is located further to the north and east of the Site. There are buildings consisting of a mixture of both residential and educational properties located in the locale of the Site in all directions.

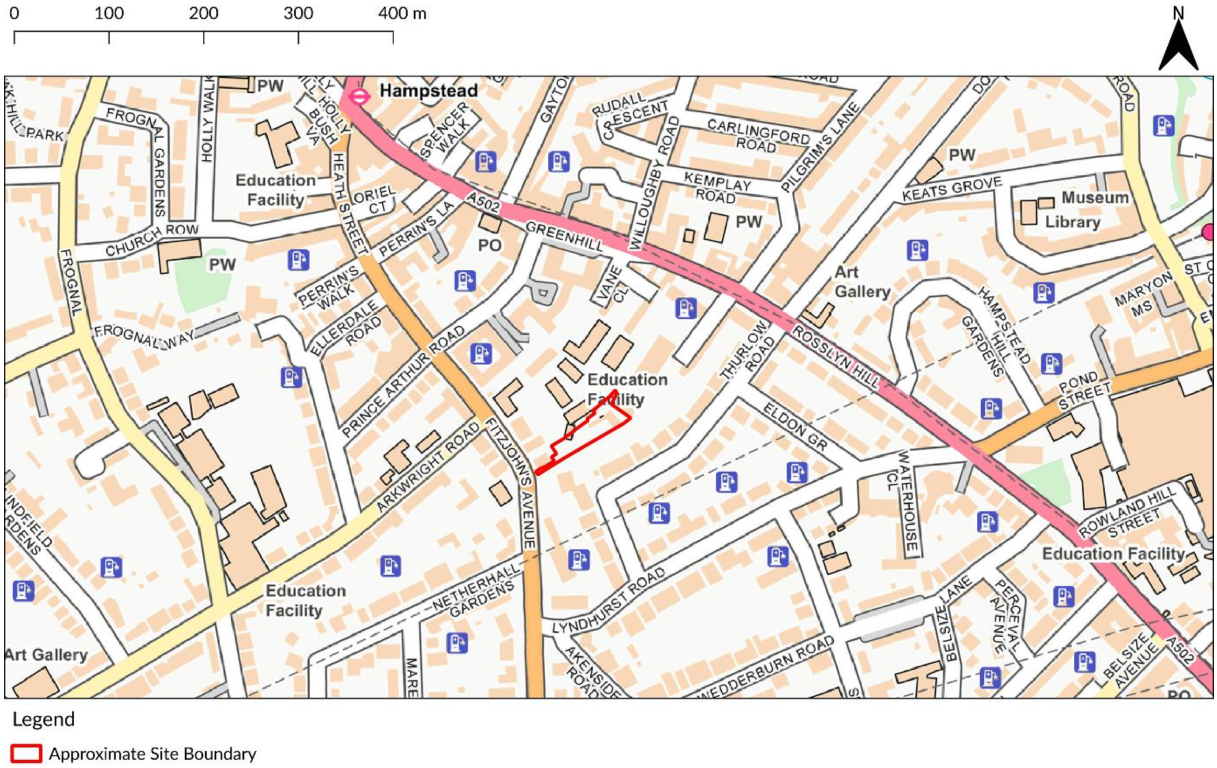

Figure 1: Location of the Site. Contains OS Data © Crown Copyright and Database rights 2024.

2. Legislation, Policy and Guidance Documents.

2.1 Relevant Objectives.

The Air Quality Objectives (AQOs) for use by local authorities are prescribed within the Air Quality (England) Regulations 2000[1], and the Air Quality (England) (Amendment) Regulations 2002[2].

The AQOs for Nitrogen Dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) are set out in Table 1. The AQOs for NO_2, PM_{10} and $PM_{2.5}$ were to have been achieved by 2005, 2004 and 2020 respectively and continue to apply in all future years thereafter.

Table 1: Air Quality Standards: Air Quality Objectives and WHO Guidelines

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO_2)	1-hour Mean	200 µg/m^3 Not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
Fine Particles (PM_{10})†	24-hour Mean	50 µg/m^3 Not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3
Fine Particles ($PM_{2.5}$)†	Annual Mean	20 µg/m^3
World Health Organisation (WHO) Guidelines (2005)		
Nitrogen Dioxide (NO_2)	Annual Mean	40 µg/m^3
Fine Particulate Matter (PM_{10})†	Annual Mean	20 µg/m^3
Fine Particulate Matter ($PM_{2.5}$) †	Annual Mean	10 µg/m^3
Notes: †Measured gravimetrically *The time period in LLAQM.TG(19) states "Work towards reducing emissions/concentrations of fine particulate matter ($PM_{2.5}$)"		

The Environment Act 2021[3] acts as the UK's new framework of environmental protection and came into force on 1st April 2022. With regard to air quality, the Environment Act established a legally binding duty on government to bring forward at least two new air quality targets This was implemented through the Environmental Improvement Plan 2023, which outlines new $PM_{2.5}$ targets for future years. These are a long term target of 10 µg/m^3 by 2040 and an interim target of 12 µg/m^3 by 31st January 2028.

In addition, the WHO has produced air quality guidelines[4] to offer global guidance on thresholds and limits for key air pollutants that pose health risks. As stated in the London Plan 2021, 'existing poor air quality' should be taken into consideration where legal limits for any pollutant, or WHO targets for particulate matter, are already exceeded or are within 5% of these limits.

---

[1] The Stationery Office (2000) Statutory Instrument 2000, No 928, The Air Quality (England) Regulations 2000, London

[2] The Stationery Office (2002) Statutory Instrument 2002, No 3043, The Air Quality (England) (Amendment) Regulations 2002, London

[3] UKAIR (2022) Air Quality Targets in the Environment Act – [online] (Last Accessed: 22/05/2024), Available at: https://uk-air.defra.gov.uk/library/air-quality-targets#:~:text=The%20Environment%20Act%202021%20establishes,Environment%20Act%20(Part%201).

[4] World Health Organisation (2005) WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide – [online] (Last accessed: 22/05/2024), Available at: apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf;jsessionid=66E22FDBE284CBF2CA8161756C3FF958?sequence=1

2.2 Regulation, Policies and Guidance.

The following regulation, policies and guidance documents are relevant and have been considered when drafting this Air Quality Technical Note are provided below:

- Latest LBoC's Air Quality Annual Status Report (ASR);
- The Clean Air Strategy (CAS) [5];
- The London Plan 2021[6] - Part B 1 and 2b of Policy SI 1 'Improving air quality';
- The London Environmental Strategy 2018[7];
- Environmental Improvement Plan 2023[8];
- Land-Use Planning & Development Control: Planning For Air Quality by the Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)[9];
- Camden Local Plan[10];
- Camden 2025[11];
- Our Camden Plan[12];
- Camden Transport Strategy 2019-2041[13];
- The GLA Energy Assessment Guidance[14]; and
- London Local Air Quality Management Technical Guidance (LLAQM.TG(19))[15]

[5] Defra (2019) The Clean Air Strategy – [online], (Last accessed: 06/06/2024), Available at: www.gov.uk/government/publications/clean-air-strategy-2019

[6] London Plan (2021) – [online], (Last accessed: 06/06/2024), Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

[7] Greater London Authority (2018) London Environment Strategy –[online] (Last accessed: 22/05/2024), Available at: www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

[8] Defra (2023). Environmental Improvement Plan 2023 – [online], (Last accessed: 22/05/2024), available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133967/environmental-improvement-plan-2023.pdf

[9] Environmental Protection UK and Institute of Air Quality Management (2017), Land-Use Planning & Development Control: Planning For Air Quality v1.2 – [online], (Last accessed: 17/06/2024), Available at: iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[10] Camden Local Plan (2017) – [online], (Last accessed: 06/06/2024), Available at: https://www.camden.gov.uk/documents/20142/4820180/Local+Plan.pdf/ce6e992a-91f9-3a60-720c-70290fab78a6

[11] Camden 2025 – [online], (Last accessed: 06/06/2024), Available at: https://www3.camden.gov.uk/2025/wp-content/uploads/2018/07/Camden-2025.pdf

[12] Our Camden Plan – [online], (Last accessed: 06/06/2024), Available at: https://www3.camden.gov.uk/2025/wp-content/uploads/2018/07/Our-Camden-Plan.pdf

[13] Camden Transport Strategy 2019-2041 (2019) – [online], (Last accessed: 06/06/2024), Available at: https://www.camden.gov.uk/documents/20142/18708392/1925.7+Camden+Transport+Strategy_Main+Document_FV.pdf/d7b19f62-b88e-31d4-0606-5a78ea47ff30

[14] Greater London Authority (2022) Mayor of London Energy Assessment Guidance – [online], (Last accessed: 06/06/2024), Available at: https://www.london.gov.uk/sites/default/files/gla_energy_assessment_guidance_june_2022_0.pdf

[15] Greater London Authority (2019) London Local Air Quality Management Technical Guidance (LLAQM.TG19) – [online], (Last accessed: 06/06/2024), Available at: www.london.gov.uk/sites/default/files/llaqm_technical_guidance_2019.pdf

3. Baseline Conditions.

3.1 Local Air Quality Management Review and Assessment.

The Site is located within the borough wide Air Quality Management Area (AQMA) for exceedances of the annual mean NO_2 AQO and the 24-hour mean PM_{10} AQO.

Air Quality Focus Areas (AQFAs) are locations that not only exceed the annual mean NO_2 AQO but are also locations with high human exposure. The Site is not located within an AQFA but there is one AQFA, Swiss Cottage from South Hampstead to Finchley Road Station, located approximately 300 m to the southwest of the Site. The location of this AQFA, in relation to the Site, is displayed in Figure 2 below.

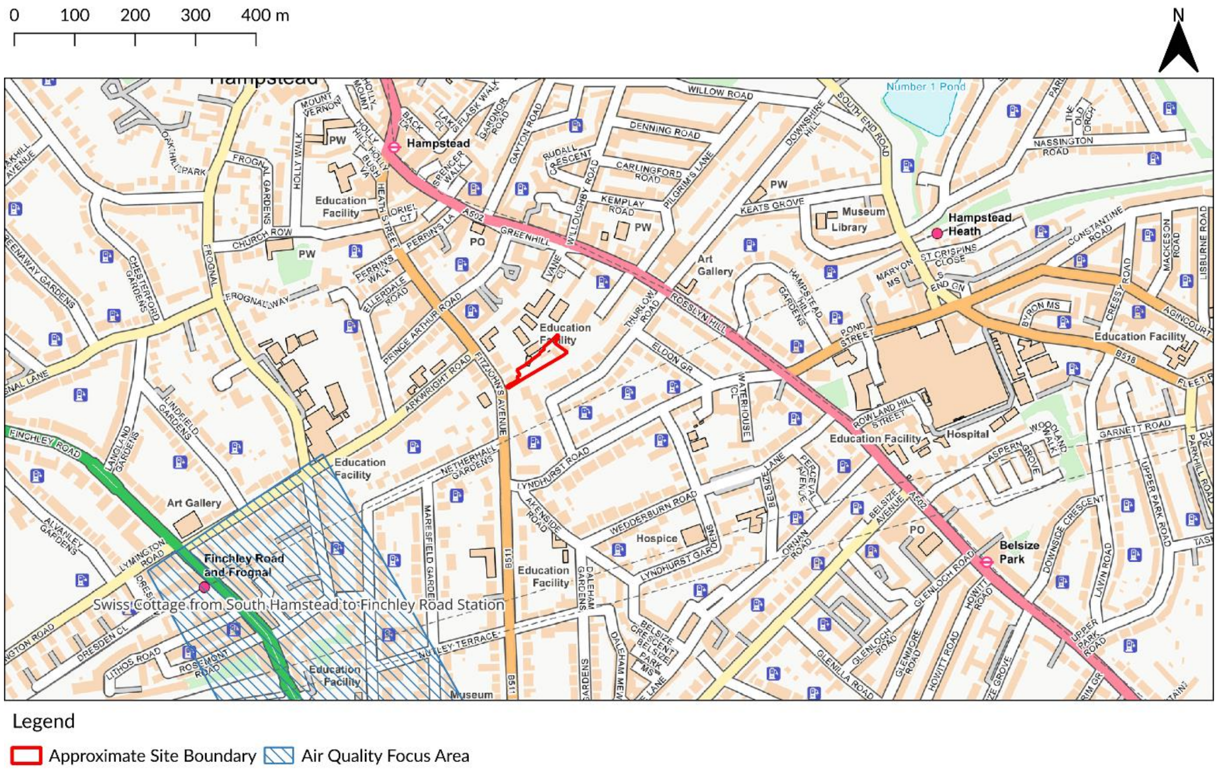

Figure 2: AQFAs in the vicinity of the Site. Contains OS Data © Crown Copyright and Database rights 2024.

3.2 Local Air Quality Monitoring.

LBoC operate five automatic monitoring stations, with one automatic monitoring station located within 1 km of the Site reporting NO_2, PM_{10} and $PM_{2.5}$ concentrations for 2022.

Due to the impacts of the COVID-19 pandemic, monitoring data from the years 2020 and 2021 is not considered representative of 'normal' air quality conditions due to government-imposed lockdowns and has been included for information purposes only. 2022 monitoring data is considered as the most recent year of representative monitoring data (the baseline year).

Table 2 outlines the past five years of representative monitoring data (2016-2019 and 2022) and Figure 3 illustrates the location of this automatic monitoring station with respect to the Site.

Table 2: Automatic Monitoring Results

Monitoring Station and distance (km) from Application Site boundary (approx.)	Air Quality Objective	2016	2017	2018	2019	2020	2021	2022
NO_2								
Swiss Cottage (Finchley Road), CD1, Kerbside, 1 km	Annual mean (µg/m^3)	**66**	**53**	**54**	**43**	33	**44**	37
	Number of hours with concentrations >200 µg/m^3	37	1	2	1	0	2	0
PM_{10}								
Swiss Cottage (Finchley Road), CD1, Kerbside, 1 km	Annual mean (µg/m^3)	21	20	21	19	16	16	21
	Number of days with concentrations >50 µg/m^3	7	8	4	8	3	0	0
$PM_{2.5}$								
Swiss Cottage (Finchley Road), CD1, Kerbside, 1 km	Annual mean (µg/m^3)	15	16	11	11	10	9	12

Notes:
Concentrations in **bold** indicate an exceedance of the annual mean NO_2 AQO.
Concentrations in **bold** and underline indicate an exceedance of the threshold 60 µg/m^3 indicating a potential exceedance of the 1-hour mean NO_2 AQO.

The nearest automatic monitoring station to the Site, CD1, is classed as a kerbside. In 2022, CD1 measured an annual mean NO_2 concentration of 37 µg/m^3 which is equivalent to 92.5% of the annual mean NO_2 AQO and it is below the respective WHO guideline. Moreover, there were no exceedances of the 1-hour mean NO_2 AQO at CD1 in 2022.

In 2022, there were no exceedance of the annual mean PM_{10} AQO, 24-hour mean PM_{10} AQO and annual mean $PM_{2.5}$ AQO. Moreover, in 2022 PM_{10} is compliant with the WHO guideline however, $PM_{2.5}$ is in exceedance of the respective guideline in 2022.

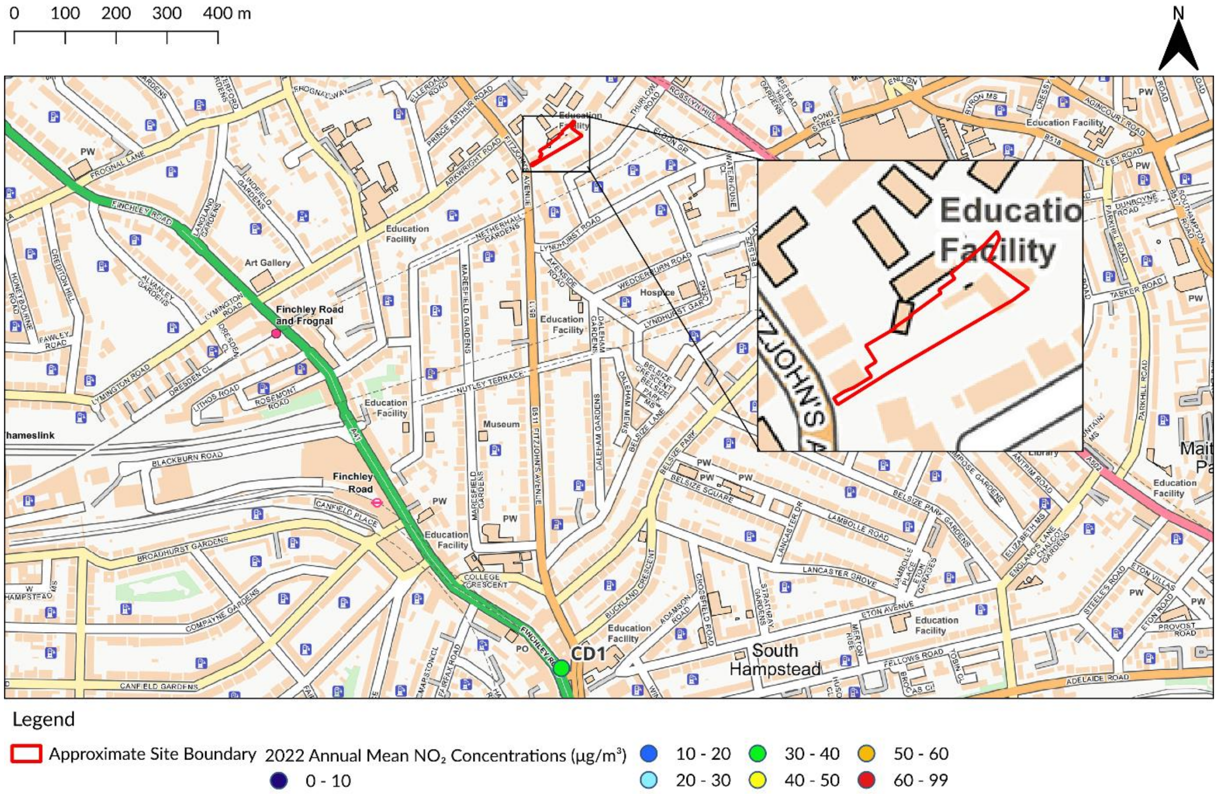

Figure 3: Automatic Monitoring Location within the vicinity of the Site. Contains OS Data © Crown Copyright and Database rights 2024.

LBoC operate 309 passive diffusion tube monitoring locations in 2022. There are eight passive diffusion tube monitoring locations within 500 m of the Site. Table 3 details recorded annual mean NO_2 concentrations for these passive diffusion tube monitoring locations. Figure 4 illustrate the location of the nine passive diffusion tube monitoring locations in relation to the Site.

Table 3: Passive Diffusion Tube Monitoring Results (2016 – 2022) from the LBoC ASR 2023

Site ID	Site Type	Site Name	Distance (m) from Application Site (approx.)	Annual Mean NO_2 Concentration (µg/m^3)						
				2016	2017	2018	2019	2020	2021	2022
CAM7	Roadside	Schools AQ 7 - Devonshire House Preparatory School	60	n/d	n/d	n/d	40	31	29	28
CAM76	Roadside	47 Fitzjohn's Road	270	56	67	48	44	34	30	28
CAM20	Roadside	HSS Phase 4&5 8 - Lyndhurst House Prep - Lyndhurst Gardens	300	n/d	n/d	n/d	n/d	n/d	20	19

Site ID	Site Type	Site Name	Distance (m) from Application Site (approx.)	Annual Mean NO_2 Concentration (µg/m^3)						
				2016	2017	2018	2019	2020	2021	2022
CAM8	Roadside	Schools AQ 8 - University College School Senior School	320	n/d	n/d	n/d	30	23	22	20
CAM75	Urban Background	Frognal Way	330	29	30	22	23	19	15	16
CAM43	Roadside	HSS Phase 3 2 - Hampstead Parochial and UCS Junior - Holly Bush Vale	380	n/d	n/d	n/d	n/d	n/d	20	20
CAM21	Roadside	HSS Phase 4&5 9 - Lyndhurst House Prep - Wedderburn Road	400	n/d	n/d	n/d	n/d	n/d	19	19
CAM22	Roadside	HSS Phase 4&5 10 - St Christopher's - Belsize Lane	450	n/d	n/d	n/d	n/d	n/d	20	20
CAM23	Roadside	HSS Phase 4&5 11 - St Christopher's - Orman Road	500	n/d	n/d	n/d	n/d	n/d	20	21
Notes: n/d – no data Concentrations in **bold** indicate an exceedance of the annual mean NO_2 AQO. Concentrations in **bold** and underline indicate an exceedance of the threshold 60 µg/m^3 indicating a potential exceedance of the 1-hour mean NO_2 AQO. Concentrations rounded to the nearest whole number.										

The closest passive diffusion tube monitoring location, CAM7, recorded an annual mean NO_2 concentration of 28 µg/m^3 in 2022, which is equivalent to 70% of the annual mean NO_2 AQO. Moreover, all other nearby passive diffusion tube monitoring locations recorded annual mean NO_2 concentrations below the respective AQO.

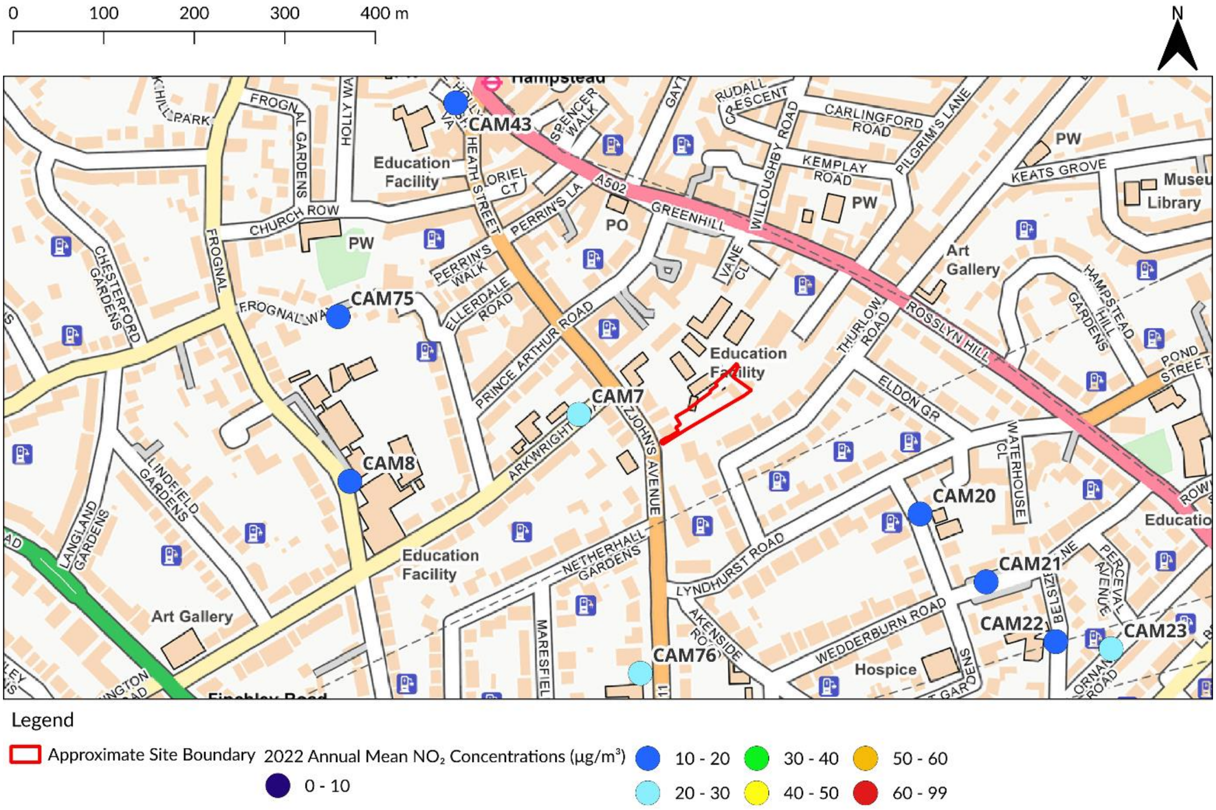

Figure 4: Passive Diffusion Tube Monitoring Locations within the vicinity of the Site. Contains OS Data © Crown Copyright and Database rights 2024.

3.3 Background Air Quality Data.

3.3.1 Defra Predicted Concentrations

The Defra predicted background concentrations have been obtained from the national maps published by Defra. These estimated concentrations are produced on a 1 km by 1 km grid basis for the whole of the UK. The Proposed Development falls into grid square X 526500 Y 185500 and the predicted concentrations for this grid square for NO_2 are provided in Table 4 for 2022, the baseline year, and 2024 the current year.

Table 4: Predicted Background Concentrations for grid square X 526500 Y 185500

Year	Predicted Background Concentration (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
2022	23.3	17.0	11.1
2024	22.2	16.5	10.8

As shown in Table 4, Defra predicted background concentrations, for NO_2 and PM_{10}, are below their respective AQOs and WHO guidelines.

For $PM_{2.5}$, whilst its Defra predicted background concentration is below its respective AQO, it is in exceedance of its WHO guideline in 2022 and 2024.

4. Generator Design.

4.1 Location.

The proposed backup generator is to be located at ground level to the west of the Site boundary. The location of the backup generator is illustrated in Figure 5. The backup generator flue will rise externally above the height of the generator itself, terminating at approximately 4.59 m above ground level.

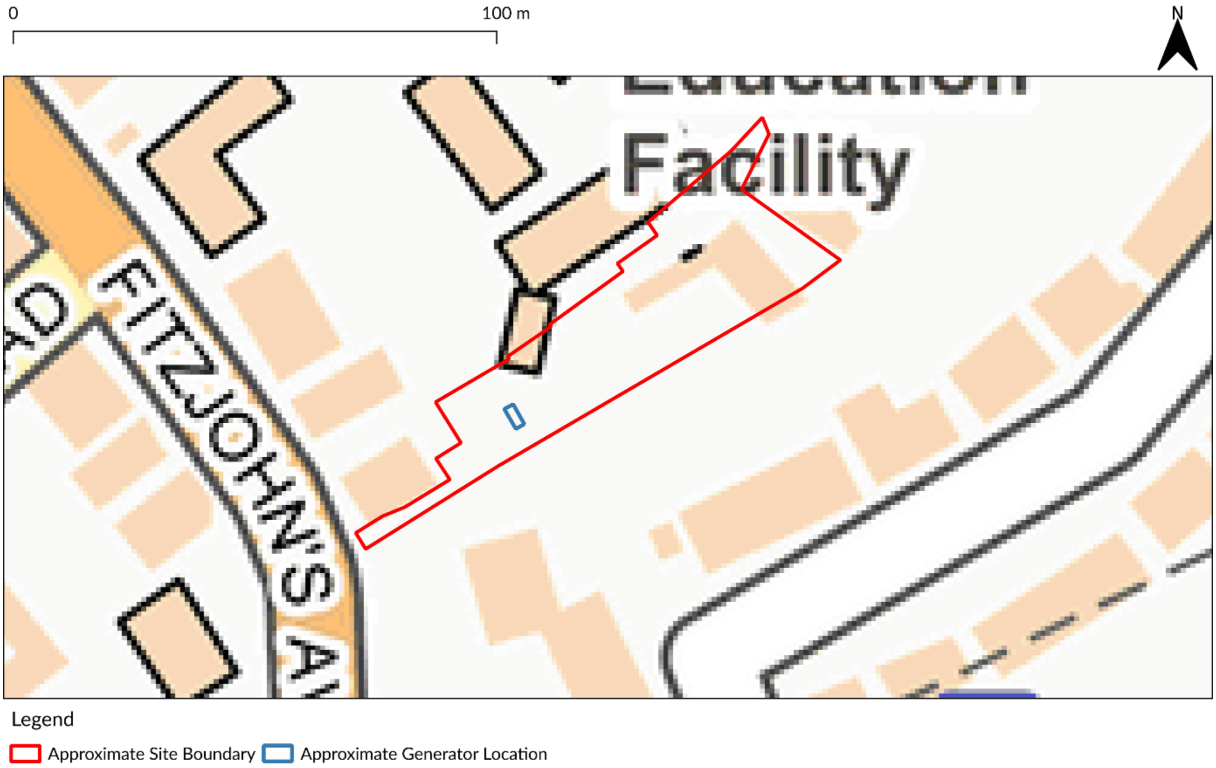

Figure 5: Backup Generator Approximate Location. Contains OS Data © Crown Copyright and Database rights 2024.

4.2 Specification.

The model of the backup generator is the 6M16G220/5 provided by Moteurs Baudouin. The backup generator can provide 204 kW at full capacity for the provision of backup power to the Development in the case of a power outage. As stated in Section 1, this Air Quality Technical Note has considered diesel fuel as a worst-case scenario.

Model input parameters have been taken from the technical specification sheet and the exhaust gas emissions test report produced by Moteurs Baudouin and relevant information has been included within Appendix 1.

4.3 Operation.

The Development will operate one generator for backup power that will only be operational as part of their maintenance testing and during any emergency power outages. Impacts associated with the backup generator at the Development will be modelled using the ADMS-6 dispersion model. ADMS-6 is an extensively validated Gaussian plume air dispersion model, and is used by regulators, government departments, consultancies and industry. The model is able to simulate the entrainment of the plume in the wake of buildings.

The assessment will consider the emissions of NO_2 only due to its emission rate being the highest emission rate calculated from the testing report provided by the manufacturer. As such, emissions of NO_2 are anticipated to lead to the highest air quality impacts. Further details are provided in Appendix 1.

Emissions of PM_{10}, $PM_{2.5}$, CO and TVOC (as Benzene) have not been considered in this assessment. Their respective emission rates, calculated from the emission testing report provided by the manufacturer (Table 5), are considered too low in comparison to their respective AQOs and therefore have been deemed negligible.

Table 5: Estimated PM, CO and Benzene Emission Rates

Parameter	Unit	Backup Generator 100% Load
PM emission rate[A]	mg/Nm^3	13.37
CO emission rate	mg/Nm^3	90.01
HC (as benzene) emission rate	mg/Nm^3	8.91
PM emission rate[A]	g/s	0.002
CO emission rate	g/s	0.015
HC (as benzene) emission rate	g/s	0.001
Notes: [A] Particulate Matter emission rate has been considered the same for both PM_{10} and $PM_{2.5}$.		

Moreover, emissions of SO_2 have not been considered in this assessment as emissions are assumed to be negligible.

The backup generator provides approximately 0.55 MWth of thermal input. The generators will be modelled using the manufacturer's technical specification which are based on the use of diesel fuel. A detailed summary of all model inputs is provided in Appendix 1.

4.3.1 Emission Testing Scenarios

The backup generator will undergo monthly maintenance tests. The monthly maintenance test has been assumed to occur in the following capacity, as a worst-case scenario:

- Monthly Maintenance Test – the backup generator will be tested for 30-minute every month (i.e. total of 12 months) at up to 100% load. Testing is expected to take place during typical working hours i.e. 8am to 6pm.

4.3.2 Model Methodology

For annual mean concentrations the model has been run for a full year and factored by the number of hours the backup generators will be operational during the monthly testing scenario divided by the total number of hours in the dataset (8,760[16] hours per year). For this assessment, the monthly testing schedule is equivalent to a total of 6 hours for the monthly maintenance test in a year.

4.3.3 Assessment Criteria

The AQOs relevant to this assessment are set out in Table 1 however not all AQOs can be assessed against due to the limited operational hours of the backup generator during the testing scenario.

[16] 8760 hours in a year has been used because the meteorological years are 2021, 2022 and 2023.

The monthly maintenance test has been assumed to take place every month throughout the year, for a maximum of a 30-minute period, as a worst-case scenario, therefore it is not possible for the 1-hour mean AQO for NO_2 to be exceeded given there is an allowance for 18 1-hour periods of exceedance.

Therefore, only the annual mean NO_2 AQO has been assessed for the monthly maintenance testing model scenario:

4.3.4 Meteorological Data

The model has been run using meteorological data from Heathrow Airport, located approximately 20 km southwest of the Site. This meteorological station is considered representative of the Site and widely used for meteorological data for the surrounding area.

The three most recent years with available meteorological data have been used in this assessment: 2021, 2022 and 2023. The maximum impact at each receptor from the three meteorological years considered have been reported for this assessment. Further information on the meteorological inputs is provided in Appendix 1.

4.3.5 Existing Receptors

Table 6 provides details of the existing and proposed sensitive receptors in the vicinity of the Site that were included in the assessment. This is not an exhaustive list of all receptors, but these receptors represent worst-case locations that have been identified in the surrounding area and at the Site. Modelled sensitive receptor locations are illustrated in Figure 6.

Table 6: Existing and Proposed Receptors in the vicinity of the Site

Receptor ID	Description	Receptor Type	Easting	Northing	Height (m)
E1	Office	Office	526584	185401	1.5
E2	Primary School	Educational	526579	185416	1.5 – 7.5
E3	Primary School	Educational	526601	185428	1.5
E4	University	Educational	526614	185384	1.5
E5	Residential Property	Residential	526640	185391	1.5 – 4.5
E6	School	Educational	526549	185358	1.5 – 4.5
E7	Residential Property	Residential	526540	185395	1.5 – 4.5
E8	Residential Property	Residential	526568	185426	1.5 – 4.5
E9	Residential Property	Residential	526546	185424	1.5
E10	School	Educational	526560	185455	1.5
P1	Property within Site Boundary	Residential	526622	185423	1.5 – 4.5
P2	Property within Site Boundary	Residential	526647	185432	1.5

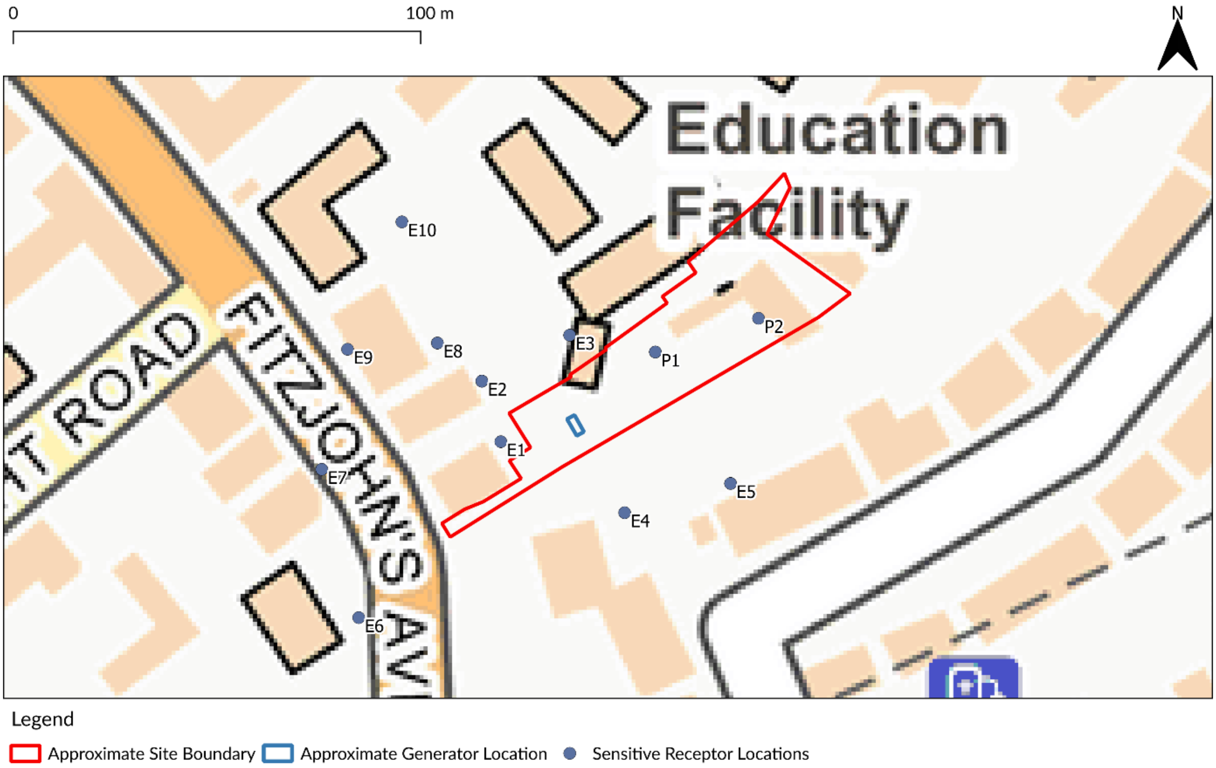

Figure 6: Sensitive Receptors at the Site and in the vicinity of the Site. Contains Ordnance Survey Data © Crown Copyright 2024.

Table 7 provides details of the 0.5 km x 0.5 km model grid that was included in the assessment. This grid has been used in ADMS-6 to predict on-site concentrations and surrounding area of the Site.

Table 7: Model Grid in ADMS-6

Grid	Start	Finish	Number of Points
x	526422	526734	51
y	185273	185551	51
z	1.5	0	1

4.4 Assessment of Significance.

The EPUK and IAQM planning guidance[9] has been used to assess the potential for significant impacts as a result of the backup generator emissions associated with the Development. The focus of the guidance is to assess generator emission impacts and advises on how to describe the air quality impacts and their significance.

The air quality impacts at individual existing receptors have been described by determining the percentage change in concentrations relative to the air quality assessment level (AQAL) and comparing this with the total long-term average concentration (proposed backup generator + existing concentration).

Table 8: EPUK and IAQM impact descriptors for individual receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% of more of AQAL	Moderate	Substantial	Substantial	Substantial

The determination of the significance of the effects includes elements of professional judgement and the professional experience of the consultants preparing the report is set out in Appendix 2. The overall significance of the air quality impacts is judged as either significant or not significant taking account of:

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

4.4.1 Site Suitability Assessment

To determine the significance of predicted air quality impacts based upon a Site Suitability Assessment, the EPUK and IAQM planning guidance[9] states:

"*Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means.*"

5. Potential Air Quality Impacts.

Air quality impacts associated with the testing of the backup diesel generator of the Development have been assessed at existing nearby receptors and proposed receptors at the Site. The existing receptor, E1, is for office use and as such the annual mean AQOs do not apply at this location. The contribution from the backup generator has been added to the Defra background concentrations to calculate the total concentration at each sensitive receptor in this assessment.

5.1 Annual mean NO_2 Concentrations

Annual mean concentrations of NO_2 have been predicted at sensitive receptors in the vicinity of the Site, as well as proposed receptors at the Site, where the annual mean AQO applies, and have been assessed against the annual mean AQO of 40 µg/m^3. NO_2 concentrations have been predicted at 18 sensitive receptors.

The maximum concentration of NO_2 from the three meteorological years considered have been provided at each sensitive receptor location.

Annual mean concentrations for NO_2 take into account the background concentration in 2022 (the baseline year) of 23.3 µg/m^3, for the worst-case grid square that the existing receptors are located within. The results are presented in Table 9.

Table 9: Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor ID	Predicted Annual Mean NO_2 Concentrations (µg/m^3)		Change (µg/m^3)	Change as a Percentage of the Air Quality Objective (%)	Impact Descriptor
	Without the Development	With the Development			
E2.1	23.3	23.3	<0.01	0.002%	Negligible
E2.2	23.3	23.3	<0.01	0.003%	Negligible
E2.3	23.3	23.3	<0.01	0.005%	Negligible
E3	23.3	23.3	<0.01	0.005%	Negligible
E4	23.3	23.3	<0.01	0.002%	Negligible
E5.1	23.3	23.3	<0.01	0.003%	Negligible
E5.2	23.3	23.3	<0.01	0.003%	Negligible
E6.1	23.3	23.3	<0.01	0.002%	Negligible
E6.2	23.3	23.3	<0.01	0.002%	Negligible
E7.1	23.3	23.3	<0.01	0.001%	Negligible
E7.2	23.3	23.3	<0.01	0.001%	Negligible
E8.1	23.3	23.3	<0.01	0.002%	Negligible
E8.2	23.3	23.3	<0.01	0.002%	Negligible
E9	23.3	23.3	<0.01	0.001%	Negligible
E10	23.3	23.3	<0.01	0.001%	Negligible
P1.1	23.3	23.3	<0.01	0.009%	Negligible

Receptor ID	Predicted Annual Mean NO_2 Concentrations (µg/m^3)		Change (µg/m^3)	Change as a Percentage of the Air Quality Objective (%)	Impact Descriptor
	Without the Development	With the Development			
P1.2	23.3	23.3	<0.01	0.011%	Negligible
P2	23.3	23.3	<0.01	0.005%	Negligible

As summarised in the methodology, IAQM guidance considers the change in concentration to be negligible if the long-term change as a percentage of the AQAL is less than 1%. All 18 of the modelled existing receptors are predicted to experience changes in concentration below 1% of the AQAL.

The maximum change in concentration is 0.0045 µg/m^3 or 0.011% of the AQAL at P1.2. As such, the impacts at this sensitive receptor and all other sensitive receptors are considered to be negligible and therefore not significant and do not need to be assessed further.

6. Conclusions.

This Air Quality Technical Note has been prepared on behalf of Fleet Street LLC to assess the air quality impacts from the proposed backup generator on local air quality both at the Site and in the surrounding area.

The emissions from the backup generator have been modelled using ADMS-6 to assess their impact on local air quality during their operation as part of the monthly maintenance test scenario. Modelling has been undertaken over three meteorological years (2021, 2022 and 2023) with the maximum concentration over these years, for each receptor, reported in this assessment.

The assessment considers the impacts from modelled emissions of NO_2 at 18 existing receptors at the Site and in the vicinity of the Site. Long-term results indicate compliance with the annual mean NO_2 AQO, with a long-term change as a percentage of the AQAL of less than 1%, at sensitive receptors in the vicinity of the Site. As such, the impacts are expected to be negligible at all modelled sensitive receptors and therefore the effects are considered not significant.

Other pollutants have not been modelled as emission rates are considered to be negligible and as such impacts are expected to not be significant.

Therefore, air quality should not be considered a constraint to the operation of the backup generator.

Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	19/06/2024	First Draft	LC	AD	CE
01	19/06/2024	First Issue	LC	AD	AD
02	24/06/2024	Second Issue	LC	AD	AD

This document has been prepared for Fleet Street LLC only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This document has been based solely on the specific design assumptions and criteria stated herein.

Appendix 1 – Generator Model Input Data.

Energy Centre.

The ADMS-6 model has been run to predict the contribution of the emissions from the proposed backup generator. Emissions of NO_2 for the annual mean AQO have been modelled. This assessment has only considered a testing scenario for the backup generator.

NO_X to NO_2 Conversion.

Annual mean NO_X concentrations have been modelled in ADMS-6. The approach recommended by Defra online guidance[17] has been used to estimate annual mean NO_2 concentrations from the modelled NO_X output assuming:

- Annual mean NO_2 concentrations = annual mean NO_X concentrations x 0.7.

Model Input Parameters.

The proposals include one backup generator, with a thermal input of approximately 0.55 MW_{th}, that will only be operational for testing purposes only. Figure 5 illustrates the proposed location for the backup generator and Figure 7 illustrates the proposed location for the generator flue.

The change in pollutant concentrations has been modelled using ADMS-6 dispersion model. Entrainment of the plume into the wake of the building (the building downwash effect) has been simulated within the model. Buildings surrounding the proposed stack have also been included in the model.

The backup generator will be tested under the following conditions as a worst-case assumption:

- Monthly Maintenance Test – the backup generator will be tested for a period of 30-minute every month (i.e. 12 months per year) at up to 100% load. Testing is expected to take place during typical working hours i.e. 8am to 6pm.

In the monthly maintenance test scenario, the testing schedule equates to a total of 6 hours of operation per year. As such, the long-term impacts of the backup generators operational phase have been modelled based on emissions from one generator and the annual mean model outputs have been scaled by a factor of 6/8760.

Model input parameters set out in Table 10 have been taken from the technical specification sheet provided by the manufacturer and relevant information has been included below.

Table 10: Model Input Parameters used in ADMS-6

Parameter	Unit	Backup Generator 100% Load
Number of Units		1
Make and Model		6M16G220/5
Fuel		Diesel fuel
Thermal input	kW	151
Actual exhaust gas temperature	°C	600
Normalised exhaust gas volume flow rate[A]	Nm^3/s	0.17
Actual exhaust gas volume flow rate	Am^3/s	0.49

[17] Environment Agency (2016) Conversion Ratios for NO_x and NO_2 – [online] (Last accessed: 17/06/2024), Available: https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment

Parameter	Unit	Backup Generator 100% Load
Stack height above ground (m)	m	4.59
Stack diameter	mm	152.4
NO_X emission rate	mg/Nm^3	309.25
NO_X emission rate	g/s	0.052
Notes: [A] The exhaust gas volume flow rate has been normalised to express the volume flow rate to a temperature of 25 degrees Celsius.		

Buildings.

Entrainment of the plume into the wake of the building (the building downwash effect) has been simulated within the model. All buildings that have been include within the model are outlined in Table 11 and displayed in Figure 7. Building heights were taken from the relative height from the western façade.

Table 11: Modelled Buildings Input Parameters

Building ID	Building Description	X (Centre Point of Building)	Y (Centre Point of Building)	Height (m)
1	Generator	526602	185405	2.34
2	Garage	526560	185400	4.5
3	84 Fitzjohn's Avenue	526577	185395	14.5
4	17-19 Lyndhurst Terrace	526603	185372	10
5	86 Fitzjohn's Avenue	526567	185410	10
6	88 Fitzjohn's Avenue	526557	185427	12
7	Pavilion Court	526656	185388	14

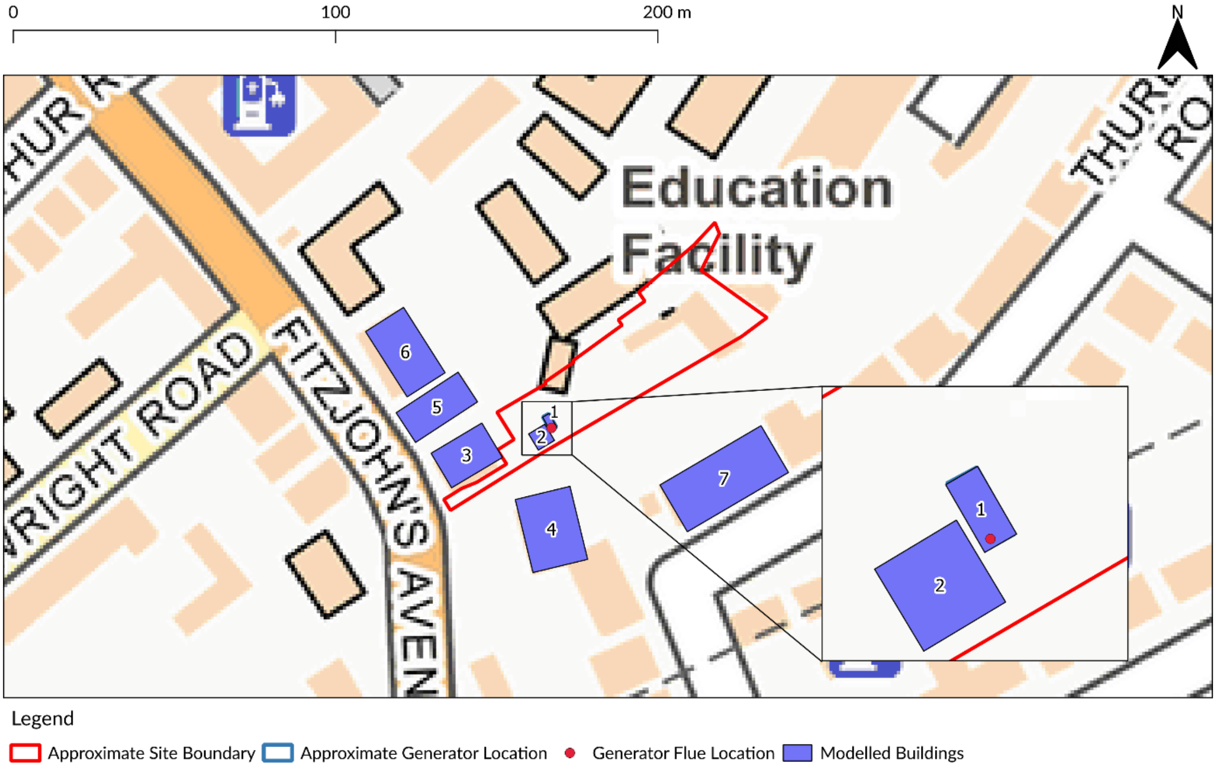

Figure 7: Generator Flue Location and Buildings Included in the Model. Contains Ordnance Survey Data © Crown Copyright and Database rights 2024.

Topography.

Topography data can also be added as an input to ADMS-6 model where required. Topography data can have an effect on the flow of the emissions and should be considered when a slope gradient of 1:10 is observed in the terrain surrounding the site. As the topography surrounding the Site is less than a gradient of 1:10, topography data was not included in this assessment.

Meteorological Data.

The meteorological site at Heathrow Airport is considered representative of the Site and the prevailing wind direction is dominated by southwest direction as shown in Figure 8. Table 12 shows the values for surface roughness and the Monin-Obukhov length inputs used in the model.

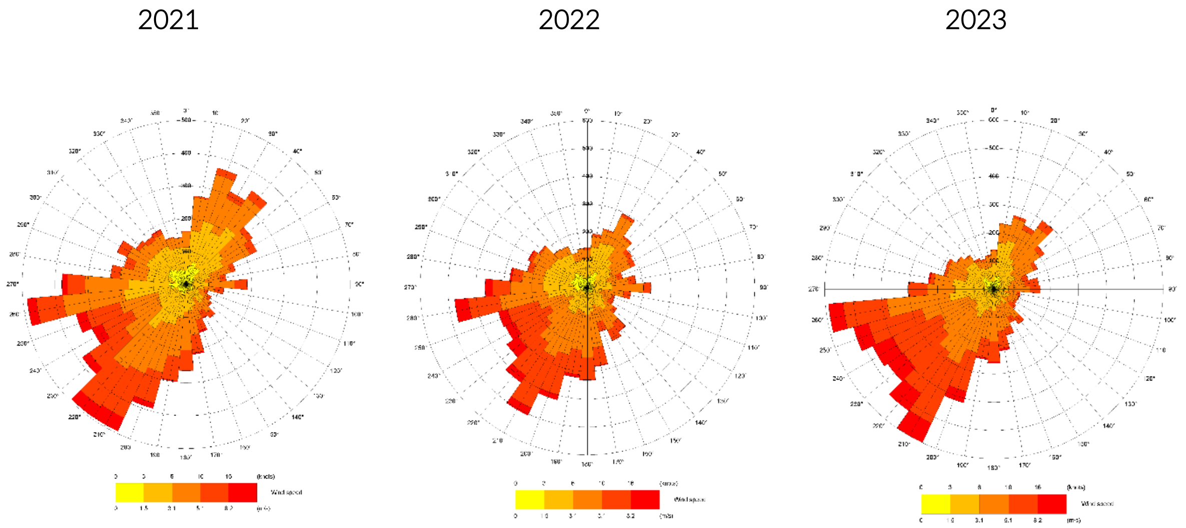

Figure 8: Wind roses for Heathrow Airport 2021, 2022 and 2023.

Table 12 Grid and Meteorological Data Settings used in ADMS 6

Meteorology		Value
Monin-Obukhov Length (m)	Dispersion Site	30
	Meteorological Measurement Site	30
Surface Roughness (m)	Dispersion Site	1.0
	Meteorological Measurement Site	0.5

Appendix 2 - Professional Experience.

Christelle Escoffier (Hoare Lea) MsEng. Msc. PhD MIES MIAQM

Christelle Escoffier is a senior associate and technical lead for air quality group with Hoare Lea; an Associate Member of the Institution of Environmental Sciences and a Full Member of the Institute of Air Quality Management. She graduated with a Master in Science Diploma and holds a Doctor of Philosophy degree in Physical Oceanography, Meteorology and Environment, both from Paris VI University in France.

In her twenty-two years of professional experience based in the UK and in the USA, she has delivered air quality services for a wide range of industrial projects. Her stack emissions dispersion modelling experience comprehends projects in England and Wales for energy centres of new developments, combustion product emissions from landfill gas utilisation plant and power reserve facilities, projects in the USA for gas-fired and oil-fired combustion turbine electric generating stations and projects in the Middle East for gas plants, sulphur recovery plants and boiler at oil and gas facility plants. The assessments covered predictions of short-term and long-term impact to the local air quality, human and ecological receptors; critical load for nitrogen deposition and acid deposition assessment at relevant ecological habitats in the UK, and also impact on regional haze of USA Natural Wilderness Areas and National Parks.

Christelle has in-depth knowledge of atmospheric dispersion models. She has delivered dispersion modelling training courses to government agencies, academic, industrial and commercial professionals worldwide since 2005.

Andy Day (Hoare Lea), BSc (Hons), MSc, AMIEnvSc, AMIAQM

Andy is a Principal Air Quality Consultant with Hoare Lea. He is an Associate Member of the Institute of Environmental Sciences and a full Member of the Institute of Air Quality Management. He is a chemistry graduate with a Master's specialising in the catalysed removal of harmful volatile organic compounds (VOCs) often generated from the combustion of fuel in car engines.

Andy has worked on a range of projects of varying size across a number of different sectors. His experience focusses on work up to and through planning for air quality assessments and environmental impact assessments. Andy also has experience in detailed dispersion modelling of energy combustion plant such as Aintree Hospital (New hospital backup generator), Leconfield House (Energy combustion plant for mixed use development) and Quayside Quarter (Energy combustion plant for mixed use development).

Andy has a particular interest in reducing emissions for the benefit of human health and the environment through the life cycle of a building.

Oliver Parsons (Hoare Lea), BSc (Hons), MSc, AMIEnvSc, AMIAQM

Oliver is a Senior Air Quality Consultant with Hoare Lea. He is an Associate Member of the Institution of Environmental Sciences and an Associate Member of the Institute of Air Quality Management. He has worked on projects across multiple sectors including residential, commercial and industrial sectors.

He has completed three EIA within the past year at Hoare Lea, including SSEN (film studio) and SBQ (mixed use residential). He has experience across different aspects of the air quality assessment processes including monitoring, detailed dispersion modelling of roads, standalone air quality assessments and environmental impact assessments.

Leticia Campello (Hoare Lea), BEng (Hons), MSc, AMIEnvSc, AMIAQM

Leticia is an Air Quality Consultant with Hoare Lea. She is an Associate Member of the Institution of

Environmental Sciences and an Associate of the Institute of Air Quality Management. She has worked on a range of projects in different sectors including residential, commercial, laboratory and industrial.

Leticia has gained experience in air quality assessments, including detailed assessments of dust, odour, roads, and industrial emissions. Her experience has been focused on preparing air quality assessments to support planning application as well as environmental impact assessments.