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CHANDOS ROAD – LHR11 AND LHR12 EPR/YP3329SB/A001

AIR QUALITY

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CHANDOS ROAD – LHR11 AND LHR12
EPR/YP3329SB/A001
AIR QUALITY ASSESSMENT

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EXECUTIVE SUMMARY

This air quality assessment has been prepared by Ramboll UK Ltd. ('Ramboll') on behalf of Vantage Data Centers Ltd in support of an Environmental Permit application for the LRH11 and LHR12 data centre at Chandos Park Industrial estate, Park Royal, NW10 6SF ('the Site').

An assessment of the impacts of emissions from the emergency generators has been undertaken assuming that the site suffers a loss of power, and all of the emergency generators are operational. The emergency generators will be fitted with SCR abatement and therefore can up to 1322 hours per year with a 1% probability of exceeding the short term NO_2 objective. Predicted annual mean NO_2 impacts have been factored to 72 hours operation which is considered a realistic maximum operating hours in an emergency and impacts are not significant. Impacts at ecological sites during the emergency scenario are potentially significant for daily mean NO_x concentrations although there is a low probability of the impacts actually arising in the first place.

An assessment of impacts during testing has been undertake assuming that 1 generator will be operating and therefore the emission rate will be 37 times smaller than for the emergency scenario. Annual impacts have been factored by the maximum testing hours of 888 hours per year. Predicted annual mean NO_2 impacts at relevant receptor locations are not significant for these operating hours. Impacts at ecological sites are not significant.

1. INTRODUCTION

1.1 Development

This air quality assessment has been prepared by Ramboll UK Ltd. ('Ramboll') on behalf of Vantage Data Centers Ltd in support of an Environmental Permit application for the LHR11 and LHR12 data centre at Chandos Park Industrial estate, Park Royal, NW10 6SF ('the Site'). The data centre has backup power systems comprising of 37 diesel generators.

When in use in an emergency all of the generators could be operational and therefore the impacts during an emergency are higher than those when individual or groups of generators are being routinely tested. The impacts during an emergency have been assessed as well as the impacts during routine testing.

This report sets out the method and results of the dispersion modelling used to assess the impact of the diesel generator array on local air quality.

1.2 Operation

The generators will be used to provide back-up power in the event of a loss of power to the data centre, i.e. an emergency scenario. For the purposes of the modelling it is assumed that all of the generators would operate simultaneously at maximum load in an emergency. The likelihood of this occurring is very low given the grid reliability and redundancy in power supplies to the data centre; in addition, it is not predictable when an emergency scenario would occur.

Regular testing of the generators at the site is also required to ensure that the generators are operational and capable of providing back-up power. Each of the generators at the site will be subject to a regular testing regime; the testing regime is expected to be in place prior to commencement of operations. The testing regime is likely to involve periods of operation at different loads on a monthly basis, but as worst-case basis full load operation has been assumed.

Based on available information, it is anticipated that each generator will be run alone for up to 24 hours per year for periodic testing. This testing regime is below the individual generator testing target set out by the EA within the Data Centre FAQ Headline Approach Guidance of 50 hours/annum per generator. Total testing hours for all 37 generators is 888 hours per year.

1.3 Emissions

The assessment of the impact of emissions from the diesel generators has been based on data sheet values (Appendix B). The proposed engines are Kohler KD3500E derated to 3250 kVA. 20 generators will be installed initially in Phase 1 (LHR11) in 2024 followed by a further 17 generators in Phase 2 (LHR12) in 2025. The engines will be fitted with SCR to reduce NO_x emissions; it is proposed that the SCR abatement is set to reduce NO_x emissions by approximately 84% which means that the engine emissions will meet MCPD emission limits for NO_x. The SO_2 emission rate is based on the fuel flow of the engine assuming a maximum sulphur content in the HVO fuel of 5mg/kg (0.0005%) as advised by the supplier. The ammonia emission rate (due to slip from the use of SCR) is assumed to be equivalent to the BAT upper emission concentration of 15 mg/Nm^3 on a conservative basis.

The calculated emission concentration data is shown in Table 1-1 for each engine.

Table 1-1: Engine Emission Rates 100% ESP

Pollutant	g/s	mg/Nm^3 (5% O_2)	mg/Nm^3 (15% O_2)
NO_x	1.22	500	186
CO	0.17	68.3	25
PM	0.01	3.41	1.3
SO_2	0.0017	0.68	0.25
NH_3	0.10	40.4	15

The NO_x emissions data assumes that Selective Catalytic Reduction (SCR) will be used to limit the NO_x emissions to a maximum of 500 mg/Nm^3 at 5% oxygen, i.e. below the indicative BAT requirement for Environmental Permitting of 2,000 mg/Nm^3 at 5% oxygen.

The normalised volumetric flowrates (dry gas, 273K) at 5% and 15% oxygen are 2.447 and 6.528 Nm^3/s respectively. These have been back calculated from the emissions data sheet in Appendix B, i.e. g/kWh x kW to give g/s and then the Nm^3/s calculated from the normalised emission concentration data presented. The oxygen and water vapour content are not required to perform the normalisation calculation or for the modelling. There is no breakdown of the particulate matter size range available and therefore all PM is assumed to be either PM_{10} or $PM_{2.5}$ which is a conservative approach.

1.4 Environmental Assessment Levels

The relevant Environmental Assessment Levels (EALs) for human health and ecological receptors are detailed in Table 1-2 below. Nitrogen and acid deposition at ecological receptors are dealt with in Section 3.

Table 1-2: EALs

Pollutant	Concentration (µg/m^3)	Averaging Period	Exceedances Allowed per annum	Percentiles
Human Health Receptors				
NO_2	200	One hour mean	18	99.79
	40	Annual mean	-	-
CO	30,000	One hour mean	-	-
	10,000	8 hour running mean	-	-
PM_{10}	50	Daily mean	35	90.41
	40	Annual mean	-	-
$PM_{2.5}$	20	Annual mean	-	-
SO_2	266	15 minute mean	35	99.9
	350	One hour mean	24	99.73

Pollutant	Concentration ($\mu g/m^3$)	Averaging Period	Exceedances Allowed per annum	Percentiles
	125	Daily mean	3	99.18
Ecological Receptors				
NO_x	75*	Daily mean	-	-
	30	Annual mean	-	-
SO_2	10	Annual mean	-	-
NH_3	1**	Annual mean	-	-
Ozone***	A0T40 of 6,000	Between May and July	-	-

* where ozone AOT40 above critical level,
** assumes lichens and bryophytes present,
*** only to assess which daily mean NO_x critical level applies.

1.5 Screening for Modelling

1.5.1 Dispersion Factors

Pollutant emissions have been screened using the Environment Agency PC dispersion factor[1] to ascertain those pollutants that require detailed dispersion modelling. The flue heights are 5.4m above the maximum building height of 44.6m meaning the effective stack height is 8.96m. The PC dispersion factors for annual mean and hourly mean concentrations are therefore 44.0 and 924 $\mu g/m^2/(g/s)$ respectively.

The hourly mean concentrations have been factored to the short-term averaging periods in accordance with EA guidance as follows:

- 8 hour averaging period using a conversion factor of 0.7;
- 15-minute averaging period using a conversion factor of 1.34;
- 24 hour averaging period using a conversion factor of 0.59.

The resulting concentrations are compared against the Environmental Assessment Levels (EALs) for the pollutant to ascertain whether modelling is required.

1.5.2 Emergency Operation

For annual mean impacts the annual operating hours in an emergency have been assumed to be a 72 as a realistic maximum. During the emergency scenario all pollutants screen into dispersion modelling apart from annual mean impacts of SO_2, PM_{10}, $PM_{2.5}$ and NO_x for locally designated sites. The predicted long term concentrations for these pollutants based on the emissions from 37 generators are provided in Table 1-3.

[1] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

Table 1-3: Emergency Operation Screening Maximum Ground Level Concentrations (µg/m^3)

Pollutant	g/s	PC (µg/m^3)	EAL (µg/m^3)	PC % EAL
NO_x – Annual (locally designated sites)	45.1	16.4	30	54.6
NH_3 – Annual (locally designated sites)	3.7	1.3	1	130
SO_2 - Annual	0.062	0.02	10	0.2
PM_{10} – annual	0.31	0.11	40	0.3
$PM_{2.5}$ – annual		0.11	20	0.6

Nitrogen deposition- locally designated sites

The Air Pollution Information System (APIS)[2] provides critical loads for nitrogen deposition (leading to eutrophication) and nitrogen acid deposition (leading to acidification) for different habitat types and specific site relevant critical loads for SACs, SPAs and SSSIs.

For locally designated sites where such information is not readily available, then the lowest critical load published on APIS can be used as a screening criteria. For grassland habitats, the lowest critical load is 5kgN/ha/yr and for woodland habitats it is 10kgN/ha/yr.

For calculated nitrogen deposition for the locally designated sites is shown in Table 1-4 below based on the predicted NO_x and NH_3 concentrations in Table 1-3.

Table 1-4: Predicted nitrogen deposition at locally designated sites

Receptor	Habitat Type	Nitrogen deposition (kgN/ha/yr)			% Critical Load
		Oxidised	Reduced	Total	
Locally designated sites	Grassland	2.36	6.89	9.24	185
	Woodland	4.71	10.33	15.04	150

For calculated nitrogen deposition for the locally designated sites is shown in Table 1-4 below based on the predicted NO_x and NH_3 concentrations in Table 1-3.

Table 1-4Table 1-4 shows that the nitrogen deposition will need to be modelled at locally designated sites.

1.5.3 Generator Testing

For the assessment of impacts during testing it is assumed that 1 generator will be operating and therefore the emission rate will be 37 times smaller than for the emergency scenario. Annual impacts have been factored by the maximum testing hours of 888 hours per year (37 generators for 24 hours per year each).

Impacts of CO, SO_2, particulate matter (PM_{10} and $PM_{2.5}$) and annual mean NO_x and NH_3 for locally designated sites will screen out from modelling as shown in Table 1-5.

[2] http://www.apis.ac.uk accessed August 2020

Table 1-5: Testing Operation Screening Maximum Ground Level Concentrations (µg/m^3)

Pollutant	g/s	PC (µg/m^3)	EAL (µg/m^3)	PC % EAL
NO_x – Annual (locally designated sites)	1.22	5.5	30	18.2
NH_3 – Annual (locally designated sites)	0.10	0.44	1	44
CO – 1 hour	0.17	154.4	30,000	0.51
CO – 8 hour		108.0	10,000	1.08
SO_2 – 15 minutes	0.0017	2.1	266	0.78
SO_2 - 1 hour		1.5	350	0.44
SO_2 – Daily		0.9	125	0.73
SO_2 - Annual		0.007	10	0.07
PM_{10} – annual	0.01	0.04	40	0.09
PM_{10} – daily		4.6	50	9.11
$PM_{2.5}$ – annual		0.04	20	0.19

Nitrogen deposition- locally designated sites

For calculated nitrogen deposition for the locally designated sites is shown in Table 1-6 below based on the predicted NO_x and NH_3 concentrations in Table 1-5.

Table 1-6: Predicted nitrogen deposition at locally designated sites

Receptor	Habitat Type	Nitrogen deposition (kgN/ha/yr)			% Critical Load
		Oxidised	Reduced	Total	
Locally designated sites	Grassland	0.79	2.30	3.08	62
	Woodland	1.57	3.44	5.01	50

Table 1-6 shows that the nitrogen deposition does not need to be modelled at locally designated sites.

2. SITE DESCRIPTION

2.1 Site Location

The Site is located at 37-39 North Acton Road, with a total site area of 0.49 hectares (ha). The Site, which currently comprises three commercial/industrial buildings (two-storey) and associated parking, is bounded to the north, east and west by industrial and commercial buildings. A recreation ground and residential properties are located to the south and southwest (Figure 2-1).

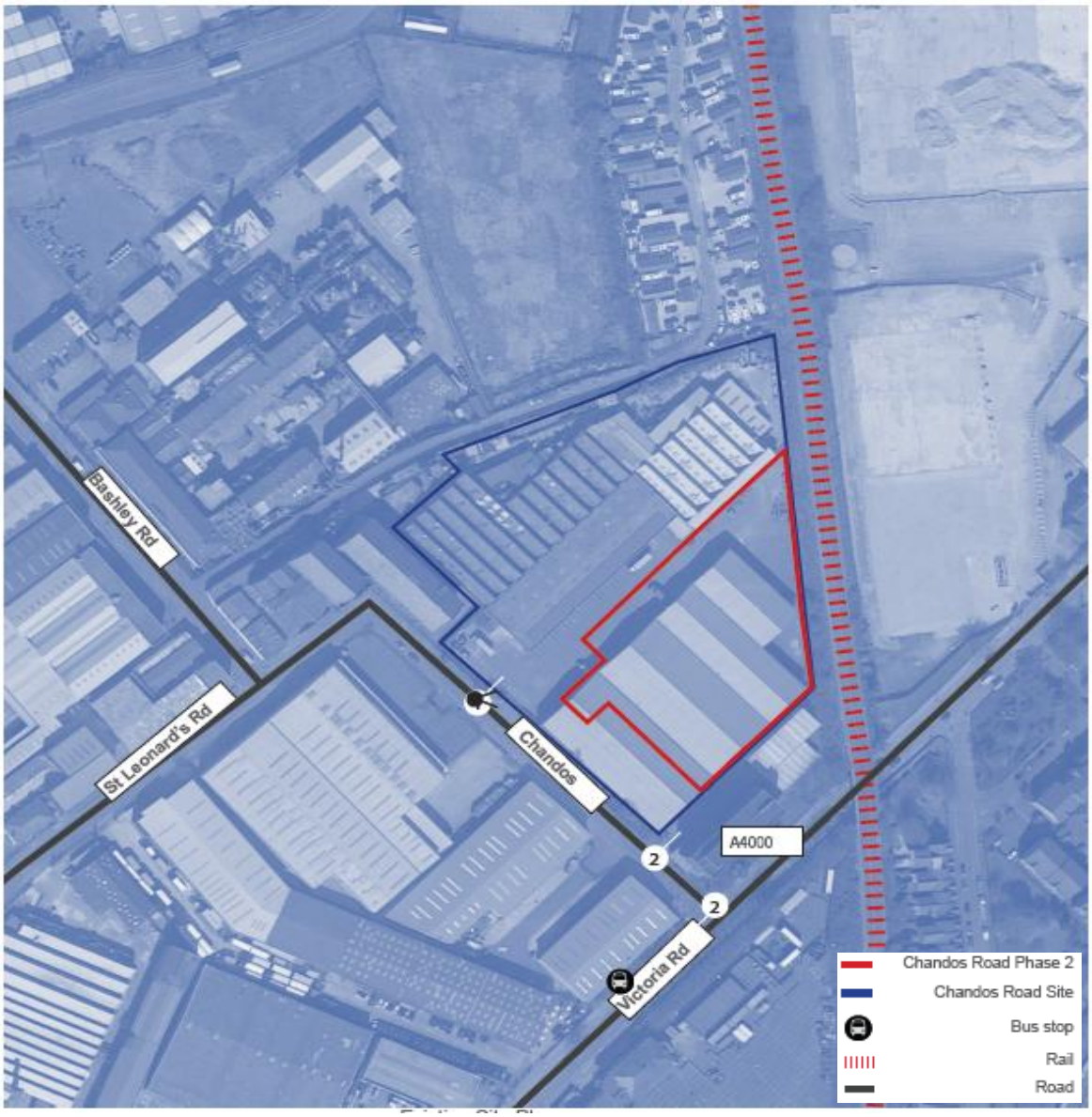


Figure 2-1: Site Location

2.2 Site Air Quality Designations

The whole of the London Borough of Ealing (LBE) has been declared an Air Quality Management Area (AQMA) for exceedances of the annual mean NO_2 and daily mean PM_{10} national air quality objectives (AQOs). The same applies to the east of the site, where the whole of Hammersmith and Fulham has similarly been declared an AQMA.

The site is located within the Old Oak and Park Royal Opportunity Area. All Non-Road Mobile Machinery (NRMM) within an Opportunity Areas used during demolition and construction phase will need to comply with stage IV emissions standards[3].

London's Ultra Low Emission Zone (ULEZ) was expanded on 26th October 2021 to create a single larger zone bound by the North and South Circular Roads, which now includes the whole of the site[4]. The site also lies within Victoria Road / Portal Way / Wales Farm Road Air Quality Focus Area.

In accordance with Environment Agency guidance, a screening distance of 2km has been used for Local Designated Sites and Sites of Special Scientific Interest (SSSI), and 10km for Special Protection Areas (SPAs) and Special Areas of Conservation (SAC). There are a total of 32 locally designated sites within the screening distance.

Wormwood Scrubs Local Nature Reserve lies approximately 600 m to the southeast of the Site; Richmond Park SAC and SSSI lies approximately 7.7km to the south and Wimbledon Common SAC and SSSI approximately 9.0km to the southeast. Whilst the emergency generator will not operate for extended periods of time, the impacts of emergency operations on these designated sites has been assessed.

[3] https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/nrmm

[4] https://tfl.gov.uk/modes/driving/ultra-low-emission-zone/ulez-where-and-when

3. ASSESSMENT CRITERIA

3.1 Air Emissions Risk Assessment

Guidance on air emissions risk assessments[5] was produced by the Environment Agency (EA) for developments which require a bespoke environmental permit under the *Environmental Permitting Regulations 2016 (as amended) (EPR)*. This guidance can be used to support an assessment of the overall impact of the emissions resulting from the installation to confirm that the emissions are acceptable (i.e. do not cause significant environmental pollution). In addition, the assessment has taken account of EA guidance on specified generators: *EA Emissions from specified generators* guidance[6] and *Data Centre FAQ Headline Approach*[7] guidance issued by the EA to assist with permit applications for data centres.

During the permit determination for the recent CyrusOne Stirling Road permit application (EA/EPR/EP3608PM/A001) the EA specifically requested information to be provided on the 100th percentile of one hour mean NO_2 concentrations for consideration against Daily Air Quality Index (DAQI) and Acute Exposure Guideline Levels (AEGLs). However, to date, no guidance has been provided by the EA on the acceptability criteria for these impacts.

3.2 Assessment Criteria

3.2.1 Human Health Receptors

The long term and short-term environmental assessment levels (EALs) that are applicable to this assessment are detailed in Table 1-2 in relation to human health.

3.2.2 Short Term NO_2 Concentrations

As the generators are only tested for a total of 24 hours per year each, the standard modelling approach of running the generators all year round and using the highest predicted concentrations is very conservative. This is because it is unlikely that the generators will be operating when worst case dispersion conditions occur. Hence, the EA guidance requiring a statistical approach for assessing the likelihood of exceeding the short term NO_2 objective is considered the most appropriate approach to adopt for assessing the environmental risk.

In terms of the testing, the monthly tests only involve each generator running individually for 24 hours, a maximum testing hours of 888 hours per year.

The model has been set up to run one generator operating all year, the annual mean results have been factored by the maximum testing hours of 888 hours per year. The 100th percentile of hourly mean NO_2 concentrations for each scenario have been considered as follows.

3.2.3 Daily Air Quality Index

The DAQI provides information to the public on levels of air pollution and provides recommended actions and health advice according to the levels. The index is numbered 1-10 and divided into four bands, low (1) to very high (10), to provide detail about air pollution levels in a simple way.

[5] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit sourced February 2021

[6] https://consult.environment-agency.gov.uk/psc/mcp-and-sg-regulations/supporting_documents/Specified%20Generators%20Modelling%20GuidanceINTERIM%20FINAL.pdf sourced November 2018

[7] Data Centre FAQ Headline Approach, DRAFT version 10.0 H.Tee 01/06/18 – Release to Industry

The band descriptions and hourly mean NO_2 concentrations corresponding to each level are shown in the following tables.

Recommended Actions and Health Advice

Air Pollution Banding	Value	Accompanying health messages for at-risk individuals*	Accompanying health messages for the general population
Low	1-3	**Enjoy** your usual outdoor activities.	**Enjoy** your usual outdoor activities.
Moderate	4-6	Adults and children with lung problems, and adults with heart problems, **who experience symptoms**, should **consider reducing** strenuous physical activity, particularly outdoors.	**Enjoy** your usual outdoor activities.
High	7-9	Adults and children with lung problems, and adults with heart problems, should **reduce** strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms. People with asthma may find they need to use their reliever inhaler more often. Older people should also **reduce** physical exertion.	Anyone experiencing discomfort such as sore eyes, cough or sore throat should **consider reducing** activity, particularly outdoors.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should **avoid** strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	**Reduce** physical exertion, particularly outdoors, especially if you experience symptoms such as cough or sore throat.

Ozone | Nitrogen Dioxide | Sulphur Dioxide | PM2.5 Particles | PM10 Particles

Nitrogen Dioxide

Based on the hourly mean concentration.

Index	1	2	3	4	5	6	7	8	9	10
Band	Low	Low	Low	Moderate	Moderate	Moderate	High	High	High	Very High
µg/m³	0-67	68-134	135-200	201-267	268-334	335-400	401-467	468-534	535-600	601 or more

3.2.4 Acute Exposure Guideline Levels

AEGLs describe the human health effects from once-in-a-lifetime, or rare, exposure to airborne chemicals. Used by emergency responders when dealing with chemical spills or other catastrophic exposures, AEGLs are set through a collaborative effort of the public and private sectors worldwide. AEGLs are calculated for five relatively short exposure periods – 10 minutes, 30

minutes, 1 hour, 4 hours, and 8 hours – as differentiated from air standards based on longer or repeated exposures. AEGL "levels" are dictated by the severity of the toxic effects caused by the exposure, with Level 1 being the least and Level 3 being the most severe.

All levels are above which it is predicted that the general population could experience, including susceptible individuals:

Level 1

- Notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

Level 2

- Irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

Level 3

- Life-threatening health effects or death.

Below AEGL Level 1

Airborne concentrations below the AEGL-1 represent exposure levels that could produce mild and progressively increasing but transient and non-disabling odour, taste, and sensory irritation or certain asymptomatic, non-sensory effects. With increasing airborne concentrations above each AEGL, there is a progressive increase in the likelihood of occurrence and the severity of effects described for each corresponding AEGL.

AEGL values represent threshold levels for the general public, including susceptible subpopulations, such as infants, children, the elderly, persons with asthma, and those with other illnesses. However, it is recognized that individuals, subject to unique or idiosyncratic responses, could experience the effects described at concentrations below the corresponding AEGL. The nitrogen dioxide AEGLs are shown below.

Nitrogen dioxide Result - AEGL Program

Nitrogen dioxide 10102-44-0 (Final)

	10 min	30 min	60 min	4 hr	8 hr
ppm					
AEGL 1	0.50	0.50	0.50	0.50	0.50
AEGL 2	20	15	12	8.2	6.7
AEGL 3	34	25	20	14	11

As the levels are provided in ppm, they have been converted to µg/m^3 assuming 1ppm = 1,912.5 µg/m^3. AEGL-1 is the most stringent, and has the same value of 956 µg/m^3 for all averaging periods between 10 minutes and 8 hours.

3.2.5 Nature Conservation Receptors

NO_x concentrations

In addition to the NAQO for human health, there is a critical level for the protection of vegetation and ecosystems of 30µg/m^3 as an annual average. In addition, in terms of the assessment of the impacts of NO_x emissions for an Environmental Permit, the assessment is required to consider the daily mean concentration against a critical level of 75µg/m^3 where ozone is above the AOT40 critical level and SO_2 concentrations are above the lower critical load of 10 µg/m^3.

Background Automatic Air Quality Monitoring Stations (AAQMS) and background data maps accessed from the Department for Environment, Food and Rural Affairs (Defra) data archive were reviewed to determine whether any exceedances of the O_3 or SO_2 Critical Levels may be exceeded within the study area.

Two background AAQMS closest to the project boundary were identified using the Defra interactive monitoring network map[8], these sites are London North Kensington and London Haringey Priory Park South. Hourly O_3 and SO_2 monitoring data from 2018 – 2022 were downloaded for Kensington; SO_2 is not monitored at London Haringey Priory Park South so only O_3 data were obtained. The O_3 background monitoring results for London North Kensington and London Haringey Priory Park South are shown in Table 3-1 and Table 3-2 respectively. The SO_2 background monitoring results for London North Kensington are shown in Table 3-3.

Table 3-1: Ozone AOT40 monitoring results for London North Kensington

Year	Vegetation Protection Ozone AOT40
2018	10,648
2019	4,711
2020	7,424
2021	4,538
2022	7,391
Five-year Average	6,942
Critical Level	Target value of 6,000 µg/m^3 averaged over five years

Table 3-2: Ozone AOT40 monitoring results for London Haringey Priory Park South

Year	Vegetation Protection Ozone AOT40
2018	9,961
2019	3,685

[8] DEFRAs, Interactive Monitoring networks Map, https://uk-air.defra.gov.uk/interactive-map, [Accessed 04/10/2023]

Year	Vegetation Protection Ozone AOT40
2020	7,726
2021	2,338
2022	8,017
Five-year Average	6,345
Critical Level	Target value of 6,000 µg/m^3 averaged over five years

Table 3-3: Annual mean SO_2 monitored concentrations for London Kensington

Year	Annual Sulphur Dioxide Concentrations (µg/m^3)
2018	1.4
2019	1.6
2020	2.3
2021	2.3
2022	0.8
Five-year Average	1.7
Critical Level	10

The results presented in Table 3-1 and Table 3-2 show that the concentrations of ozone are above the Critical Level of 6,000 µg/m^3 for vegetation protection, with the highest concentrations recorded in 2018 at both monitoring sites. As such, the daily mean NO_x concentration has been evaluated against the critical level of 75µg/m^3. Discounting the results from 2018 would have the potential to alter the assessment level to 200µg/m^3.

4. METHODOLOGY

4.1 Baseline

In order to establish baseline air quality in the vicinity of the Site, relevant monitoring data was reviewed and assessed. Data was obtained from the following sources:

- Diffusion tubes operated by the London Borough of Ealing (LBE) and associated Annual Progress Report[9]; and
- Department of Environment, Food and Rural Affairs (Defra) background maps[10].

No additional site-specific air quality monitoring was carried out.

4.2 Emergency Generator Impacts

4.2.1 Model Set Up

4.2.1.1 Emission Rates and Operating Hours for Emergency Operation

Air quality impacts were modelled using the Atmospheric Dispersion Modelling System (ADMS 6)[11] air quality dispersion model, originally developed for regulatory authorities in the UK. The model uses representative meteorological data for the local area and plant emissions data to predict ambient concentrations of pollutants in the vicinity of the site.

For dispersion modelling purposes it is assumed that the generators will be operational all year round and the annual average impacts can be factored by the calculated allowable operating hours for emergency operation. The allowable operating hours for emergency operation are primarily estimated from a statistical analysis of the likelihood of breaching the 1-hour objective for NO_2 concentrations.

The statistical approach allows for the fact that operation will only occur for a limited number of hours per year, and therefore operation is unlikely to occur during the meteorological conditions giving rise to the highest hourly average concentrations.

Emission rates and volumetric flowrates have been based on data contained in the Kohler KD3500 sheet (Appendix B) using the emission concentrations corresponding to Emergency Standby Power (ESP), which represents the worst-case emission. Flue heights and diameters were taken from the CAD layout drawings which indicated a flue height of 50m (6 m above the height of the chillers) and flue diameter of 0.6 m. The modelled flue parameters are shown in Figure 4-2.

In order to undertake the assessment, for LHR11 each generator was allocated its own flue and the flues arranged five in one stack and four in three other stacks (making a total of 17 generators). For LHR12, the stacks were arranged in two rows of 10 stacks parallel to one another, giving a total of 20 stacks; overall there are 37 generators for both LHR11 and LHR12. The locations of the flues used in the modelling are shown in Figure 4-1.

The grid references of the modelled flue locations are provided in Appendix C.

[9] London Borough of Ealing, 2022. London Borough of Ealing Air Quality Annual Status Report for 2022 (V1).
[10] https://uk-air.defra.gov.uk/data/laqm-background-home
[11] https://www.cerc.co.uk/environmental-software/ADMS-model.html

Table 4-1: Full Load Emission Data

Equipment	Model Input				
	Flue Height m	Flow rate Am^3/s	Temperature ^oC	Velocity m/s	Diameter m
LHR11 1 to 17	50.0	10.266	510	36.3	0.6
LHR12 1 to 20					

4.2.1.2 Buildings

The following figure illustrates the building layouts, with the flues shown in red. The buildings parameters are described in Appendix C. The data centre building was modelled at 39.7m high.

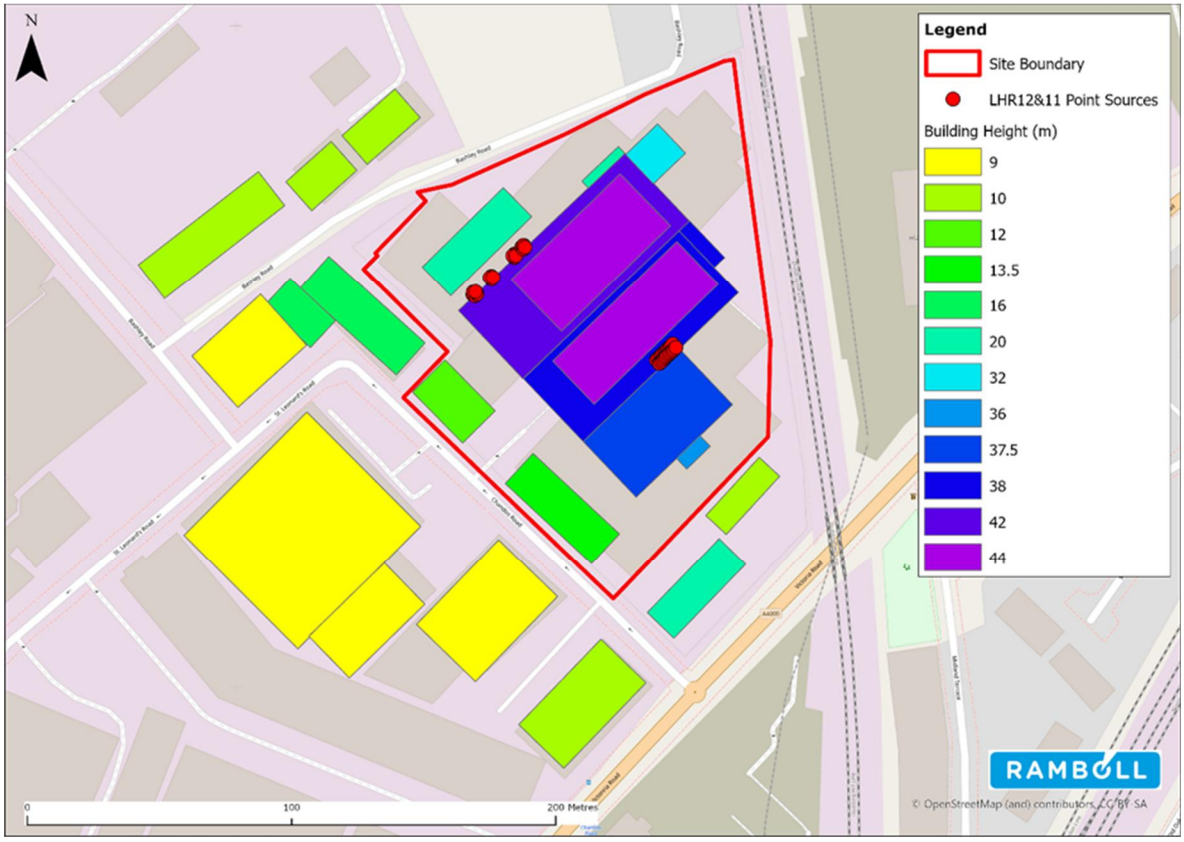


Figure 4-1: Buildings

4.2.1.3 Meteorological Data

The modelling has used 5 years' worth of meteorological data for 2018-2022 from the Heathrow Airport meteorological station which is located approximately 14km to the west of the Site. The results from the year that gave the highest predicted concentrations have been reported in the assessment.

Heathrow Airport was chosen for the assessment as the meteorological data is representative of the conditions in the western portion of London and was the meteorological station used for the planning application for the development. The main alternative station for assessments in London is London City Airport, but this is located further from the site in eastern London where meteorological conditions may be different due to the influence of the urban area of London.

4.2.1.4 Human Health Receptors

Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. Several locations have been identified as receptors for the assessment, both at industrial/commercial locations (where the 1-hour mean AQO applies) and at residential receptor locations (where both the annual mean and 1-hour mean AQOs apply).

The locations of existing receptors were chosen to represent locations where impacts from the generators are likely to be the greatest. These locations are described in Table 4-2 and shown in Figure 4-2. Receptors were modelled at varying heights depending on the estimated height of the buildings in which they are located. An average of 3m per floor has been used to estimate building and receptor heights.

In addition to individual receptor points, a grid of receptors was used to illustrate the spatial variation in dispersion in order to visually demonstrate the pattern of dispersion. The grid was modelled at zero metres height to show the dispersion pattern at sensitive residential receptors.

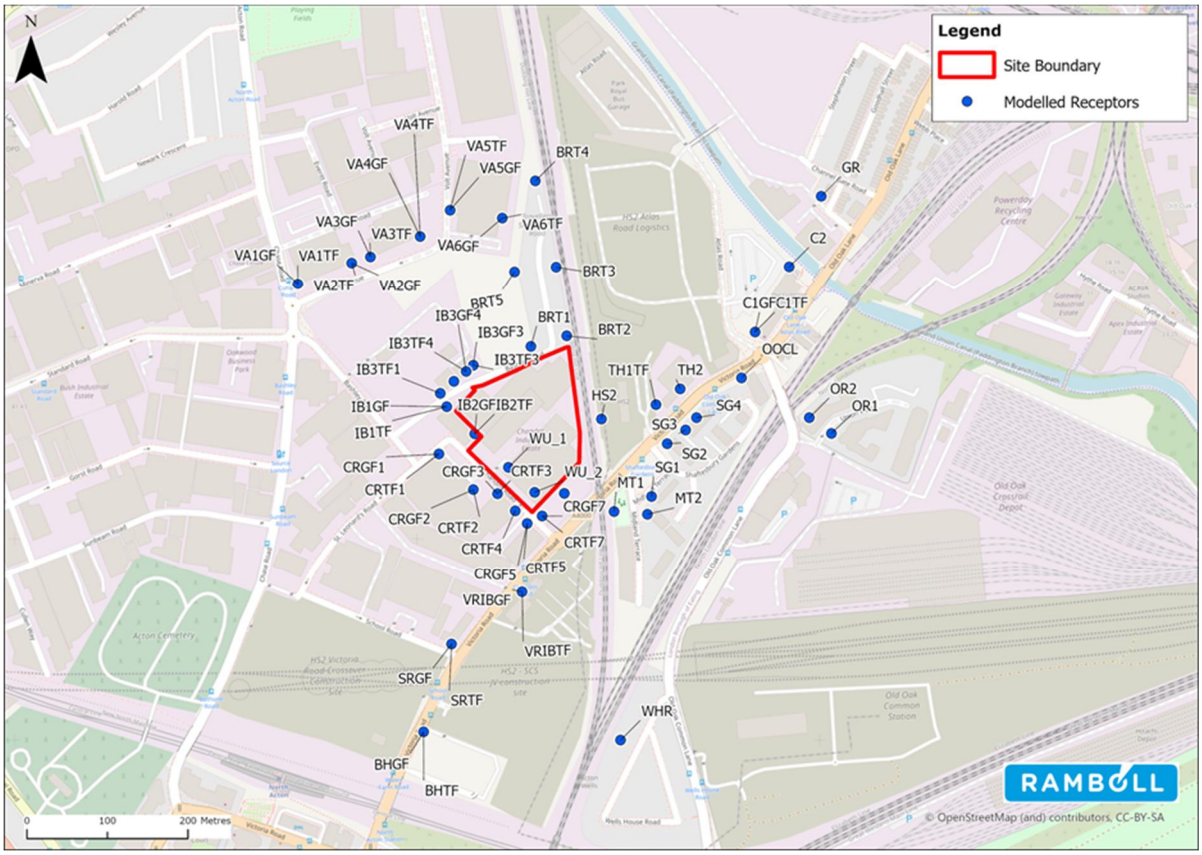


Figure 4-2: Human Health Receptor Locations

Table 4-2: Receptor Locations

Receptor	Location	Type	x	y	Height (m)
BRT1	Bashley Road, Travellers Site	Potential Long Term Exposure	521142	182488	0
BRT2	Bashley Road, Travellers Site	Potential Long Term Exposure	521186	182501	0
BRT3	Bashley Road, Travellers Site	Potential Long Term Exposure	521173	182587	0
BRT4	Bashley Road, Travellers Site	Potential Long Term Exposure	521147	182694	0
BRT5	Bashley Road, Travellers Site	Potential Long Term Exposure	521121	182581	0
MT1	Midland Terrace	Residential	521245	182284	0
MT2	Midland Terrace	Residential	521286	182281	0
SG1	Midland Terrace	Residential	521291	182303	0
SG2	Shaftesbury Gardens	Residential	521311	182368	0
SG3	Shaftesbury Gardens	Residential	521334	182385	0
SG4	Shaftesbury Gardens	Residential	521347	182400	0
OOCL	Shaftesbury Gardens	Residential	521403	182449	0
C1 (GF & TF)	Atlas Road/Old Okland Road	GF - Office/ Commercial TF - Potential Long Term Exposure (Hotel/ Residential)	521420	182506	0, 18
C2 (GF & TF)	Atlas Road/Old Okland Road	GF - Office/ Commercial TF - Potential Long Term Exposure (Hotel/ Residential)	521462	182587	0, 18
GR	Goodhall Street	Residential	521502	182675	0
WHR	Wells House Road	Residential	521253	182000	0
TH1 (GF & TF)	Tudor House, Victorian Road	Office	521297	182416	0, 9

Receptor	Location	Type	x	y	Height (m)
TH2 (GF & TF)	Tudor House, Victorian Road	Office	521327	182436	0, 9
IB1 (GF & TF)	Chandos Road	Commercial /Industrial	521037	182414	0, 11
IB2 (GF & TF)	Chandos Road	Commercial /Industrial	521072	182380	0, 11
IB3 1 (GF & TF)	Bashley Road	Commercial /Industrial	521029	182430	0, 9
IB3 2 (GF & TF)	Bashley Road	Commercial /Industrial	521046	182445	0, 9
IB3 3 (GF & TF)	Bashley Road	Commercial /Industrial	521070	182465	0, 9
IB3 4 (GF & TF)	Bashley Road	Commercial /Industrial	521061	182457	0, 9
CR 1 (GF & TF)	Chandos Road	Commercial /Industrial	521027	182355	0, 4
CR 2 (GF & TF)	Chandos Road	Commercial /Industrial	521070	182311	0, 4
CR 3 (GF & TF)	Chandos Road	Commercial /Industrial	521100	182306	0, 4
CR 4 (GF & TF)	Chandos Road	Commercial /Industrial	521122	182285	0, 4
CR 5 (GF & TF)	Chandos Road	Commercial /Industrial	521137	182269	0, 4
CR 6 (GF & TF)	Chandos Road	Commercial /Industrial	521183	182307	0, 15
CR 7 (GF & TF)	Chandos Road	Commercial /Industrial	521155	182278	0, 15
VA1 (GF & TF)	Volt Avenue	Commercial /Industrial	520852	182566	0, 7
VA2 (GF & TF)	Volt Avenue	Commercial /Industrial	520919	182592	0, 7
VA3 (GF & TF)	Volt Avenue	Commercial /Industrial	520942	182600	0, 7

Receptor	Location	Type	x	y	Height (m)
VA4 (GF & TF)	Volt Avenue	Commercial /Industrial	521004	182625	0, 7
VA5 (GF & TF)	Volt Avenue	Commercial /Industrial	521041	182658	0, 7
VA6 (GF & TF)	Volt Avenue	Commercial /Industrial	521106	182648	0, 7
BH (GF & TF)	Victoria Road	Commercial /Industrial	521008	182010	0, 15
SR (GF & TF)	Victoria Road	Commercial /Industrial	521043	182119	0, 7
VRIB (GF & TF)	Victoria Road	Commercial /Industrial	521131	182184	0, 6
HS2	Victoria Road	Commercial /Industrial	521229	182398	0
OR1 (GF & TF)	Oaklands Rise	GF - Commercial TF - Residential	521515	182381	0, 48
OR2 (GF & TF)	Oaklands Rise	GF - Commercial TF - Residential	521487	182400	0, 48
WU_1 (GF & TF)	Site working units	Commercial /Industrial	521114	182339	0, 9
WU_2 (GF & TF)	Site working units	Commercial /Industrial	521146	182307	0, 9
GF: ground floor. TF: Top floor.					

4.2.2 Environment Agency Criteria

4.2.2.1 Specified Generator Guidance

The assessment has principally been carried out following the *EA Emissions from specified generators [Version 1] guidance*[12] and the referenced guidance therein, including the *EA Guidance* for detailed air quality assessments as set out on the *UK Government website*[13].

For dispersion modelling purposes it is assumed that the generators will be operational all year round. The allowable hours for emergency operation are estimated from a statistical analysis of

[12] https://consult.environment-agency.gov.uk/psc/mcp-and-sg-regulations/supporting_documents/Specified%20Generators%20Modelling%20GuidanceINTERIM%20FINAL.pdf sourced June 2021.
[13] https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports sourced June 2021.

the likelihood of breaching the hourly mean NO_2 AQO (taking into account baseline pollutant concentrations).

Guidance provided by the Environment Agency provides a methodology to assess the probability of exceedances of the hourly mean AQO. The hypergeometric probability distribution test provides an estimate of the probability of breaching the AQO given random use of the generators for a total number of operating hours per year. Table 4-3 shows how the calculated probabilities are judged by the Environment Agency.

The 1% probability is normally used as the benchmark to calculate the allowable operating hours during emergency operation; if the generators had a life of less than 20 years then it may be possible to use the 5% probability level although this does not increase the allowable operating hours significantly.

Table 4-3: Probability Significance for hourly mean AQO

Probability	Significance
1%	Indicates exceedance is highly unlikely
5%	Indicates that exceedance is unlikely provided generator lifetime is less than 20 years
>5%	Indicates potential for exceedance

The annual mean pollutant concentrations are calculated on the assumption that all of the generators will operate in an emergency for the number of hours allowed during emergency operation determined by the probability of exceedance.

4.2.3 Ecological Receptors

Environment Agency screening criteria has been used to select specific ecological receptors for the assessment:

- Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites within 10km; and
- Sites of Special Scientific Interest (SSSIs) and local nature sites (ancient woods, local wildlife sites and national and local nature reserves) within 2km.

The location of the three sites that meet the above criteria is shown in Figure 4-4 and described in Table 4-4.

Table 4-4: Modelled Ecological Habitats

Site Name	Model ID	Designation
Richmond Park	RPSAC	Special Area of Conservation and Site of Specific Scientific Information
Wimbledon Common	WCSAC	Special Area of Conservation Site of Specific Scientific Information
Wormwood Scrubs	WSLNR	Local Nature Reserve
Abbey Road Mound and Bestway Park	AbRdMount	Site of Importance to Nature Conservation
Acton Park & Acton Lane Sports Ground	ActonPark	Site of Importance to Nature Conservation
Acton Railsides	ActonRail_01	Site of Importance to Nature Conservation

Site Name	Model ID	Designation
Acton Railsides	ActonRail_02	Site of Importance to Nature Conservation
Acton Railsides	ActonRail_03	Site of Importance to Nature Conservation
Acton Railsides	ActonRail_04	Site of Importance to Nature Conservation
Brentfield Open Space	BrentOpenSpace	Site of Importance to Nature Conservation
Canal Feeder	BrentCanFeeder	Site of Importance to Nature Conservation
Canal Feeder	CanalFeeder	Site of Importance to Nature Conservation
Central line west of White City	Central_WWhiteC	Site of Importance to Nature Conservation
Central line west of White City	CentralWest_01	Site of Importance to Nature Conservation
Central Line and Castle Bar	CentralWest_02	Site of Importance to Nature Conservation
Central line west of White City	WhiteCityGar	Site of Importance to Nature Conservation
Connell Crescent Allotments	Connell_Cres	Site of Importance to Nature Conservation
Diageo Lake & Coronation Gardens	DiageoLake_North	Site of Importance to Nature Conservation
Diageo Lake & Coronation Gardens	DiageoLake_South	Site of Importance to Nature Conservation
Elmwood Green	Elmwood	Site of Importance to Nature Conservation
Former Guinness Mounds	GuinnessMound	Site of Importance to Nature Conservation
Harlesden to Wembley Central railsides, including the Wembley Brook	Harl_Wem_Brook	Site of Importance to Nature Conservation
Harlesden to Wembley Central railsides, including the Wembley Brook	HarlWebCen	Site of Importance to Nature Conservation
Harlesden to Wembley Central railsides, including the Wembley Brook	WemBrook	Site of Importance to Nature Conservation
Kensal Green Cemetery	KensalGrnCem	Site of Importance to Nature Conservation
Little Wormwood Scrubs Park	LilWormScrubs	Site of Importance to Nature Conservation
London's Canals	GUC_EAST_DHL_01	Site of Importance to Nature Conservation
London's Canals	GUC_North	Site of Importance to Nature Conservation
London's Canals	GUC_Tow	Site of Importance to Nature Conservation
London's Canals	GUC_West	Site of Importance to Nature Conservation
London's Canals	LonCanal	Site of Importance to Nature Conservation

Site Name	Model ID	Designation
London's Canals	RailSideHab_01	Site of Importance to Nature Conservation
London's Canals	RailSideHab_02	Site of Importance to Nature Conservation
Mason's Green Lane	MasonGreenLn	Site of Importance to Nature Conservation
North Acton Cemetery	NorthActon	Site of Importance to Nature Conservation
North Acton Cemetery	NorthActonCem	Site of Importance to Nature Conservation
Old Oak Common Sidings Birch Wood	OldOak_Sidings_02	Site of Importance to Nature Conservation
Old Oak Sidings	OldOak_Sidings	Site of Importance to Nature Conservation
Piccadilly and District Lines in Ealing	Picc_Dist_Ealing	Site of Importance to Nature Conservation
River Brent at Hanger Lane	RiverBrentHang	Site of Importance to Nature Conservation
River Brent west of Stonebridge	RiverBrentWest	Site of Importance to Nature Conservation
Roundwood Park and Willesden Cemeteries	RndWdPk_WilsCem	Site of Importance to Nature Conservation
Silverlink Metro and Dudding Hill Loop railsides in Ealing	DHL_02	Site of Importance to Nature Conservation
Silverlink Metro and Dudding Hill Loop railsides in Ealing	DHL_03	Site of Importance to Nature Conservation
Silverlink Metro between Brondesbury and Willesden Junction	CentralWestRuis	Site of Importance to Nature Conservation
Silverlink Metro between Brondesbury and Willesden Junction	SilMet	Site of Importance to Nature Conservation
St Mary's Cemetery	StMarysCem	Site of Importance to Nature Conservation
St Mary's Cemetery	StMarysRC_Cem	Site of Importance to Nature Conservation
St Mary's Churchyard, Willesden	StMaryChurchYrd	Site of Importance to Nature Conservation
The Old Orchard	TheOldOrch	Site of Importance to Nature Conservation
Trinity Way Recreation Ground	Trinity_Way	Site of Importance to Nature Conservation
Twyford Abbey Grounds	Twyford_AbGround	Site of Importance to Nature Conservation
Wesley Playing fields	WesleyPlaying	Site of Importance to Nature Conservation

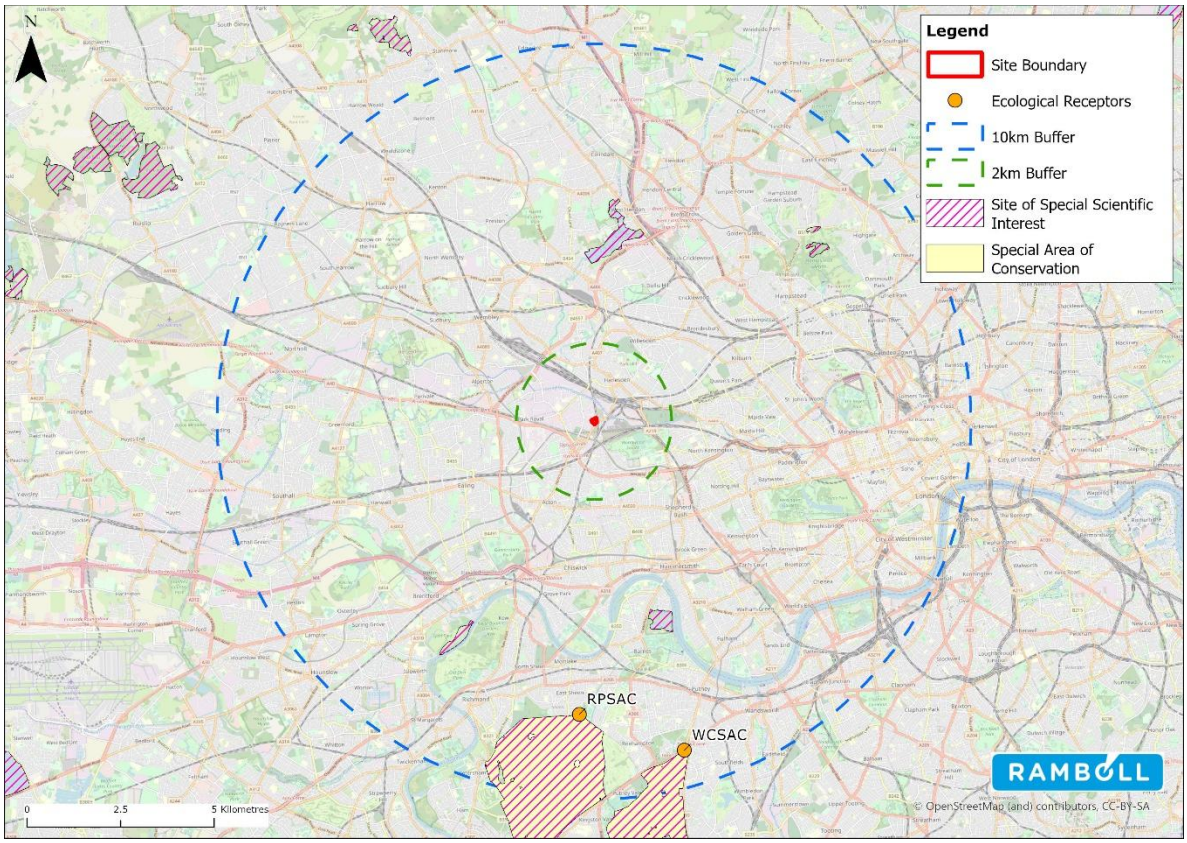


Figure 4-3: Ecological Receptors within 10km of the site

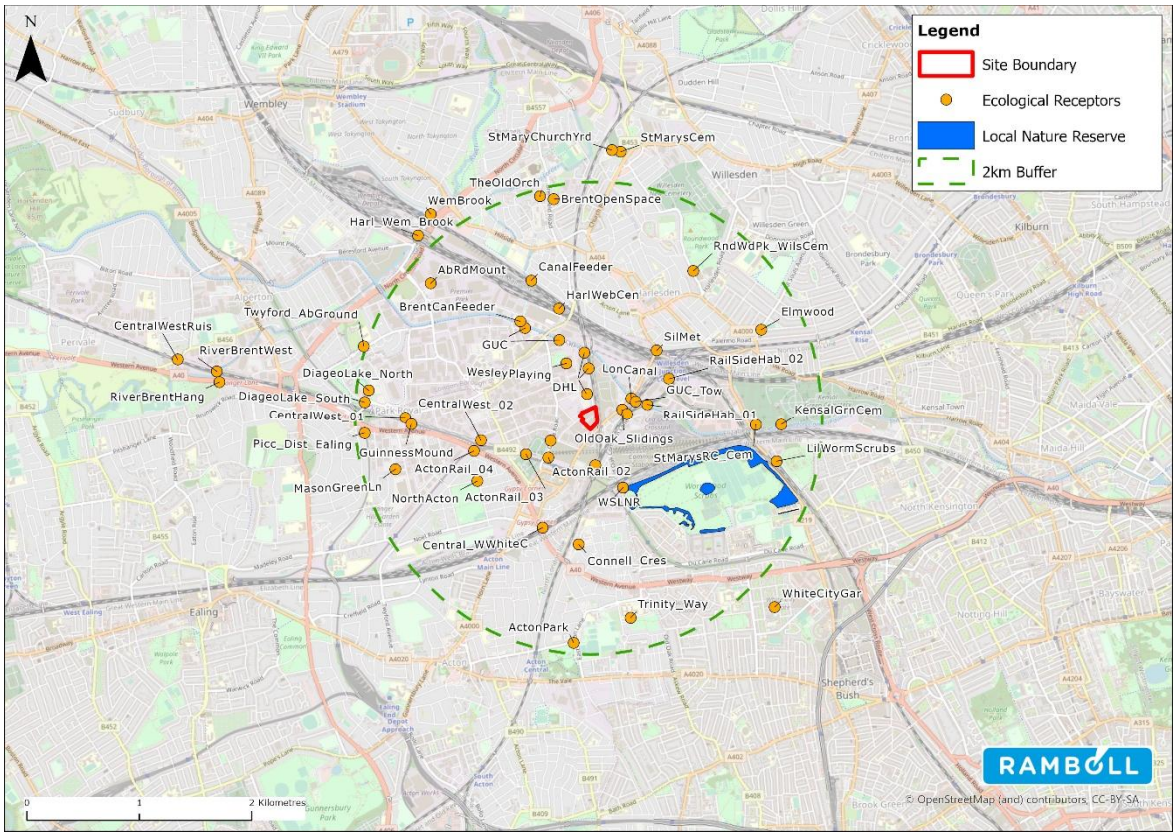


Figure 4-4: Ecological Receptors within 2km of the Site

5. BASELINE ASSESSMENT

5.1 Local Air Quality Management

LBE has investigated air quality within its area as part of its responsibilities under the LAQM regime. A whole borough AQMA has been declared due to exceedances of the annual mean NO_2 objectives.

5.2 Nitrogen Dioxide Monitoring

LBE deploys NO_2 diffusion tubes at several locations within the borough. The closest and most representative diffusion tube monitoring locations are shown in Figure 5-1 and described in Table 5-1.

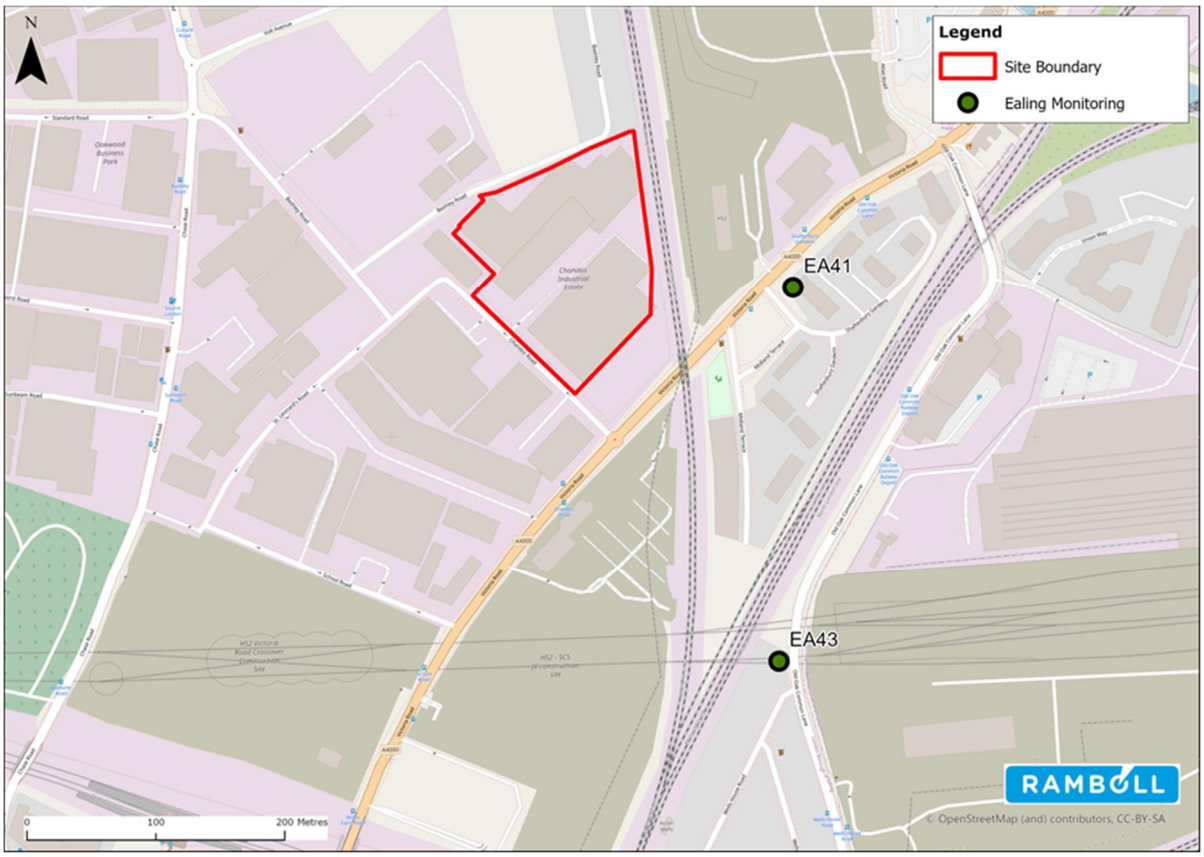


Figure 5-1: Monitoring Locations in the vicinity of the site

Table 5-1: Measured NO_2 Concentrations

Site ID	Site Type	Within AQMA	Annual Mean (µg/m^3)						
			2016	2017	2018	2019	2020*	2021	2022
EA41	Roadside	Y	37.7	32.6	32.6	30.0	25.2	24.2	23.2
EA43	Roadside	Y	40.5	36.9	36.6	33.2	24.9	24.4	25.4
Objective			40						

Exceedances of the objective highlighted in bold.
*2020-2021 monitoring data measured during Covid-19 pandemic scenario with restriction to travel imposed and therefore pollutant concentrations are likely to be lower than previous years and are unlikely to be representative of standard conditions.

Measured roadside NO_2 concentrations at diffusion tube EA41 and EA43 have been in compliance with the annual mean objective from 2016-2022. The data shows a downward trend between 2016 and 2019 which would be expected to continue in the future due to improvements in vehicle emissions and policy measures taken to reduce pollution within London. The impact of the Covid 19 pandemic in 2020 is likely to reduce pollutant concentrations making measured data during this period unrepresentative of long-term trends.

5.3 Background Concentrations

In addition to measured concentrations, estimated background concentrations have been obtained from the national maps provided by Defra[14] (shown in Table 5-2). The mapped background concentrations were calibrated against background concentrations measured at the EA03 diffusion tube and KC1 automatic monitoring sites (see Appendix D for more details).

Table 5-2: Estimated Annual Mean Background Concentrations

Year	Location	Annual Mean (µg/m^3)	
		NO_x	NO_2
2023	521500 182500	-	22.7
	520500 182500	-	24.3
	520500 174500	22.1	-
	523500 173500	26.5	-
	521500 181500	32.0	-
Objectives		30*	40

*relevant for ecological receptors

5.4 Baseline Concentrations used in the assessment

5.4.1 Human Health Receptors

The closest receptor locations to the proposed development site are the industrial and commercial buildings on Park Royal and the travellers' site at Bashley Road. These locations are not immediately adjacent to busy roads and are typical of urban background locations. The Defra

[14] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018 [Accessed September 2023]

predicted background concentrations for these locations in 2023 are relatively low and lower than the measured concentrations at EA41 and EA43 in 2022.

On a conservative basis, the average of the measured concentrations at EA41 and EA43 (25.4µg/m^3) has been used to represent the annual mean baseline NO_2 concentration for the assessment. This will be conservative for elevated receptor locations where the concentration will reduce to background levels, and also conservative regarding the future concentrations which will be lower.

For hourly mean concentrations, in accordance with Environment Agency guidance, a value of twice the annual mean has been used, 50.8µg/m^3.

In order to assess the number of operating hours equal to a 1% chance of exceeding the 1 hour mean objective, the modelling has used a NO_2 predicted environmental concentration of 200µg/m^3. With a baseline of 50.8µg/m^3, the allowable NO_2 process contribution (PC) (i.e. from the development) is 149.2µg/m^3 which is equivalent to a NO_x concentration of 426.3µg/m^3.

5.4.2 Ecological Receptors

For the ecological receptors, the background data in Table 5-2 has been used for NO_x concentrations. For nitrogen and acid deposition, the results of the modelling show that the PCs are insignificant and therefore the baseline deposition data has not been presented herein.

6. ASSESSMENT OF IMPACTS

6.1 Human Health Receptors

6.1.1 Emergency Operation

The modelling has been undertaken to determine the emergency operation with a 1% probability of exceeding the objective.

Table 6-1 shows the results of the modelling for the highest impacted receptor for any of the assessed residential, commercial and industrial receptor locations in the vicinity of the development.

Table 6-1: Probability of exceeding 1 hour mean NO_2 objective

Operating hours	1% probability	5% probability
	1780	2069

During the emergency scenario, the allowable operating hours for a 1% probability of exceeding the objective would be 1780 hours. Which equates to 74 days and is far in exceedance of the likely operating hours in an emergency. If the emergency generators were to operate for 2069 hours, the probability of exceedance would be 5% indicating that exceedances are unlikely provided the lifetime of the generator is less than 20 years.

The combined the maximum probability occurs to the east of the site, around Oaklands Rise, the areas of 1% probability are small with much lower probabilities outside of the areas of maxima.

6.1.1.1 Long term impacts

The results from the hypergeometric analysis (Table 6-1) show that the allowable operating hours in an emergency are far higher than those which would actually be required as this suggests a total loss of grid power to this area of London for over 74 days. As such, the annual mean impacts have been factored to assume the emergency generators will run for 72-hours or three days. It is considered that the predicted impacts are conservative as it would require a loss of grid power to this area of London for 3 days in a year.

6.1.1.2 Nitrogen Dioxide Results

The maximum predicted annual mean NO_2 concentrations for all assessed receptor locations that are relevant for annual mean impacts (Residential areas, schools and hospitals) for 72-hours emergency operation are presented in Table 6-2.

Table 6-2: Predicted Annual Mean NO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	NO_2 Process Contribution ($\mu g/m^3$)	% Change in concentration relative to AQO	Background NO_2 ($\mu g/m^3$)	Annual Mean NO_2 ($\mu g/m^3$)	% EAL
BRT1	0	0.06	0.2%	25.4	25.5	63.7%
BRT2	0	0.05	0.1%	25.4	25.4	63.6%
BRT3	0	0.15	0.4%	25.4	25.5	63.9%
BRT4	0	0.15	0.4%	25.4	25.6	63.9%
BRT5	0	0.11	0.3%	25.4	25.5	63.8%
MT1	0	0.02	0.1%	25.4	25.4	63.6%

Receptor	Height (m)	NO_2 Process Contribution ($\mu g/m^3$)	% Change in concentration relative to AQO	Background NO_2 ($\mu g/m^3$)	Annual Mean NO_2 ($\mu g/m^3$)	% EAL
MT2	0	0.05	0.1%	25.4	25.4	63.6%
SG1	0	0.05	0.1%	25.4	25.4	63.6%
SG2	0	0.10	0.3%	25.4	25.5	63.8%
SG3	0	0.18	0.5%	25.4	25.6	64.0%
SG4	0	0.22	0.6%	25.4	25.6	64.1%
C2TF	18	0.19	0.5%	25.4	25.6	64.0%
OOCL	0	0.26	0.7%	25.4	25.7	64.2%
C1TF	18	0.26	0.6%	25.4	25.7	64.1%
GR	0	0.15	0.4%	25.4	25.6	63.9%
WHR	0	0.05	0.1%	25.4	25.4	63.6%
OR1GF	0	0.18	0.4%	25.4	25.6	63.9%
OR1TF	48	0.20	0.5%	25.4	25.6	64.0%
OR2GF	0	0.20	0.5%	25.4	25.6	64.0%
OR2TF	48	0.24	0.6%	25.4	25.6	64.1%
Grid maxima (521375, 182437)	0	0.27	0.6%	25.4	25.7	64.1%
Objective		40				-

Figure 6-1 shows the maximum annual mean NO_2 concentrations during an emergency for 72-hours operation. The contours are the maximum PC from any of the five years of meteorological data modelled and are therefore do not represent the impacts from any one single year. Whilst the annual mean NO_2 concentration is only relevant at locations where there are likely to be receptors present for long periods of time, e.g. residential receptors, the grid maxima is provided. As the grid maximum PC is less than 1%, the impacts are not significant.

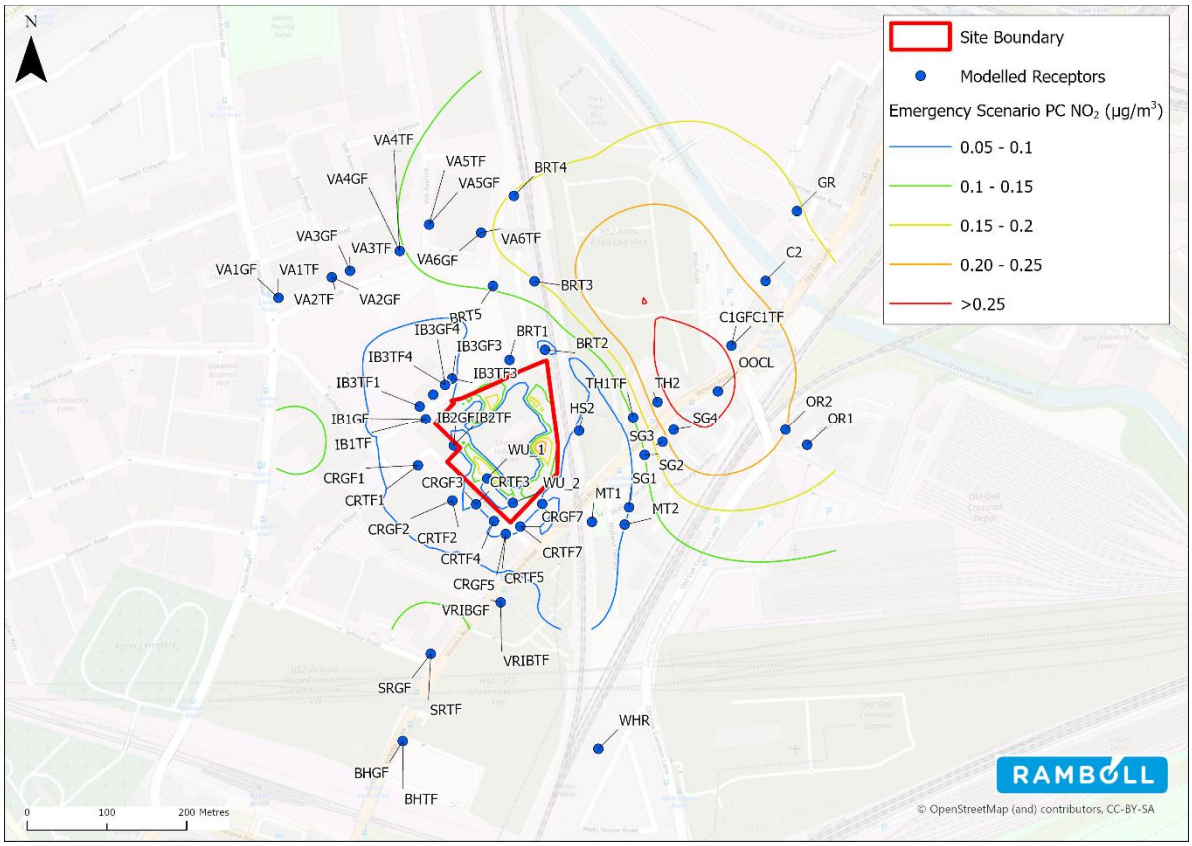


Figure 6-1: Annual Mean NO_2 Process Contribution for 72-hour operation

6.1.2 Short-term Impacts

6.1.2.1 Nitrogen Dioxide predicted 100th Percentile

Table 6-3 shows the largest predicted 100%ile hourly mean NO_2 PEC concentrations during the emergency scenario in relation to the DAQI and AEGL. Full results shown in Appendix F.

Table 6-3: Predicted 100th percentile NO_2 Concentrations for Emergency Operation (µg/m³)

Receptor	Height (m)	1 hour average		
		µg/m³	AEGL	DAQI Level
BRT1	0	203.4	Below AEGL-1	4
BRT2	0	221.7	Below AEGL-1	4
BRT3	0	163.7	Below AEGL-1	3
BRT4	0	154.2	Below AEGL-1	3
BRT5	0	174.9	Below AEGL-1	3
MT1	0	220.7	Below AEGL-1	4
MT2	0	188.1	Below AEGL-1	3
SG1	0	186.5	Below AEGL-1	3

Receptor	Height (m)	1 hour average		
		µg/m^3	AEGL	DAQI Level
SG2	0	199.0	Below AEGL-1	3
SG3	0	185.4	Below AEGL-1	3
SG4	0	191.0	Below AEGL-1	3
C2GF	0	124.2	Below AEGL-1	2
C2TF	18	126.2	Below AEGL-1	2
OOCL	0	179.1	Below AEGL-1	3
C1GF	0	149.5	Below AEGL-1	3
C1TF	18	151.9	Below AEGL-1	3
GR	0	113.1	Below AEGL-1	2
WHR	0	137.4	Below AEGL-1	3
OR1GF	0	162.8	Below AEGL-1	3
OR1TF	48	209.2	Below AEGL-1	4
OR2GF	0	168.7	Below AEGL-1	3
OR2TF	48	223.3	Below AEGL-1	4
Grid Max 521186 182241*	0	280.5	Below AEGL-1	5

*Located to the south west of the site near Victoria Road

Figure 6-2 shows the predicted 100%ile hourly mean NO_2 concentration during emergency scenario. The results are for the stacks that gave rise to the maximum ground level concentrations. The contours are the maximum results from any of the five years of meteorological data modelled and are therefore do not represent the impacts from any one single year.

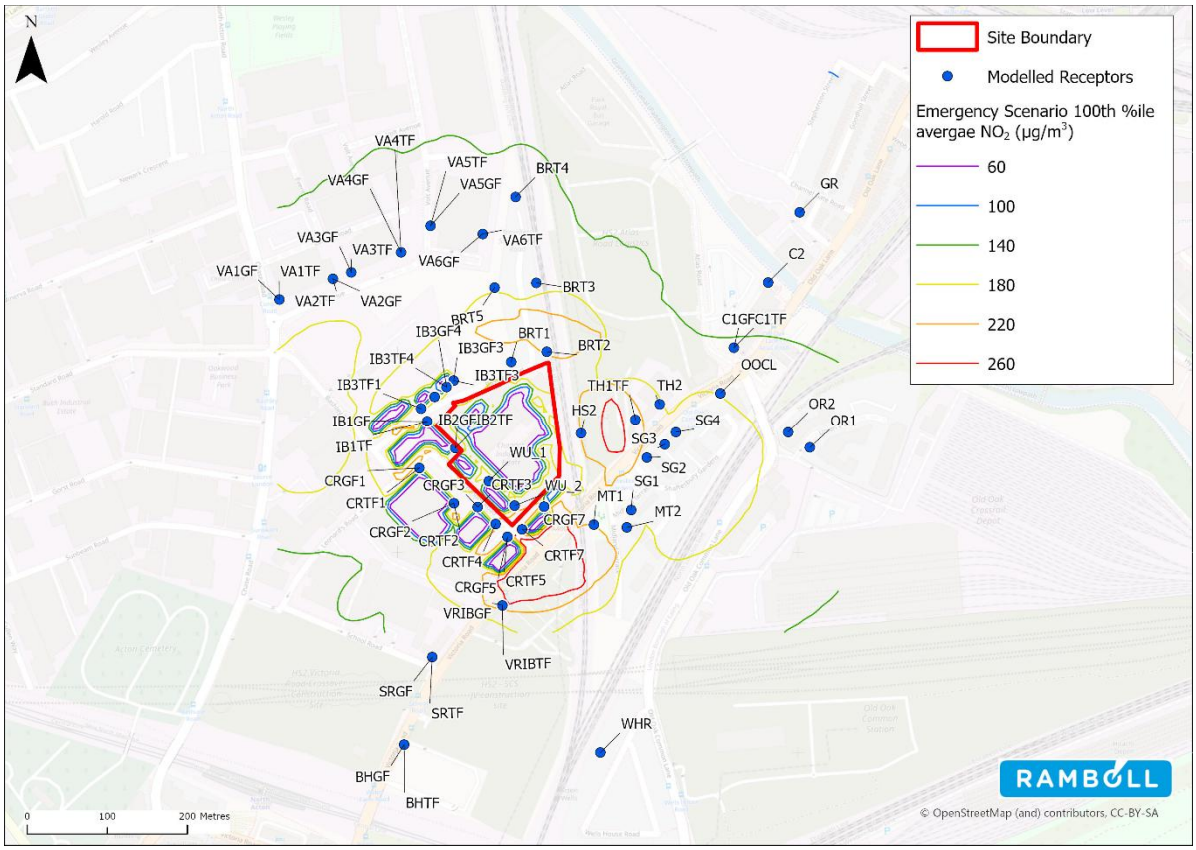


Figure 6-2: 100th Percentile NO_2 PEC concentrations for Emergency scenario

The maximum predicted concentration occurs the east and south of the site, isolated within Park Royal Old Oak. The assessed receptor locations all have concentrations less than AEGL-1.

6.1.2.2 Maximum daily mean 90.41th percentile PM_{10}

The highest maximum daily 90.41th percentile process contribution at modelled receptors from any of the 5 years of meteorological data are presented in Table 6-4 for the emergency operation. Full modelled results around found in Appendix F.

Table 6-4: Daily 90.41th percentile PM_{10} Concentrations

Receptor	Height (m)	EAL µg / m3	PC µg / m3	PC as % of the EAL
OOCL	0	50	1.1	2.1%
SG4	0	50	1.0	1.9%
C1TF	18	50	0.9	1.8%
OR2TF	48	50	0.9	1.8%

Receptor	Height (m)	EAL µg/m^3	PC µg/m^3	PC as % of the EAL
TH2TF	9	50	0.9	1.8%
C1GF	0	50	0.9	1.8%
TH2GF	0	50	0.9	1.7%
OR1TF	48	50	0.8	1.6%
OR2GF	0	50	0.8	1.6%
SG3	0	50	0.8	1.5%
Grid maxima (521375, 182437)	0	50	1.1	2.2%

The maximum PC Daily PM_{10} is less than 10% of the critical level, no further consideration of the PEC is required.

6.1.2.3 Sulphur Dioxide (SO_2)

The maximum hourly mean SO_2 process contribution at the highest 10 modelled receptors from any of the 5 years of meteorological data are presented in Table 6-5 for the emergency operation. Full modelled results around found in Appendix F.

Table 6-5: Predicted 99.73th %ile Hourly Mean SO_2

Receptor	Height (m)	EAL µg/m^3	PC µg/m^3	PC as % of the EAL
OR2TF	48	350	0.61	0.17%
OR1TF	48	350	0.56	0.16%
SG4	0	350	0.50	0.14%
OOCL	0	350	0.48	0.14%
SG3	0	350	0.48	0.14%
VRIBTF	6	350	0.46	0.13%
VRIBGF	0	350	0.46	0.13%
OR2GF	0	350	0.44	0.13%
CRTF7	15	350	0.44	0.13%
TH2TF	9	350	0.43	0.12%
Grid maxima (521368, 1822353)	0	350	0.55	0.16%

The maximum hourly mean SO_2 PC is below the 10% of the short-term objective and therefore insignificant, and no consideration of the PECs is necessary.

The 15-minute mean and the daily mean results follow a similar trend and the results are contained in Appendix F. The maximum 15-minute mean and the daily mean results are below the 10% of the short-term objective and therefore insignificant, and no consideration of the PECs is necessary.

6.1.2.4 Carbon Monoxide (CO)

The maximum hourly mean CO process contribution at the highest 10 modelled receptors from any of the 5 years of meteorological data are presented in Table 6-6 for the emergency operation. Full modelled results around found in Appendix F.

Table 6-6: Predicted 1-Hourly Mean CO

Receptor	Height (m)	EAL µg/m^3	PC µg/m^3	PC as % of the EAL
CRTF7	15	30,000	84.9	0.3%
CRGF7	0	30,000	79.9	0.3%
CRTF5	4	30,000	79.0	0.3%
CRGF5	0	30,000	78.8	0.3%
CRTF6	15	30,000	76.4	0.3%
VRIBGF	0	30,000	75.3	0.3%
VRIBTF	6	30,000	75.2	0.3%
TH1TF	9	30,000	71.9	0.2%
TH1GF	0	30,000	71.7	0.2%
CRGF6	0	30,000	68.4	0.2%
Grid maxima (521186, 182241)	0	30,000	89.6	0.3%

The maximum hourly mean CO PC is below the 10% of the short-term objective and therefore insignificant, and no consideration of the PECs is necessary.

The maximum 8 hour running mean CO process contribution at the highest 10 modelled receptors from any of the 5 years of meteorological data are presented in Table 6-6 for the emergency operation. Full modelled results around found in Appendix F.

Table 6-7: Predicted 8-Hour Running Mean CO

Receptor	Height (m)	EAL µg/m^3	PC µg/m^3	PC as % of the EAL
OOCL	0	10,000	6.3	0.06%
C1TF	18	10,000	6.1	0.06%
TH2TF	9	10,000	5.9	0.06%
C1GF	0	10,000	5.8	0.06%

Receptor	Height (m)	EAL µg/m^3	PC µg/m^3	PC as % of the EAL
OR2TF	48	10,000	5.6	0.06%
TH2GF	0	10,000	5.4	0.05%
SG4	0	10,000	5.4	0.05%
OR1TF	48	10,000	4.9	0.05%
OR2GF	0	10,000	4.8	0.05%
C2TF	18	10,000	4.7	0.05%
Grid maxima (521361, 182472)	0	10,000	6.6	0.07%

The 8-hour rolling mean are below the 10% of the short-term objective and therefore insignificant, and no consideration of the PECs is necessary. Full results can be found in Appendix F.

6.1.3 Testing

This section contains the results of the testing. The modelling assumes that each generator will be tested for individually for 2-hours per month over the course of a year; there would be no simultaneous testing of generators on LHR11 and LHR12. The model was set up using one representative emission point (flue) which was selected as the worst case emission point by evaluating the impacts from emissions from different generator locations. Stack LHR11_17 was shown to have the largest impact on most modelled receptors, as such, this stack was chosen for modelling the testing.

The annual mean results have been factored representing an annual running time of 888 hours. The highest results are reported. Given assumed intermittent operation and short duration of the testing the maximum predicted hourly mean concentrations are unlikely to occur in reality.

6.1.3.1 Nitrogen Dioxide

The maximum predicted annual mean NO_2 concentrations for all assessed receptor locations that are relevant for annual mean (Residential areas, schools and hospitals) for the testing scenario are presented in Table 6-8.

Table 6-8: Predicted Annual Mean NO_2 Concentrations (µg/m^3)

Receptor	Height (m)	NO_2 Process Contribution (µg/m^3)	% Change in concentration relative to AQO	Background NO_2 (µg/m^3)	Annual Mean NO_2 (µg/m^3)	Impact Descriptor
BRT1	0	0.02	0.0%	25.4	25.4	63.5%
BRT2	0	0.03	0.1%	25.4	25.4	63.6%
BRT3	0	0.07	0.2%	25.4	25.5	63.7%
BRT4	0	0.06	0.2%	25.4	25.5	63.7%
BRT5	0	0.04	0.1%	25.4	25.4	63.6%
MT1	0	0.02	0.0%	25.4	25.4	63.5%
MT2	0	0.02	0.1%	25.4	25.4	63.6%

Receptor	Height (m)	NO_2 Process Contribution ($\mu g/m^3$)	% Change in concentration relative to AQO	Background NO_2 ($\mu g/m^3$)	Annual Mean NO_2 ($\mu g/m^3$)	Impact Descriptor
SG1	0	0.02	0.1%	25.4	25.4	63.6%
SG2	0	0.05	0.1%	25.4	25.4	63.6%
SG3	0	0.07	0.2%	25.4	25.5	63.7%
SG4	0	0.07	0.2%	25.4	25.5	63.7%
C2TF	18	0.06	0.1%	25.4	25.5	63.6%
OOCL	0	0.07	0.2%	25.4	25.5	63.7%
C1TF	18	0.07	0.2%	25.4	25.5	63.7%
GR	0	0.05	0.1%	25.4	25.5	63.6%
WHR	0	0.01	0.0%	25.4	25.4	63.5%
OR1GF	0	0.05	0.1%	25.4	25.5	63.6%
OR1TF	48	0.07	0.2%	25.4	25.5	63.7%
OR2GF	0	0.06	0.1%	25.4	25.5	63.6%
OR2TF	48	0.07	0.2%	25.4	25.5	63.7%
Grid Maxima (521102, 182409)	0	0.10	0.3%	25.4	25.5	63.8%
Objective		40				-

The maximum PCs at all locations are less than 1% and are therefore not significant.

Figure 6-3 shows the maximum annual mean NO_2 concentrations during a testing scenario. The contours are the maximum PC from any of the five years of meteorological data modelled and are therefore do not represent the impacts from any one single year.

The impact on annual mean NO_2 concentration is described as not significant at all relevant receptors.

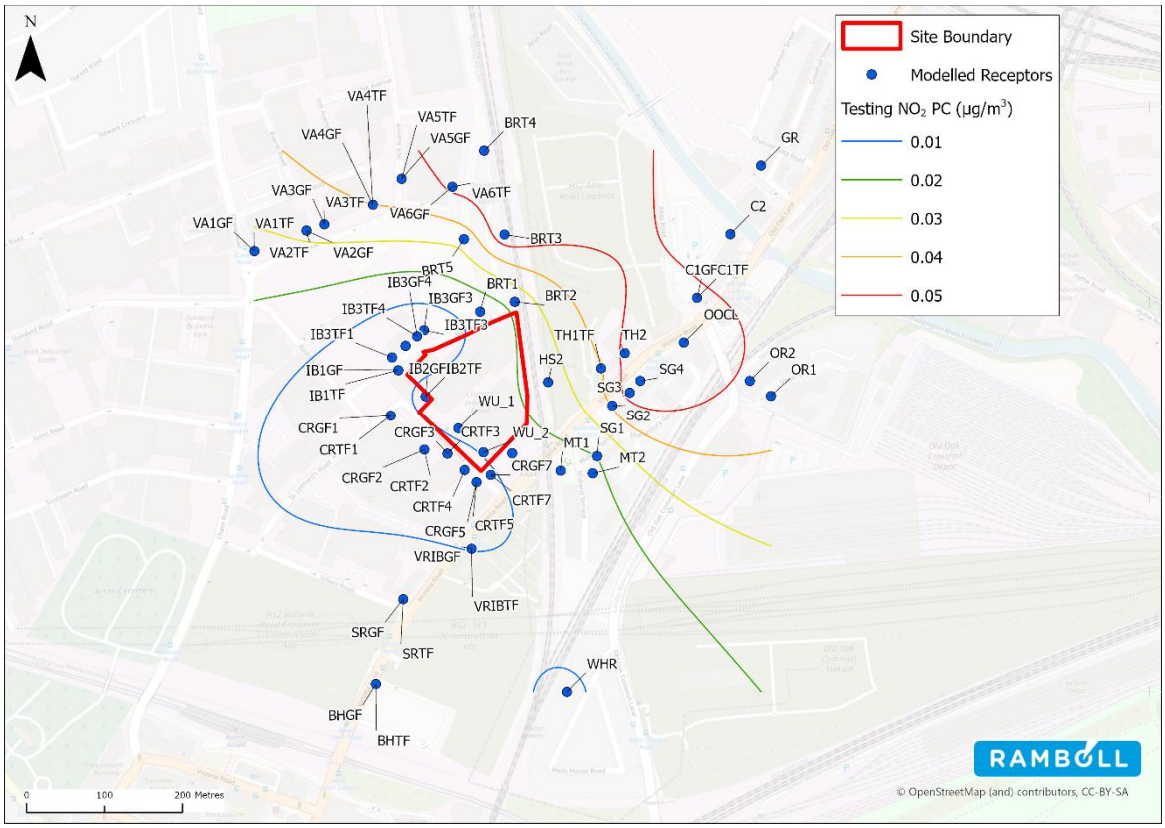


Figure 6-3: Testing Annual Mean NO_2 PC

6.1.3.2 Nitrogen Dioxide predicted 100th Percentile

Table 6-9 shows the predicted 100%ile hourly mean NO_2 concentration during testing in relation to the DAQI and AEGL. Full results are shown in Appendix F.

Table 6-9: Predicted 100th percentile NO_2 Concentrations for Testing Operation (µg/m³)

Receptor	Height (m)	1 hour average		
		µg/m³	AEGL	DAQI Level
BRT1	0	55.9	Below AEGL-1	1
BRT2	0	57.8	Below AEGL-1	1
BRT3	0	55.8	Below AEGL-1	1
BRT4	0	55.4	Below AEGL-1	1
BRT5	0	56.2	Below AEGL-1	1
MT1	0	58.4	Below AEGL-1	1
MT2	0	58.0	Below AEGL-1	1
SG1	0	57.5	Below AEGL-1	1

Receptor	Height (m)	1 hour average		
		µg/m^3	AEGL	DAQI Level
SG2	0	56.1	Below AEGL-1	1
SG3	0	55.8	Below AEGL-1	1
SG4	0	55.7	Below AEGL-1	1
C2GF	0	53.1	Below AEGL-1	1
C2TF	18	53.1	Below AEGL-1	1
OOCL	0	55.2	Below AEGL-1	1
C1GF	0	54.5	Below AEGL-1	1
C1TF	18	54.6	Below AEGL-1	1
GR	0	52.9	Below AEGL-1	1
WHR	0	53.9	Below AEGL-1	1
OR1GF	0	54.5	Below AEGL-1	1
OR1TF	48	56.3	Below AEGL-1	1
OR2GF	0	54.7	Below AEGL-1	1
OR2TF	48	56.9	Below AEGL-1	1
Grid Maxima (521228, 182437)	0	60.4	Below AEGL-1	1

Figure 6-4 shows the predicted 100%ile hourly mean NO_2 concentration during generator testing. The results are for the stack that gave rise to the maximum ground level concentrations. The contours are the maximum results from any of the five years of meteorological data modelled and are therefore do not represent the impacts from any one single year.

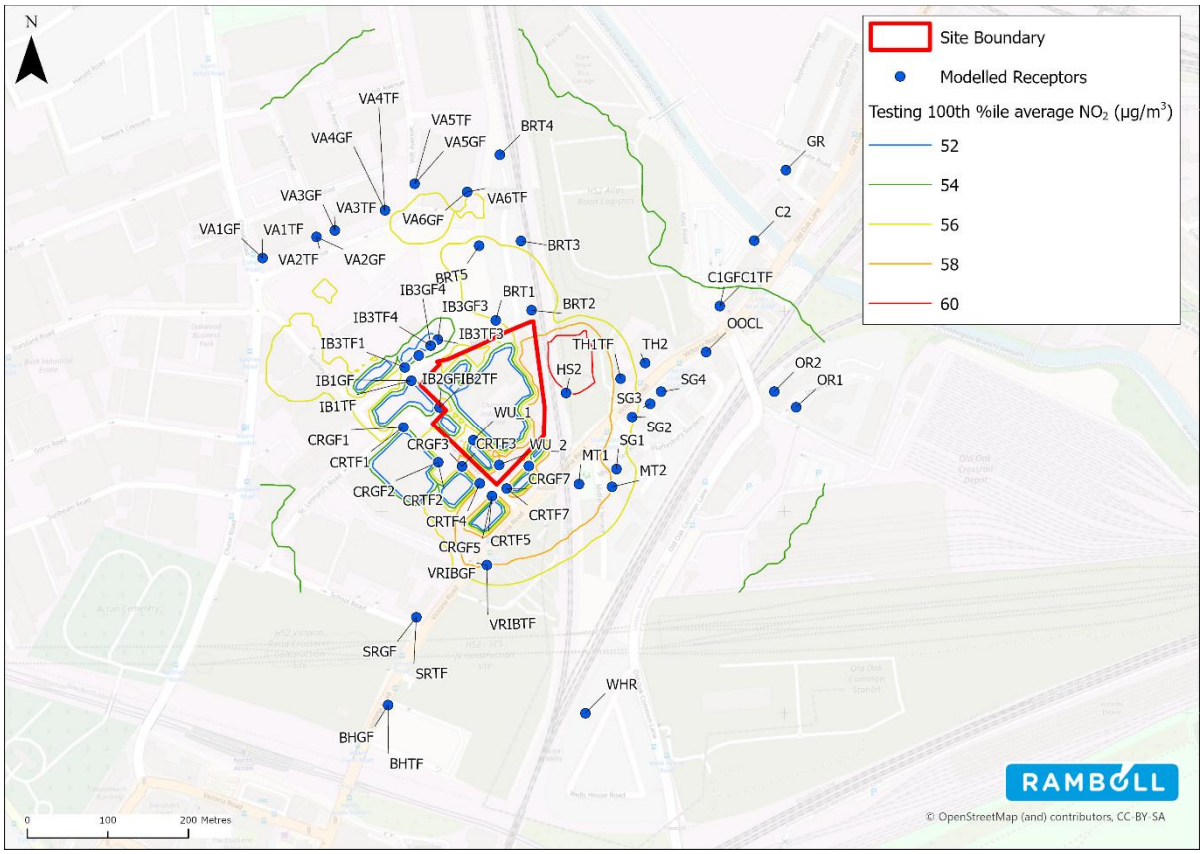


Figure 6-4: 100th Percentile NO_2 PEC concentrations for testing scenario

The maximum predicted concentration during the testing scenario follows a similar pattern as the emergency scenario; immediately east and south of the site, isolated within Park Royal Old Oak. The assessed receptor locations all have concentrations less than AEGL-1.

6.2 Ecological Receptors

6.2.1 Emergency Scenario

6.2.1.1 Annual Mean NO_x

Predicted NO_x concentrations within the ecological receptors are shown in Table 6-10. The predicted concentrations assume that all the emergency generators operate for a period of 72 hours.

Table 6-10: Ecological Receptors Predicted Annual Mean NO_x Concentrations (µg/m^3)

Receptor	Critical Level (µg/m^3)	PC (µg/m^3)	PC % of Critical Level
Richmond Park SAC	30	0.003	0.01%
Wimbledon Common SAC	30	0.002	0.01%

The maximum predicted NO_x PCs at all the assessed ecological sites are well below 1% of the critical level, as such they are not significant.

6.2.1.2 Daily mean NO_x

Predicted daily mean NO_x process contribution at modelled designated habitats and the highest predicted PC at modelled local nature reserves from any of the 5 years of meteorological data are presented in Table 6-11 for the emergency operation. Full modelled results are presented in Appendix F.

Table 6-11: Ecological Receptors Predicted Daily NO_x Concentrations ($\mu g/m^3$)

Receptor	Critical Level ($\mu g/m^3$)	PC ($\mu g/m^3$)	PC % of Critical Level
Richmond Park SAC	75	5.3	7.0%
Wimbledon Common SAC	75	7.5	7.3%
Wormwood Scrubs LNR	75	86.4	115%
ActonRail_01	75	150.9	201%
ActonRail_02	75	129.2	172%
ActonRail_03	75	85.5	114%
DHL_02	75	134.2	178%
DHL_03	75	240.5	321%
GUC_EAST_DHL_01	75	98.7	132%
GUC_Tow	75	159.1	212%
LonCanal	75	150.1	200%
NorthActonCem	75	139.9	187%
OldOak_Sidings	75	235.4	314%
OldOak_Sidings_02	75	254.7	340%
RailSideHab_01	75	139.6	186%
WesleyPlaying	75	105.7	127%
Grid Maxima (520871,182367)	75	341.9	457%

Exceedances in the Critical Level are in bold

Figure 6-5 shows the predicted 100%ile daily mean NO_x concentration during emergency scenario.

The daily mean NO_x PC is below 10% for Richmond Park SAC and Wimbledon Common and is therefore not significant for these sites.

The daily mean NO_x is over 100% for 14 of the modelled ecological receptors therefore potentially significant and this is discussed further below. Whilst the grid maximum is presented, it is only relevant for locations where there are ecological receptors present.

There are only three sites where the maximum predicted daily mean NO_x concentration is above $200\mu g/m^3$.

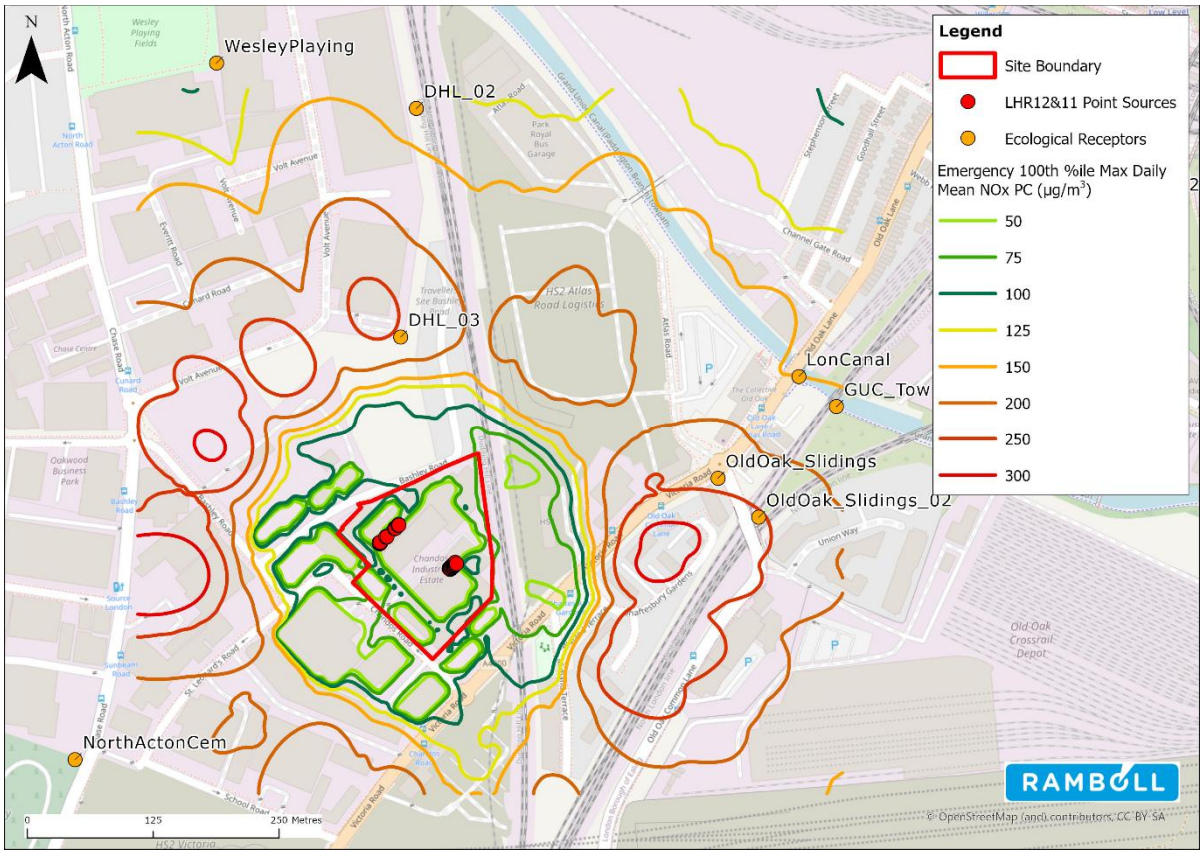


Figure 6-5: 100th Percentile Daily Mean NO_x PC concentrations for Emergency scenario

6.2.1.3 Ecological Habitats Daily Mean NO_x exceedances

Table 6-12 presents the total number of days where the daily mean NO_x PC is predicted to be above the AQO at the ecological habitats for each modelled year.

Table 6-12: Wormwood Scrubs number of Daily Mean NO_x PC exceedances

ID	2018	2019	2020	2021	2022	Maximum
Wormwood scrums	0	0	2	0	0	2
ActonRail_01	2	3	2	5	5	5
ActonRail_02	14	6	10	10	6	15
ActonRail_03	6	4	4	3	0	6
DHL_02	16	11	17	18	25	25
DHL_03	30	14	25	26	40	40
GUC_EAST_DHL_01	3	1	1	5	5	5
GUC_Tow	30	40	52	31	28	52
LonCanal	38	44	56	25	32	56
NorthActonCem	16	10	13	8	2	16
OldOak_Slidings	72	74	83	63	61	83

ID	2018	2019	2020	2021	2022	Maximum
OldOak_Slidings_02	67	69	72	54	56	72
RailSideHab_01	21	21	34	18	20	34
WesleyPlaying	0	0	0	0	1	1

At Wormwood Scrubs LNR the daily mean was only exceeded in one of the modelled years and then only for 2 days in the year.

For the other sites, the frequency of exceedance varies, with the maximum at OldOak_Sidings of 83 days, or approximately 23% of the year. Whilst the annual mean NO_2 impacts have been predicted on the assumption of 3 days continuous operation in an emergency, this in itself is unlikely to occur given the grid reliability in this area of London such that emergency operation is unlikely to last for 24 hours.

6.2.1.4 Annual mean Ammonia (NH_3)

The highest maximum Annual Mean NH_3 process contribution at modelled ecological habitats receptors from any of the 5 years of meteorological data are presented in Table 6-13 for the emergency scenario. Full modelled results around found in Appendix F.

Table 6-13: Predicted Annual Mean NH_3 PC concentrations at modelled ecological sites

Receptor	EAL µg / m^3	PC µg / m^3	PC as % of the EAL
RPSAC	1	0.0002	0.02%
WCSAC	1	0.0001	0.01%
OldOak_Slidings	1	0.0287	2.87%
OldOak_Slidings_02	1	0.0249	2.49%
LonCanal	1	0.0205	2.05%
GUC_Tow	1	0.0195	1.95%
RailSideHab_01	1	0.0150	1.50%
DHL_03	1	0.0150	1.50%
DHL_02	1	0.0124	1.24%
GUC_EAST_DHL_01	1	0.0087	0.87%
NorthActonCem	1	0.0087	0.87%
RailSideHab_02	1	0.0086	0.86%
Grid maxima (521368, 182465)	1	0.0316	3.16%

The maximum annual mean is less than 1% of the critical level for Richmond Park and Wimbledon Common, and less than 100% for modelled local nature sites. No further consideration of the PEC is required.

6.2.1.5 Nitrogen Deposition

Predicted nitrogen deposition for Richmond Park and Wimbledon Common for Broadleaved, Mixed and Yew Woodland habitat and Dry Heaths are shown in Table 6-14.

Table 6-14: Predicted Nitrogen Deposition for Habitats during the Emergency Scenario

Site	Nitrogen Depositon (kgN/ha/ yr)				PC % of Critical Load
	Critical Load	NO_2 depostion PC	NH_3 Deposition PC	Total PC	
Richmond Park SAC (Forest)	10	0.0006	0.0018	0.0024	0.024%
Wimbledon Common SAC (Forest)	10	0.0004	0.0011	0.0015	0.015%
Wimbledon Common SAC (Grassland)	5	0.0002	0.0008	0.0009	0.019%

The maximum contribution to nitrogen deposition does not exceed 1% of the critical load for both Woodland and Dry Heath and is therefore not significant.

Nitrogen deposition was also undertaken for all modelled local nature sites. For locally designated sites where such information is not readily available, the lowest critical load published on APIS was conservatively used. For grassland habitats, the lowest critical load is 5kgN/ha/yr and for woodland habitats it is 10kgN/ha/y.

Full deposition results can be found in Appendix F, but the maximum contribution to nitrogen deposition is less than 100% of the critical loads at all of the locally designated sites and is therefore not significant.

6.2.1.6 Acid Deposition

Predicted acid deposition for Richmond Park and Wimbledon Common for Broadleaved, Mixed and Yew Woodland habitat and Dry Heaths are shown in Table 6-15.

Table 6-15: Predicted Acid Deposition for Habitats during the Emergency Scenario

Site	Acidity Critical Load (keq/ha/yr)		Acid Deposition PC (keq/ha/yr)			PC (% Critical Load)
	N	S	NO_2	NH_3	Total	
Richmond Park SAC (Forest)	0.142 – 1.009	0.724	0.00004	0.00013	0.00017	0.017%
Wimbledon Common SAC (Forest)	0.285 – 1.008	0.723	0.00003	0.00008	0.00011	0.011%
Wimbledon Common SAC (Grassland)	0.642 – 0.872	0.230	0.00001	0.00005	0.00007	0.008%

The maximum predicted total acid deposition is below 1% of the critical load function at all assessed habitats, and therefore no further consideration needs to be given.

Acid deposition was also undertaken for all modelled local nature sites. Full deposition results can be found in Appendix F, but the maximum contribution to acid deposition is less than 100% of the critical loads and is therefore not significant.

6.2.2 Testing

6.2.2.1 Annual Mean NO_x

Predicted NO_x concentrations within the ecological receptors are shown in Table 6-16. The predicted annual mean concentrations assume that each generator will be tested for two-hours a month over the course of a year.

Table 6-16: Ecological Receptors Predicted annual mean NO_x Concentrations ($\mu g/m^3$)

Receptor	Critical Level ($\mu g/m^3$)	PC ($\mu g/m^3$)	PC % of Critical Level
Richmond Park SAC	30	0.00003	0.0001%
Wimbledon Common SAC	30	0.00004	0.0001%

The maximum predicted annual mean NO_x PCs at all the assessed ecological sites is well below 1% of the critical level, as such they are not significant.

6.2.2.2 Annual Mean Ammonia (NH_3)

The highest maximum Annual Mean NH_3 process contribution at modelled ecological habitats receptors from any of the 5 years of meteorological data are presented in Table 6-13 for the emergency operation. Full modelled results around found in Appendix F.

Table 6-17: Predicted Annual Mean NH_3 PC concentrations at modelled ecological sites

Receptor	EAL µg/m^3	PC µg/m^3	PC as % of the EAL
RPSAC	1	0.0002	0.02%
WCSAC	1	0.0001	0.01%

The maximum annual mean is less than 1% of the critical level for Richmond park and Wimbledon Common. No further consideration of the PEC is required.

6.2.2.3 Daily mean NO_x

Predicted daily mean NO_x process contribution at modelled designated habitats and the highest predicted PC at modelled local nature reserves from any of the 5 years of meteorological data are presented in Table 6-18 for the testing operation. Full modelled results around found in Appendix F.

Table 6-18: Ecological Receptors Predicted Daily NO_x Concentrations (µg/m^3)

Receptor	Critical Level (µg/m^3)	PC (µg/m^3)	PC % of Critical Level
Richmond Park SAC	75	0.12	0.2%
Wimbledon Common SAC	75	0.17	0.2%
Wormwood Scrubs LNR	75	2.68	3.6%
DHL_03	75	9.76	13%
OldOak_Slidings	75	7.48	10%
OldOak_Slidings_02	75	7.28	9.7%
ActonRail_01	75	5.28	7.0%
DHL_02	75	5.16	6.9%
NorthActonCem	75	4.97	6.6%
ActonRail_02	75	4.33	5.8%
GUC_Tow	75	4.17	5.6%
RailSideHab_01	75	4.02	5.4%
LonCanal	75	3.88	5.2%

The predicted modelled PCs are less than 10% of the critical level for Richmond Park and Wimbledon Common (SAC). The predicted modelled PCs at all modelled local nature sites are less than 100%. Short-term concentrations are unlikely to give rise to significant impacts during the testing scenario.

6.2.2.4 Nitrogen Deposition

Predicted nitrogen deposition for Richmond Park, Wimbledon Common and Wormwood Scrubs for Broadleaved, Mixed and Yew Woodland habitat and Dry Heaths are shown in Table 6-19.

Table 6-19: Predicted Nitrogen Deposition for Habitats during the testing Scenario

Site	Nitrogen Depositon (kgN/ha/ yr)				PC % of Critical Load
	Critical Load	NO_2 Depostion PC	NH_3 Deposition PC	Total PC	
Richmond Park SAC (Forest)	10	0.000007	0.0000205	0.0000271	0.0003%
Wimbledon Common SAC (Forest)	10	0.000008	0.0000250	0.0000330	0.0003%
Wimbledon Common SAC (Grassland)	5	0.000004	0.0000167	0.0000207	0.0004%

The maximum contribution to nitrogen does not exceed 1% of the critical load for both Woodland and Dry Heath and is therefore Not Significant.

6.2.2.5 Acid Deposition

Predicted acid deposition for Richmond Park, Wimbledon Common and Wormwood Scrubs for Broadleaved, Mixed and Yew Woodland habitat and Dry Heaths are shown in Table 6-20.

Table 6-20: Predicted Acid Deposition for Habitats during the Testing Scenario

Site	Acidity Critical Load (keq/ha/yr)		Acid Deposition PC (keq/ha/yr)			PC (% Critical Load)
	N	S	NO_2	NH_3	Total	
Richmond Park SAC (Forest)	0.142 – 1.009	0.724	0.0000005	0.0000015	0.0000019	0.0002%
Wimbledon Common SAC (Forest)	0.285 – 1.008	0.723	0.0000006	0.0000018	0.0000024	0.0002%
Wimbledon Common SAC (Grassland)	0.642 – 0.872	0.230	0.0000003	0.0000012	0.0000015	0.0002%

The maximum predicted total acid deposition is below 1% of the critical load function at all assessed habitats, and therefore no further consideration needs to be given.

7. CONCLUSIONS

An assessment of the impacts of the emissions from the emergency generators for LHR11 and LHR12 has been undertaken.

In an emergency scenario the emergency generators can operate up to 1780 hours per year with a 1% probability of exceeding the short term NO_2 objective. Predicted annual mean NO_2 impacts have been factored to 72 hours to represent a maximum emergency scenario. Predicted annual mean NO_2 at all relevant receptor locations are not significant.

Impacts at ecological sites are potentially significant during the emergency scenario for daily mean NO_x concentrations, however, is it unlikely that the generators would be running for more than 24 hours.

Impacts during testing are lower than in an emergency scenario and are not significant.

APPENDIX A
GLOSSARY

Abbreviations	Meaning
ADMS	Air Dispersion Modelling System
APIS	Air Pollution Information System
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CO	Carbon monoxide
Defra	Department for Environment, Food and Rural Affairs
Diffusion Tube	A passive sampler used for collecting NO_2 in the air
EA	Environmental Agency
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LNR	Local Nature Reserve
AQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NO_2	Nitrogen Dioxide
NO_x	Nitrogen oxides, generally considered to be nitric oxide and NO_2
$PM_{10}/PM_{2.5}$	Small airborne particles less than 10/2.5 microns in aerodynamic diameter
Receptor	A location where the effects of pollution may occur
SSSI	Site of Special Scientific Interest
SO_2	Sulphur dioxide
SPA/SAC	Special Protection Areas (SPAs) and Special Areas of Conservation (SAC)

APPENDIX B
GENERATOR TECHNICAL DATA

ENGINE DATASHEET

KOHLER

Engine ref. : KD83V16-5CES

General technical data

Cylinders configuration	V
Number of cylinders	16
Engine optimisation	Emission optimisation
Dual Frequency	Yes
Speed (RPM)	1500
Speed (RPM)	1800
Displacement (l)	82.74
Bore (mm)	175
Stroke (mm)	215
Compression ratio	16 : 1
Engine Firing Order	A1-B7-A2-B5-A4-B3-A6-B1-A8-B2-A7-B4-A5-B6-A3-B8
Air inlet system	Turbo
Fuel	Diesel Fuel

Performance

RPM	1500	1800
Maximum stand-by power at rated RPM (kW)	3007	3007
PRP Power (kW)	2734	2734
Pistons speed (m/s)	10.75	12.90
BMEP @ ESP 50 Hz (bar) / BMEP @ ESP 60 Hz (bar)	29.10	24.20
Friction Power Loss (kW)	240	354
Max Combustion Pressure (Mpa)	240	

Electrical system

Governor type	Electronic
ECU type	KODEC
Frequency regulation, no-load to full-load	Isochrone
Frequency regulation, steady state (%)	+/- 0.25%
No. of teeth on ring gear	182
Idle speed (RPM)	650
Battery voltages (V)	24
Charging alternator (V/Ah)	24 / 28 / 140
Starter characteristics (V/kW)	2 * (24 / 9)

Dimensions and weight

Length (mm)	3240
Width (mm)	1777
Height (mm)	2125
Dry weight (kg)	11300
Wet weight (kg)	12157
Center of Gravity from Rear Face of Block (mm)	-1200

ENGINE DATASHEET

KOHLER

Engine ref. : KD83V16-5CES

Construction / Material

Main Bearing Type	Half shell bearing
Cylinder Head Material	Cast Iron
Crankshaft Material	Steel
Intake and Exhaust Valve Material	Steel
Piston type & material	Steel
Exhaust manifold type	Dry

Installation

Maximum Bending Moment at Rear Face of Block (RFOB) (Nm)	
Maximum Rear Bearing Load (N)	
Maximal engine inclination, longitudinal front up/down (degree)	10
Maximal engine inclination, lateral (degree)	15
SAE Flywheel housing	00
SAE Flywheel	21
Inertia (kg.m²)	42.10

Fuel system

RPM	**1500**	**1800**
Maximum fuel pump flow (l/h)	1070	
Max. restriction at fuel pump (m)	3.50	
Max head on fuel return line (m)	3.50	
Maximum allowed inlet fuel temperature (°C)	70	
Primary fuel filter rating (micron)	5	
Fuel Prefilter / Water Separator Micron Size	10	
Fuel Inlet Minimum recommended size (mm)	33.70	
Fuel Outlet Minimum recommended size (mm)	33.70	

Fuel consumption (Specific fuel consumption +5% ; ISO3046-1 ; 42.7 MJ/kg)

RPM	**1500**	**1800**
Specific consumption 25% PRP load (g/kW.h)	262	
Specific consumption 50% PRP load (g/kW.h)	226	
Specific consumption 75% PRP load (g/kW.h)	211	
Specific consumption 100% PRP load (g/kW.h)	204	
Specific consumption 25% ESP load (g/kW.h)	257	253
Specific consumption 50% ESP load (g/kW.h)	223	
Specific consumption 75% ESP load (g/kW.h)	211	199
Specific consumption 100% ESP load (g/kW.h)	200	198

Lubrification system

ENGINE DATASHEET

KOHLER.

Engine ref. : KD83V16-5CES

RPM	1500	1800
Oil consumption 100% ESP 50Hz (l/h)	1.42	1.42
Oil system capacity including filters (l)	560	
Oil sump capacity (l)	460	
Oil capacity between dipstick marks Max-Min (l)	83	
Min. oil pressure (bar)		
Oil Pressure at rated speed (bar)	4.50	
Max. oil pressure (bar)		
Oil temperature maximum (°C at 25°C ambient)	100	
Oil filter micron size	10	
Oil Filter Quantity and type	Spin On / 8	
Oil cooler	Plate Exchanger	

Air intake system

RPM	1500	1800
Intake air flow (l/s)	3720.58	4027.66
Max. intake restriction (mm H2O)	510	
Maximum air filter temp without derating (°C)	65	

Exhaust system

RPM	1500	1800
Heat rejection to exhaust (kW)	2090	1950
Max. exhaust back pressure (mm H2O)	867	
Exhaust gas temperature @ ESP 50Hz (°C)	510	
Exhaust gas temperature @ ESP 60Hz (°C)	400	
Exhaust gas flow @ ESP 50Hz (l/s)	10266	
Exhaust gas flow @ ESP 60Hz (l/s)	9523	

Cooling system

RPM	1500	1800
Radiated heat to ambiant (kW)	140	140
Heat rejection to coolant HT (kW)	1100	1110
Flow on the HT circuit at 0.7Bars pressure drop off engine (l/min)	1980	2480
Heat rejection to coolant LT (kW)	820	860
Flow on the LT circuit at 0.7Bars pressure drop off engine (l/min)	620	810
Temperature of inlet to LT engine water circuit (°C)	55	
Outlet coolant temperature (°C)	85	
Maximum Coolant temp without derating (°C)	100	
Max coolant temperature, Shutdown (°C)	105	
Coolant capacity HT, engine only (l)	270	
Restriction pressure drop off engine – HT circuit (mbar)	700	
Minimal pressure before HT pump (mbar)	400	

ENGINE DATASHEET

KOHLER.

Engine ref. : KD83V16-5CES

Max. pressure at inlet of HT water pump (mbar)	2500
Thermostat begin of opening HT (°C)	71
Thermostat end of opening HT (°C)	81
HT Standard pressure cap setting (kPa)	100
Coolant capacity LT, engine only (l)	105
Restriction pressure drop off engine – LT circuit (mbar)	700
Minimal pressure before LT pump (mbar)	400
Max. pressure at inlet of LT water pump (mbar)	2500
Thermostat begin of opening LT (°C)	45
Thermostat end of opening LT (°C)	57
LT Standard pressure cap setting (kPa)	100
Water Pump Type	Vane Wheel pump

Charge air cooling system

ENGINE INFORMATION

Model:	KD83V16	Bore:	175 mm (6.89 in.)
Type:	4-Cycle, 16-V Cylinder	Stroke:	215 mm (8.46 in.)
Aspiration:	Turbocharged, Intercooled	Displacement:	83 L (5048 cu. in.)
Compression ratio:	16:0:1		
Emission Control Device:	Direct Diesel Injection, Engine Control Module, Turbocharger, Charge Air Cooler		

EXHAUST EMISSION DATA:	EPA D2 Cycle 5-mode weighted
HC	0.45 g/kWh
NO_x (Oxides of Nitrogen as NO_2)	5.88 g/kWh
CO (Carbon Monoxide)	1.05 g/kWh
PM (Particular Matter)	0.08 g/kWh

EMISSION DATA

Cycle point	100% ESP		100% PRP		75% ESP		75% PRP		50% PRP	
Power [kW]	3007		2734		2255		2051		1367	
Speed [rpm]	1500		1500		1500		1500		1500	
NO_X [g/kWh]	9.3		7.8		6.0		5.9		5.2	
CO [g/kWh]	0.2		0.2		0.3		0.4		1.3	
HC [g/kWh]	0.29		0.31		0.34		0.35		0.45	
PM [g/kWh]	0.01		0.01		0.02		0.02		0.07	
	@ 5% O_2	@ 15% O_2	@ 5% O_2	@ 15% O_2	@ 5% O_2	@ 15% O_2	@ 5% O_2	@ 15% O_2	@ 5% O_2	@ 15% O_2
HC [mg/Nm³]	98	37	102	38	109	41	113	42	134	50
NOx [mg/Nm³]	3174	1190	2610	979	1920	720	1873	702	1538	577
CO [mg/Nm³]	79	30	82	31	105	39	120	45	382	143
PM [mg/Nm³]	2	1	2	1	7	3	6	2	21	8

APPENDIX C
MODEL INPUTS AND RESULTS PROCESSING TOOLS

Table C.1: ADMS 6 Model inputs and data processing

Meteorological Data	2018 - 2022 Hourly meteorological data from London Heathrow has been used in the model. The wind rose is shown overleaf.
ADMS	ADMS 6, version 6.0.0.1
Latitude	52º
Surface Roughness	A value of 1.5 for Large Urban Areas was used for the modelled area and 0.5 for agricultural areas was used for the meteorological station site.
Minimum Monin-Obukhov length	A value of 100 for Large Conurbations was used to represent the modelled area and 30 for Cities and Large towns was used for the meteorological station site
NO_x to NO_2 Conversion	0.7 for annual mean 0.35 for hourly mean
Background Maps	2018 reference year background maps

Buildings

Table C.2: ADMS 6 buildings set up*

Name	X (m)	Y (m)	Height (m)	Length (m) / Diameter (m)	Width (m)	Angle (Degrees)
LHR12 main building	521150	182383	38.145	81.33	32.75	226.3
LHR11	521128	182409	42	87.0	35	46.5
LHR11 engines	521091	182418	20	43.0	15	45.5
LH11_2	521159	182452	32	17.0	15.3	46.4
Industry5	521025	182309	9.0	65.8	61.0	45.0
Industry6	521050	182275	9.0	22.0	39.9	135.7
Industry7	521095	182279	9.0	31.1	44.7	134.0
Industry8	521131	182244	10.0	23.7	44.8	134.0
Industry9	520991	182421	10.0	57.6	16.3	52.2
Industry10	521032	182443	10.0	22.9	14.7	48.3
Industry11	521055	182462	10.0	26.7	14.5	48.7
Industry1	521048	182390	16.0	16.3	49.1	42.0

Name	X (m)	Y (m)	Height (m)	Length (m) / Diameter (m)	Width (m)	Angle (Degrees)
Industry2	521024	182391	16.0	14.0	23.6	43.0
Office1	521174	182287	20.0	39.1	14.0	44.1
Industry3	521005	182377	9.0	35.0	26.0	48.0
Office2	521192	182322	10.0	29.8	10.6	42.7
LH11_1	521140	182446	20.0	19.1	3.6	46.7
LHR11_12_ centre1	521157	182391	44.0	57.5	27.3	45.8
LHR11_12_ centre2	521134	182414	44.0	57.5	27.3	45.8
LH12 Engines	521159	182349	20.0	43.0	15.4	45.5
LHR12 Chillers	521151	182388	44.0	65.3	22.6	46.0
LHR12 Stairwell	521173	182339	35.6	6.0	12.4	136.0
LHR12 main building 2	521176	182417	38	6.0	19.3	46.3
LHR12 Work units	521124	182318	13.5	15.5	45.0	42.8
substation	521083	182358	12.0	17.3	27.0	45.3

* Building layout shown in Figure 4-1.

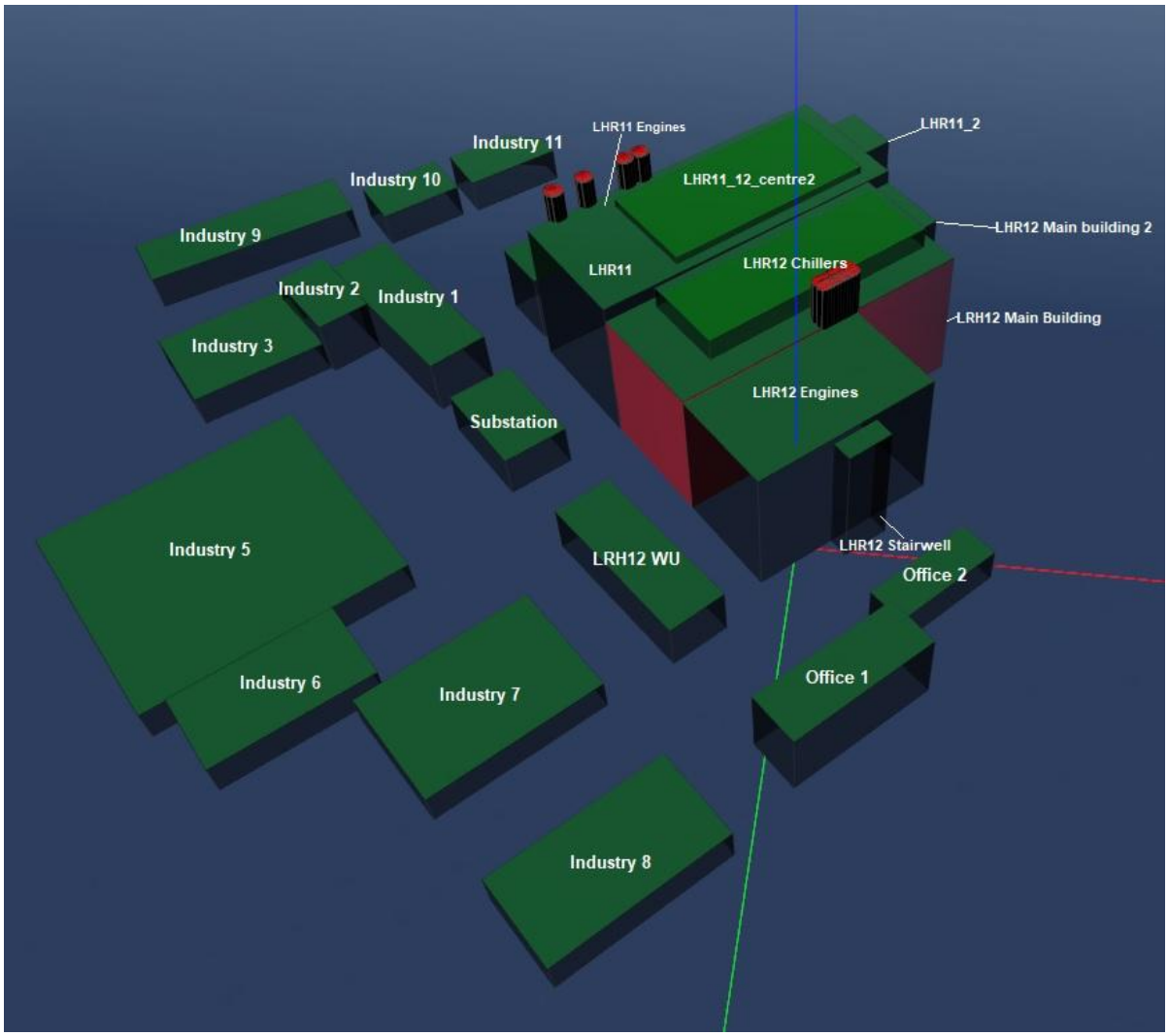


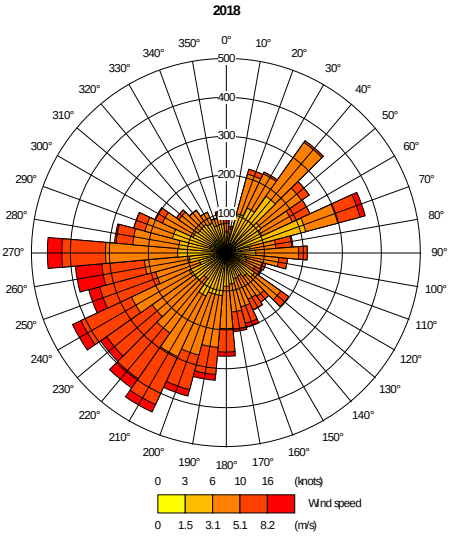
Figure C.1: ADMS Building Configuration

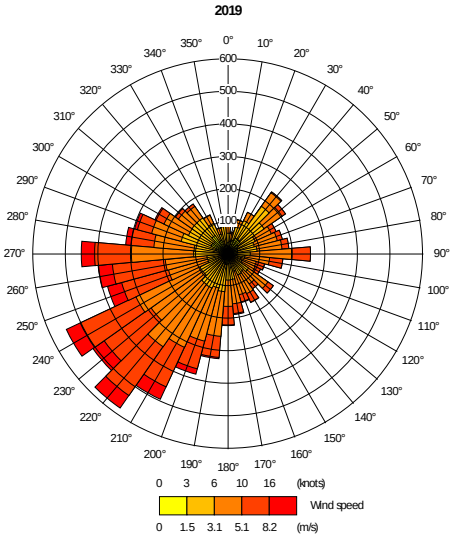
Name	X (m)	Y (m)
LHR11_1	521089.73	182398.14
LHR11_2	521090.57	182397.71
LHR11_3	521091.23	182398.41
LHR11_4	521089.89	182399.12
LHR11_5	521090.79	182399.26
LHR11_6	521096.77	182404.04
LHR11_7	521096.76	182405.26
LHR11_8	521096.18	182404.72
LHR11_9	521097.42	182404.77
LHR11_10	521105.43	182412.51
LHR11_11	521105.46	182413.76
LHR11_12	521104.85	182413.12
LHR11_13	521106.08	182413.07
LHR11_14	521108.26	182416.36
LHR11_15	521108.87	182415.71

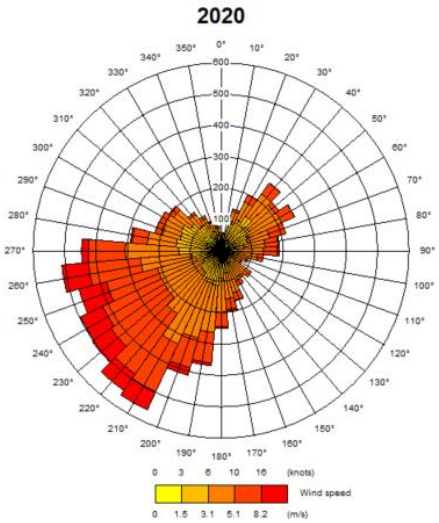
LHR11_16	521108.9	182417
LHR12_1	521159.22	182373.48
LHR12_2	521159.91	182374.13
LHR12_3	521160.61	182374.79
LHR12_4	521161.27	182375.4
LHR12_5	521161.93	182376.06
LHR12_6	521162.63	182376.71
LHR12_7	521163.35	182377.41
LHR12_8	521164.03	182378.06
LHR12_9	521164.68	182378.72
LHR12_10	521165.44	182379.46
LHR12_11	521160.35	182372.23
LHR12_12	521161.09	182372.89
LHR12_13	521161.71	182373.54
LHR12_14	521162.45	182374.24
LHR12_15	521163.09	182374.85
LHR12_16	521163.8	182375.51
LHR12_17	521164.48	182376.17
LHR12_18	521165.16	182376.84
LHR12_19	521165.86	182377.48
LHR12_20	521166.6	182378.22
LHR11_17	521109.45	182416.35

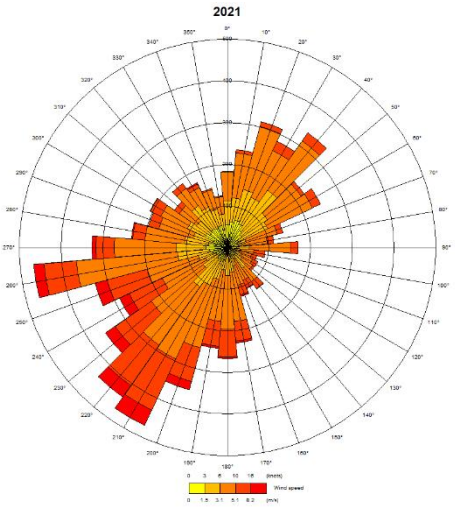
Figure C.2: ADMS Stack Locations and Designations

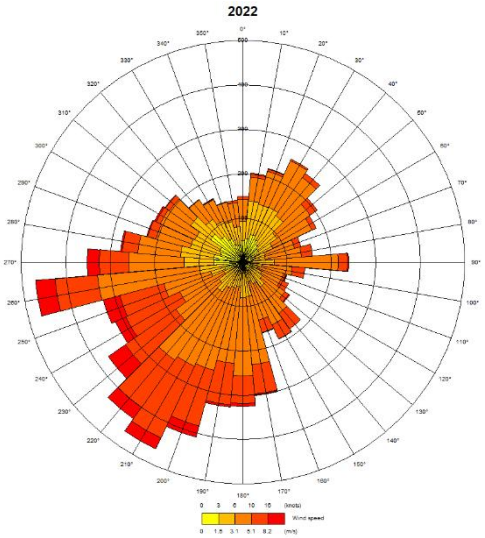
Heathrow Wind roses











APPENDIX D
BACKGROUND CONCENTRATIONS

Background concentrations for the Site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid[15].

In order to more accurately reflect background concentrations across the study area, Defra mapped background concentrations have been compared against concentrations measured at North Kensington Automatic Urban and Rural Network (AURN)[16] automatic urban background station in 2019 to produce a calibration factor and LBE diffusion tube EA03, which then has been applied to background concentrations across the study area (Table D.1). The AURN site has also been used in previous years by the LBHF to determine the local bias adjustment factor from a co-location diffusion tube studies[17].

Table D.1: 2019 DEFRA NO_2 Background Mapping adjustment factors ($\mu g/m^3$)

Source	Grid Reference (x,y)	Distance to Site (km)	Defra Modelled Background ($\mu g/m^3$)	Measured Concentration ($\mu g/m^3$)	Factor
KC1 North Kensington AURN	524045, 181752	2.8	33.8	27.3	0.808
EA03	514740, 180643	6.6	25.5	20.5	0.803
Average Factor					0.806

[15] Department of the Environment, Food and Rural Affairs (Defra) (2019). '2017 Based Background Maps for NO_x, NO_2, PM_{10} and $PM_{2.5}$'
[16] https://uk-air.defra.gov.uk/networks/site-info?uka_id=UKA00253
[17] Hammersmith & Fulham (2019). Hammersmith & Fulham Air Quality Annual Status Report for 2019. Date of publication: December 2019.

APPENDIX E
HYPERGEOMETRIC DISTRIBUTION FUNCTION

Specified generators: air dispersion modelling example short term statistical analysis

The following text is taken from Environment Agency guidance as an illustration of the short term statistical analysis calculation:

The applicant applies for an environmental permit to operate:

- *an aggregated diesel specified generator site with a capacity of 40 MWth*
- *any time of the year for up to a maximum of 400 hours per year*

Operations are expected to last up to 4 hours when needed.

Therefore, the operating envelope is all 8760 hours in the year. There are 400 operational hours within the operating envelope.

Dispersion modelling over the full year shows that the Predicted Environmental Concentration (PEC) exceeds the hourly mean limit value of 200mg/m^3 for 300 hours at a sensitive receptor over the worst modelled meteorological year.

This gives:

- *400 operational hours - the sample size denoted by 'N'*
- *an 8760 hour operating envelope - the population size denoted by 'M'*
- *300 exceedance hours - or the number of failures in the population denoted by 'e'*
- *8460 non-exceedance hours - the number of successes in the population denoted by 'K', where K = M - e = 8760 - 300 = 8460*

The probability of randomly selecting 19 or more exceedance hours (failures) in 400 sample trials, is the same as selecting at most 'N' minus 19 non-exceedance hours (successes) in 400 sample trials (N - 19 = 400 - 19 = 381). So you can calculate the probability of an exceedance, 'P' by using the cumulative hypergeometric distribution.

$$P = \sum_{i=0}^{N-19} \frac{\binom{K}{i}\binom{M-K}{N-i}}{\binom{M}{N}}$$

Based on these data the cumulative hypergeometric distribution is 9.3%. As the continuous operations can be up to 4 hours, you multiply this probability by 2.5, giving a probability of exceedance of 23.25%. This indicates there is potential for an exceedance of the hourly standard.

The cumulative hypergeometric distribution calculates the probability to be less than 1.8% when there are 330 operational hours. Again multiplying this by the 2.5 factor gives a probability of 4.6%, indicating short term exceedances are unlikely.

Therefore we would propose to permit the generator and restrict the operational hours to 330 hours per year.

APPENDIX F
RECEPTOR RESULTS

Emergency Scenario Results

The results of the dispersion modelling at existing are shown in Table F.1. The results are the highest from the five years' worth of modelling.

100th Percentile NO_2 Results

Table F.1: Predicted 100th percentile NO_2 Concentrations for Emergency Operation ($\mu g/m^3$)

Receptor	Height (m)	100th Percentile NO_2 PC ($\mu g/m^3$)	Background NO_2	PEC NO_2 ($\mu g/m^3$)	AEGL	DAQI
BRT1	0	152.6	50.2	203.4	Below AEGL-1	4
BRT2	0	170.9	50.2	221.7	Below AEGL-1	4
BRT3	0	112.9	50.2	163.7	Below AEGL-1	3
BRT4	0	103.4	50.2	154.2	Below AEGL-1	3
BRT5	0	124.1	50.2	174.9	Below AEGL-1	3
MT1	0	169.9	50.2	220.7	Below AEGL-1	4
MT2	0	137.3	50.2	188.1	Below AEGL-1	3
SG1	0	135.7	50.2	186.5	Below AEGL-1	3
SG2	0	148.2	50.2	199.0	Below AEGL-1	3
SG3	0	134.6	50.2	185.4	Below AEGL-1	3
SG4	0	140.2	50.2	191.0	Below AEGL-1	3
C2GF	0	73.4	50.2	124.2	Below AEGL-1	2
C2TF	18	75.4	50.2	126.2	Below AEGL-1	2
OOCL	0	128.3	50.2	179.1	Below AEGL-1	3
C1GF	0	98.7	50.2	149.5	Below AEGL-1	3
C1TF	18	101.1	50.2	151.9	Below AEGL-1	3
GR	0	62.3	50.2	113.1	Below AEGL-1	2
WHR	0	86.6	50.2	137.4	Below AEGL-1	3
TH1GF	0	183.8	50.2	234.6	Below AEGL-1	4
TH1TF	9	184.2	50.2	235.0	Below AEGL-1	4
TH2GF	0	133.2	50.2	184.0	Below AEGL-1	3
TH2TF	9	133.2	50.2	184.0	Below AEGL-1	3
IB1GF	0	152.6	50.2	203.4	Below AEGL-1	4
IB1TF	11	156.1	50.2	206.9	Below AEGL-1	4
IB2GF	0	137.3	50.2	188.1	Below AEGL-1	3

Table F.1: Predicted 100th percentile NO_2 Concentrations for Emergency Operation ($\mu g/m^3$)

Receptor	Height (m)	100th Percentile NO_2 PC ($\mu g/m^3$)	Background NO_2	PEC NO_2 ($\mu g/m^3$)	AEGL	DAQI
IB2TF	11	145.1	50.2	195.9	Below AEGL-1	3
IB3GF1	0	143.5	50.2	194.3	Below AEGL-1	3
IB3TF1	9	147.1	50.2	197.9	Below AEGL-1	3
IB3GF2	0	142.7	50.2	193.5	Below AEGL-1	3
IB3TF2	9	145.3	50.2	196.1	Below AEGL-1	3
IB3GF3	0	152.4	50.2	203.2	Below AEGL-1	4
IB3TF3	9	155.6	50.2	206.4	Below AEGL-1	4
IB3GF4	0	149.5	50.2	200.3	Below AEGL-1	4
IB3TF4	9	152.5	50.2	203.3	Below AEGL-1	4
CRGF1	0	166.8	50.2	217.6	Below AEGL-1	4
CRTF1	4	167.2	50.2	218.0	Below AEGL-1	4
CRGF2	0	150.1	50.2	200.9	Below AEGL-1	4
CRTF2	4	150.8	50.2	201.6	Below AEGL-1	4
CRGF3	0	150.6	50.2	201.4	Below AEGL-1	4
CRTF3	4	151.6	50.2	202.4	Below AEGL-1	4
CRGF4	0	170.8	50.2	221.6	Below AEGL-1	4
CRTF4	4	171.7	50.2	222.5	Below AEGL-1	4
CRGF5	0	201.9	50.2	252.7	Below AEGL-1	4
CRTF5	4	202.6	50.2	253.4	Below AEGL-1	4
CRGF6	0	175.4	50.2	226.2	Below AEGL-1	4
CRTF6	15	195.9	50.2	246.7	Below AEGL-1	4
CRGF7	0	204.9	50.2	255.7	Below AEGL-1	4
CRTF7	15	217.6	50.2	268.4	Below AEGL-1	5
VA1GF	0	113.8	50.2	164.6	Below AEGL-1	3
VA1TF	7	114.1	50.2	164.9	Below AEGL-1	3
VA2GF	0	114.7	50.2	165.5	Below AEGL-1	3
VA2TF	7	115.0	50.2	165.8	Below AEGL-1	3
VA3GF	0	113.4	50.2	164.2	Below AEGL-1	3

Table F.1: Predicted 100th percentile NO_2 Concentrations for Emergency Operation ($\mu g/m^3$)

Receptor	Height (m)	100th Percentile NO_2 PC ($\mu g/m^3$)	Background NO_2	PEC NO_2 ($\mu g/m^3$)	AEGL	DAQI
VA3TF	7	113.9	50.2	164.7	Below AEGL-1	3
VA4GF	0	117.1	50.2	167.9	Below AEGL-1	3
VA4TF	7	117.9	50.2	168.7	Below AEGL-1	3
VA5GF	0	110.7	50.2	161.5	Below AEGL-1	3
VA5TF	7	111.1	50.2	161.9	Below AEGL-1	3
VA6GF	0	114.0	50.2	164.8	Below AEGL-1	3
VA6TF	7	114.9	50.2	165.7	Below AEGL-1	3
BHGF	0	68.5	50.2	119.3	Below AEGL-1	2
BHTF	15	70.6	50.2	121.4	Below AEGL-1	2
SRGF	0	90.4	50.2	141.2	Below AEGL-1	3
SRTF	7	91.1	50.2	141.9	Below AEGL-1	3
VRIBGF	0	193.1	50.2	243.9	Below AEGL-1	4
VRIBTF	6	192.9	50.2	243.7	Below AEGL-1	4
HS2	0	171.2	50.2	222.0	Below AEGL-1	4
WU_1 GF	0	130.9	50.2	181.7	Below AEGL-1	3
WU_1 TF	9	131.5	50.2	182.3	Below AEGL-1	3
WU_2 GF	0	155.4	50.2	206.2	Below AEGL-1	4
WU_2 TF	9	161.6	50.2	212.4	Below AEGL-1	4
OR1GF	0	112.0	50.2	162.8	Below AEGL-1	3
OR1TF	48	158.4	50.2	209.2	Below AEGL-1	4
OR2GF	0	117.9	50.2	168.7	Below AEGL-1	3
OR2TF	48	172.5	50.2	223.3	Below AEGL-1	4

Particulate Matter

Daily mean Particulate PM_{10} are shown below in Table F.2.

Table F.2: Predicted Daily Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Height (m)	Daily Mean PM_{10} PC ($\mu g/m^3$)	% Change in concentration relative to AQO	Background PM_{10} ($\mu g/m^3$)	PEC PM_{10} ($\mu g/m^3$)	PEC as % of Objective
BRT1	0	0.27	0.5%	33.0	33.3	66.5%

Table F.2: Predicted Daily Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Height (m)	Daily Mean PM_{10} PC ($\mu g/m^3$)	% Change in concentration relative to AQO	Background PM_{10} ($\mu g/m^3$)	PEC PM_{10} ($\mu g/m^3$)	PEC as % of Objective
BRT2	0	0.19	0.4%	33.0	33.2	66.4%
BRT3	0	0.58	1.2%	33.0	33.6	67.1%
BRT4	0	0.59	1.2%	33.0	33.6	67.2%
BRT5	0	0.48	1.0%	33.0	33.5	66.9%
MT1	0	0.11	0.2%	33.0	33.1	66.2%
MT2	0	0.22	0.4%	33.0	33.2	66.4%
SG1	0	0.24	0.5%	33.0	33.2	66.4%
SG2	0	0.45	0.9%	33.0	33.4	66.9%
SG3	0	0.77	1.5%	33.0	33.8	67.5%
SG4	0	0.96	1.9%	33.0	33.9	67.9%
C2GF	0	0.64	1.3%	33.0	33.6	67.2%
C2TF	18	0.65	1.3%	33.0	33.6	67.3%
OOCL	0	1.06	2.1%	33.0	34.0	68.1%
C1GF	0	0.88	1.8%	33.0	33.9	67.7%
C1TF	18	0.92	1.8%	33.0	33.9	67.8%
GR	0	0.53	1.1%	33.0	33.5	67.0%
WHR	0	0.23	0.5%	33.0	33.2	66.4%
TH1GF	0	0.40	0.8%	33.0	33.4	66.8%
TH1TF	9	0.52	1.0%	33.0	33.5	67.0%
TH2GF	0	0.85	1.7%	33.0	33.8	67.7%
TH2TF	9	0.92	1.8%	33.0	33.9	67.8%
IB1GF	0	0.20	0.4%	33.0	33.2	66.4%
IB1TF	11	0.21	0.4%	33.0	33.2	66.4%
IB2GF	0	0.22	0.4%	33.0	33.2	66.4%
IB2TF	11	0.22	0.4%	33.0	33.2	66.4%
IB3GF1	0	0.15	0.3%	33.0	33.1	66.3%
IB3TF1	9	0.16	0.3%	33.0	33.1	66.3%
IB3GF2	0	0.15	0.3%	33.0	33.1	66.3%
IB3TF2	9	0.15	0.3%	33.0	33.1	66.3%
IB3GF3	0	0.21	0.4%	33.0	33.2	66.4%
IB3TF3	9	0.21	0.4%	33.0	33.2	66.4%
IB3GF4	0	0.17	0.3%	33.0	33.2	66.3%
IB3TF4	9	0.17	0.3%	33.0	33.2	66.3%
CRGF1	0	0.16	0.3%	33.0	33.1	66.3%
CRTF1	4	0.16	0.3%	33.0	33.1	66.3%
CRGF2	0	0.11	0.2%	33.0	33.1	66.2%
CRTF2	4	0.11	0.2%	33.0	33.1	66.2%
CRGF3	0	0.25	0.5%	33.0	33.2	66.5%

Table F.2: Predicted Daily Mean PM_{10} Concentrations ($\mu g/m^3$)

Receptor	Height (m)	Daily Mean PM_{10} PC ($\mu g/m^3$)	% Change in concentration relative to AQO	Background PM_{10} ($\mu g/m^3$)	PEC PM_{10} ($\mu g/m^3$)	PEC as % of Objective
CRTF3	4	0.25	0.5%	33.0	33.2	66.5%
CRGF4	0	0.30	0.6%	33.0	33.3	66.6%
CRTF4	4	0.30	0.6%	33.0	33.3	66.6%
CRGF5	0	0.22	0.4%	33.0	33.2	66.4%
CRTF5	4	0.22	0.4%	33.0	33.2	66.4%
CRGF6	0	0.34	0.7%	33.0	33.3	66.7%
CRTF6	15	0.35	0.7%	33.0	33.3	66.7%
CRGF7	0	0.34	0.7%	33.0	33.3	66.6%
CRTF7	15	0.34	0.7%	33.0	33.3	66.7%
VA1GF	0	0.25	0.5%	33.3	33.6	67.1%
VA1TF	7	0.25	0.5%	33.3	33.6	67.1%
VA2GF	0	0.32	0.6%	33.3	33.6	67.3%
VA2TF	7	0.33	0.7%	33.3	33.6	67.3%
VA3GF	0	0.35	0.7%	33.3	33.7	67.3%
VA3TF	7	0.35	0.7%	33.3	33.7	67.3%
VA4GF	0	0.47	0.9%	33.0	33.5	66.9%
VA4TF	7	0.48	1.0%	33.0	33.5	66.9%
VA5GF	0	0.56	1.1%	33.0	33.5	67.1%
VA5TF	7	0.56	1.1%	33.0	33.5	67.1%
VA6GF	0	0.66	1.3%	33.0	33.6	67.3%
VA6TF	7	0.66	1.3%	33.0	33.7	67.3%
BHGF	0	0.41	0.8%	33.0	33.4	66.8%
BHTF	15	0.44	0.9%	33.0	33.4	66.9%
SRGF	0	0.54	1.1%	33.0	33.5	67.1%
SRTF	7	0.55	1.1%	33.0	33.5	67.1%
VRIBGF	0	0.37	0.7%	33.0	33.4	66.7%
VRIBTF	6	0.38	0.8%	33.0	33.4	66.7%
HS2	0	0.17	0.3%	33.0	33.2	66.3%
WU_1 GF	0	0.38	0.8%	33.0	33.4	66.7%
WU_1 TF	9	0.38	0.8%	33.0	33.4	66.7%
WU_2 GF	0	0.34	0.7%	33.0	33.3	66.7%
WU_2 TF	9	0.34	0.7%	33.0	33.3	66.7%
OR1GF	0	0.72	1.4%	33.0	33.7	67.4%
OR1TF	48	0.81	1.6%	33.0	33.8	67.6%
OR2GF	0	0.79	1.6%	33.0	33.8	67.6%
OR2TF	48	0.92	1.8%	33.0	33.9	67.8%

PC: process contribution
PEC: annual mean predicted environmental concentration (i.e. including background)
GF: Ground Floor

Table F.2: Predicted Daily Mean PM_{10} Concentrations ($\mu g/m^3$)						
Receptor	Height (m)	Daily Mean PM_{10} PC ($\mu g/m^3$)	% Change in concentration relative to AQO	Background PM_{10} ($\mu g/m^3$)	PEC PM_{10} ($\mu g/m^3$)	PEC as % of Objective
TF: Top Floor						

Sulphur Dioxide Results

Hourly, 15-minute and daily mean SO_2 results are shown below in Table F.3 – Table F.5 respectively.

Table F.3: Predicted Hourly Mean SO_2 Concentrations ($\mu g/m^3$)			
Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
BRT1	0	0.27	0.08%
BRT2	0	0.26	0.08%
BRT3	0	0.37	0.10%
BRT4	0	0.39	0.11%
BRT5	0	0.38	0.11%
MT1	0	0.30	0.09%
MT2	0	0.38	0.11%
SG1	0	0.37	0.10%
SG2	0	0.41	0.12%
SG3	0	0.48	0.14%
SG4	0	0.50	0.14%
C2GF	0	0.27	0.08%
C2TF	18	0.28	0.08%
OOCL	0	0.48	0.14%
C1GF	0	0.35	0.10%
C1TF	18	0.37	0.11%
GR	0	0.23	0.07%
WHR	0	0.30	0.09%
TH1GF	0	0.31	0.09%
TH1TF	9	0.34	0.10%
TH2GF	0	0.40	0.11%
TH2TF	9	0.43	0.12%
IB1GF	0	0.30	0.08%
IB1TF	11	0.33	0.09%
IB2GF	0	0.26	0.08%
IB2TF	11	0.27	0.08%
IB3GF1	0	0.31	0.09%

Table F.3: Predicted Hourly Mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
IB3TF1	9	0.33	0.09%
IB3GF2	0	0.31	0.09%
IB3TF2	9	0.32	0.09%
IB3GF3	0	0.30	0.08%
IB3TF3	9	0.32	0.09%
IB3GF4	0	0.30	0.08%
IB3TF4	9	0.32	0.09%
CRGF1	0	0.28	0.08%
CRTF1	4	0.28	0.08%
CRGF2	0	0.20	0.06%
CRTF2	4	0.20	0.06%
CRGF3	0	0.31	0.09%
CRTF3	4	0.31	0.09%
CRGF4	0	0.35	0.10%
CRTF4	4	0.36	0.10%
CRGF5	0	0.35	0.10%
CRTF5	4	0.35	0.10%
CRGF6	0	0.34	0.10%
CRTF6	15	0.36	0.10%
CRGF7	0	0.38	0.11%
CRTF7	15	0.44	0.13%
VA1GF	0	0.41	0.12%
VA1TF	7	0.42	0.12%
VA2GF	0	0.41	0.12%
VA2TF	7	0.41	0.12%
VA3GF	0	0.41	0.12%
VA3TF	7	0.42	0.12%
VA4GF	0	0.42	0.12%
VA4TF	7	0.43	0.12%
VA5GF	0	0.41	0.12%
VA5TF	7	0.42	0.12%
VA6GF	0	0.41	0.12%
VA6TF	7	0.42	0.12%
BHGF	0	0.25	0.07%
BHTF	15	0.26	0.07%
SRGF	0	0.33	0.09%
SRTF	7	0.33	0.09%
VRIBGF	0	0.46	0.13%

Table F.3: Predicted Hourly Mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
VRIBTF	6	0.46	0.13%
HS2	0	0.21	0.06%
WU_1 GF	0	0.34	0.10%
WU_1 TF	9	0.34	0.10%
WU_2 GF	0	0.35	0.10%
WU_2 TF	9	0.35	0.10%
OR1GF	0	0.42	0.12%
OR1TF	48	0.56	0.16%
OR2GF	0	0.44	0.13%
OR2TF	48	0.61	0.17%

PC: process contribution
GF: Ground Floor
TF: Top Floor

Table F.4: Predicted 15-Minute Mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
BRT1	0	0.37	0.16%
BRT2	0	0.35	0.16%
BRT3	0	0.41	0.18%
BRT4	0	0.43	0.19%
BRT5	0	0.42	0.19%
MT1	0	0.39	0.17%
MT2	0	0.44	0.20%
SG1	0	0.46	0.21%
SG2	0	0.48	0.21%
SG3	0	0.52	0.23%
SG4	0	0.55	0.24%
C2GF	0	0.30	0.13%
C2TF	18	0.32	0.14%
OOCL	0	0.52	0.23%
C1GF	0	0.38	0.17%
C1TF	18	0.40	0.18%
GR	0	0.26	0.11%
WHR	0	0.35	0.16%
TH1GF	0	0.43	0.19%

Table F.4: Predicted 15-Minute Mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
TH1TF	9	0.45	0.20%
TH2GF	0	0.44	0.20%
TH2TF	9	0.46	0.20%
IB1GF	0	0.37	0.16%
IB1TF	11	0.40	0.18%
IB2GF	0	0.31	0.14%
IB2TF	11	0.33	0.14%
IB3GF1	0	0.38	0.17%
IB3TF1	9	0.41	0.18%
IB3GF2	0	0.38	0.17%
IB3TF2	9	0.40	0.18%
IB3GF3	0	0.39	0.17%
IB3TF3	9	0.41	0.18%
IB3GF4	0	0.38	0.17%
IB3TF4	9	0.40	0.18%
CRGF1	0	0.36	0.16%
CRTF1	4	0.36	0.16%
CRGF2	0	0.27	0.12%
CRTF2	4	0.28	0.12%
CRGF3	0	0.39	0.17%
CRTF3	4	0.39	0.17%
CRGF4	0	0.42	0.19%
CRTF4	4	0.43	0.19%
CRGF5	0	0.46	0.20%
CRTF5	4	0.46	0.20%
CRGF6	0	0.43	0.19%
CRTF6	15	0.47	0.21%
CRGF7	0	0.45	0.20%
CRTF7	15	0.52	0.23%
VA1GF	0	0.47	0.21%
VA1TF	7	0.47	0.21%
VA2GF	0	0.46	0.20%
VA2TF	7	0.46	0.20%
VA3GF	0	0.45	0.20%
VA3TF	7	0.46	0.20%
VA4GF	0	0.48	0.21%
VA4TF	7	0.48	0.21%
VA5GF	0	0.46	0.20%

Table F.4: Predicted 15-Minute Mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
VA5TF	7	0.46	0.20%
VA6GF	0	0.46	0.20%
VA6TF	7	0.46	0.20%
BHGF	0	0.29	0.13%
BHTF	15	0.30	0.13%
SRGF	0	0.38	0.17%
SRTF	7	0.38	0.17%
VRIBGF	0	0.57	0.25%
VRIBTF	6	0.56	0.25%
HS2	0	0.28	0.13%
WU_1 GF	0	0.40	0.18%
WU_1 TF	9	0.40	0.18%
WU_2 GF	0	0.42	0.18%
WU_2 TF	9	0.42	0.19%
OR1GF	0	0.49	0.22%
OR1TF	48	0.75	0.33%
OR2GF	0	0.51	0.23%
OR2TF	48	0.81	0.36%

PC: process contribution
GF: Ground Floor
TF: Top Floor

Table F.5: Predicted Max Daily mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
BRT1	0	0.11	0.09%
BRT2	0	0.08	0.07%
BRT3	0	0.22	0.18%
BRT4	0	0.25	0.20%
BRT5	0	0.24	0.20%
MT1	0	0.08	0.06%
MT2	0	0.16	0.12%
SG1	0	0.13	0.10%
SG2	0	0.20	0.16%
SG3	0	0.35	0.28%
SG4	0	0.39	0.31%

Table F.5: Predicted Max Daily mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
C2GF	0	0.19	0.15%
C2TF	18	0.19	0.16%
OOCL	0	0.32	0.26%
C1GF	0	0.27	0.21%
C1TF	18	0.27	0.22%
GR	0	0.17	0.14%
WHR	0	0.13	0.10%
TH1GF	0	0.15	0.12%
TH1TF	9	0.19	0.15%
TH2GF	0	0.29	0.23%
TH2TF	9	0.31	0.25%
IB1GF	0	0.11	0.08%
IB1TF	11	0.11	0.09%
IB2GF	0	0.10	0.08%
IB2TF	11	0.11	0.08%
IB3GF1	0	0.09	0.07%
IB3TF1	9	0.10	0.08%
IB3GF2	0	0.08	0.07%
IB3TF2	9	0.09	0.07%
IB3GF3	0	0.10	0.08%
IB3TF3	9	0.10	0.08%
IB3GF4	0	0.10	0.08%
IB3TF4	9	0.10	0.08%
CRGF1	0	0.10	0.08%
CRTF1	4	0.10	0.08%
CRGF2	0	0.05	0.04%
CRTF2	4	0.05	0.04%
CRGF3	0	0.09	0.07%
CRTF3	4	0.09	0.07%
CRGF4	0	0.11	0.09%
CRTF4	4	0.11	0.09%
CRGF5	0	0.11	0.08%
CRTF5	4	0.11	0.08%
CRGF6	0	0.11	0.09%
CRTF6	15	0.11	0.09%
CRGF7	0	0.11	0.09%
CRTF7	15	0.12	0.09%
VA1GF	0	0.18	0.14%

Table F.5: Predicted Max Daily mean SO_2 Concentrations ($\mu g/m^3$)

Receptor	Height (m)	1-hour Mean SO_2 PC ($\mu g/m^3$)	% Change in concentration relative to AQO
VA1TF	7	0.18	0.15%
VA2GF	0	0.23	0.18%
VA2TF	7	0.23	0.18%
VA3GF	0	0.20	0.16%
VA3TF	7	0.20	0.16%
VA4GF	0	0.21	0.17%
VA4TF	7	0.22	0.17%
VA5GF	0	0.22	0.18%
VA5TF	7	0.23	0.18%
VA6GF	0	0.29	0.23%
VA6TF	7	0.29	0.24%
BHGF	0	0.19	0.15%
BHTF	15	0.20	0.16%
SRGF	0	0.24	0.19%
SRTF	7	0.24	0.19%
VRIBGF	0	0.17	0.14%
VRIBTF	6	0.18	0.14%
HS2	0	0.07	0.05%
WU_1 GF	0	0.12	0.09%
WU_1 TF	9	0.12	0.09%
WU_2 GF	0	0.12	0.09%
WU_2 TF	9	0.12	0.09%
OR1GF	0	0.29	0.23%
OR1TF	48	0.32	0.26%
OR2GF	0	0.31	0.25%
OR2TF	48	0.35	0.28%

PC: process contribution
GF: Ground Floor
TF: Top Floor

Carbon Monoxide (CO)

1-hour and 8-hour rolling mean Particulate CO results are shown below in Table F.6 and Table F.7 respectively.

Table F.6: Predicted 1-hour mean CO Concentrations (µg/m^3)

Receptor	Height (m)	1-hour Mean CO PC (µg/m^3)	% Change in concentration relative to AQO
BRT1	0	59.5	0.20%
BRT2	0	66.7	0.22%
BRT3	0	44.0	0.15%
BRT4	0	40.3	0.13%
BRT5	0	48.4	0.16%
MT1	0	66.3	0.22%
MT2	0	53.5	0.18%
SG1	0	52.9	0.18%
SG2	0	57.8	0.19%
SG3	0	52.5	0.17%
SG4	0	54.7	0.18%
C2GF	0	28.6	0.10%
C2TF	18	29.4	0.10%
OOCL	0	50.0	0.17%
C1GF	0	38.5	0.13%
C1TF	18	39.4	0.13%
GR	0	24.3	0.08%
WHR	0	33.8	0.11%
TH1GF	0	71.7	0.24%
TH1TF	9	71.9	0.24%
TH2GF	0	51.9	0.17%
TH2TF	9	52.0	0.17%
IB1GF	0	59.5	0.20%
IB1TF	11	60.9	0.20%
IB2GF	0	53.6	0.18%
IB2TF	11	56.6	0.19%
IB3GF1	0	56.0	0.19%
IB3TF1	9	57.4	0.19%
IB3GF2	0	55.6	0.19%
IB3TF2	9	56.7	0.19%
IB3GF3	0	59.5	0.20%
IB3TF3	9	60.7	0.20%
IB3GF4	0	58.3	0.19%
IB3TF4	9	59.5	0.20%
CRGF1	0	65.1	0.22%
CRTF1	4	65.2	0.22%
CRGF2	0	58.5	0.20%
CRTF2	4	58.8	0.20%

Table F.6: Predicted 1-hour mean CO Concentrations (µg/m^3)

Receptor	Height (m)	1-hour Mean CO PC (µg/m^3)	% Change in concentration relative to AQO
CRGF3	0	58.7	0.20%
CRTF3	4	59.2	0.20%
CRGF4	0	66.6	0.22%
CRTF4	4	67.0	0.22%
CRGF5	0	78.8	0.26%
CRTF5	4	79.0	0.26%
CRGF6	0	68.4	0.23%
CRTF6	15	76.4	0.25%
CRGF7	0	79.9	0.27%
CRTF7	15	84.9	0.28%
VA1GF	0	44.4	0.15%
VA1TF	7	44.5	0.15%
VA2GF	0	44.7	0.15%
VA2TF	7	44.9	0.15%
VA3GF	0	44.2	0.15%
VA3TF	7	44.4	0.15%
VA4GF	0	45.7	0.15%
VA4TF	7	46.0	0.15%
VA5GF	0	43.2	0.14%
VA5TF	7	43.3	0.14%
VA6GF	0	44.5	0.15%
VA6TF	7	44.8	0.15%
BHGF	0	26.7	0.09%
BHTF	15	27.5	0.09%
SRGF	0	35.3	0.12%
SRTF	7	35.5	0.12%
VRIBGF	0	75.3	0.25%
VRIBTF	6	75.2	0.25%
HS2	0	66.8	0.22%
WU_1 GF	0	51.0	0.17%
WU_1 TF	9	51.3	0.17%
WU_2 GF	0	60.6	0.20%
WU_2 TF	9	63.0	0.21%
OR1GF	0	43.7	0.15%
OR1TF	48	61.8	0.21%
OR2GF	0	46.0	0.15%
OR2TF	48	67.3	0.22%

PC: process contribution

Table F.6: Predicted 1-hour mean CO Concentrations (µg/m^3)			
Receptor	Height (m)	1-hour Mean CO PC (µg/m^3)	% Change in concentration relative to AQO
GF: Ground Floor TF: Top Floor			

Table F.7: Predicted 8-hour rolling mean CO Concentrations (µg/m^3)			
Receptor	Height (m)	8-hour rolling Mean CO PC (µg/m^3)	% Change in concentration relative to AQO
BRT1	0	1.47	0.015%
BRT2	0	1.10	0.011%
BRT3	0	3.54	0.035%
BRT4	0	3.62	0.036%
BRT5	0	2.59	0.026%
MT1	0	0.54	0.005%
MT2	0	1.21	0.012%
SG1	0	1.18	0.012%
SG2	0	2.41	0.024%
SG3	0	4.42	0.044%
SG4	0	5.36	0.054%
C2GF	0	4.54	0.045%
C2TF	18	4.68	0.047%
OOCL	0	6.28	0.063%
C1GF	0	5.84	0.058%
C1TF	18	6.15	0.061%
GR	0	3.67	0.037%
WHR	0	1.14	0.011%
TH1GF	0	2.46	0.025%
TH1TF	9	3.16	0.032%
TH2GF	0	5.40	0.054%
TH2TF	9	5.91	0.059%
IB1GF	0	0.97	0.010%
IB1TF	11	1.02	0.010%
IB2GF	0	1.26	0.013%
IB2TF	11	1.28	0.013%
IB3GF1	0	0.83	0.008%
IB3TF1	9	0.87	0.009%
IB3GF2	0	0.81	0.008%

Table F.7: Predicted 8-hour rolling mean CO Concentrations (µg/m^3)

Receptor	Height (m)	8-hour rolling Mean CO PC (µg/m^3)	% Change in concentration relative to AQO
IB3TF2	9	0.84	0.008%
IB3GF3	0	1.03	0.010%
IB3TF3	9	1.05	0.010%
IB3GF4	0	0.89	0.009%
IB3TF4	9	0.92	0.009%
CRGF1	0	0.77	0.008%
CRTF1	4	0.78	0.008%
CRGF2	0	0.48	0.005%
CRTF2	4	0.49	0.005%
CRGF3	0	1.76	0.018%
CRTF3	4	1.76	0.018%
CRGF4	0	1.99	0.020%
CRTF4	4	1.99	0.020%
CRGF5	0	1.31	0.013%
CRTF5	4	1.31	0.013%
CRGF6	0	2.21	0.022%
CRTF6	15	2.24	0.022%
CRGF7	0	2.09	0.021%
CRTF7	15	2.18	0.022%
VA1GF	0	1.43	0.014%
VA1TF	7	1.45	0.014%
VA2GF	0	1.62	0.016%
VA2TF	7	1.65	0.016%
VA3GF	0	1.76	0.018%
VA3TF	7	1.79	0.018%
VA4GF	0	2.32	0.023%
VA4TF	7	2.37	0.024%
VA5GF	0	2.80	0.028%
VA5TF	7	2.84	0.028%
VA6GF	0	3.42	0.034%
VA6TF	7	3.49	0.035%
BHGF	0	2.11	0.021%
BHTF	15	2.22	0.022%
SRGF	0	2.57	0.026%
SRTF	7	2.62	0.026%
VRIBGF	0	1.86	0.019%
VRIBTF	6	1.90	0.019%
HS2	0	1.07	0.011%

Table F.7: Predicted 8-hour rolling mean CO Concentrations (µg/m^3)			
Receptor	Height (m)	8-hour rolling Mean CO PC (µg/m^3)	% Change in concentration relative to AQO
WU_1 GF	0	3.37	0.034%
WU_1 TF	9	3.37	0.034%
WU_2 GF	0	2.38	0.024%
WU_2 TF	9	2.39	0.024%
OR1GF	0	4.29	0.043%
OR1TF	48	4.89	0.049%
OR2GF	0	4.80	0.048%
OR2TF	48	5.62	0.056%
PC: process contribution GF: Ground Floor TF: Top Floor			

Ecological Results

Annual Mean Ammonia NH_3

Annual Mean NH_3 results for all local wildlife sites is shown in Table F.9 below.

Table F.8: Predicted Annual mean NH_3 Concentrations (µg/m^3)				
Ecological Habitat	Model ID	Annual Mean NH_3 PC	EAL	% Change in concentration relative to EAL
Wormwood Scrubs	WSLNR	0.003	1	0.3%
Abbey Road Mound and Bestway Park	AbRdMount	0.001	1	0.1%
Acton Park & Acton Lane Sports Ground	ActonPark	0.001	1	0.1%
Acton Railsides	ActonRail_01	0.006	1	0.6%
Acton Railsides	ActonRail_02	0.007	1	0.7%
Acton Railsides	ActonRail_03	0.005	1	0.5%
Acton Railsides	ActonRail_04	0.003	1	0.3%
Canal Feeder	BrentCanFeeder	0.002	1	0.2%
Brentfield Open Space	BrentOpenSpace	0.002	1	0.2%
Canal Feeder	CanalFeeder	0.002	1	0.2%
Central line west of White City	Central_WWhiteC	0.004	1	0.4%
Central line west of White City	CentralWest_01	0.002	1	0.2%
Central Line and Castle Bar	CentralWest_02	0.003	1	0.3%

Table F.8: Predicted Annual mean NH_3 Concentrations ($\mu g/m^3$)				
Ecological Habitat	Model ID	Annual Mean NH_3 PC	EAL	% Change in concentration relative to EAL
Silverlink Metro between Brondesbury and Willesden Junction	CentralWestRuis	0.000	1	0.0%
Connell Crescent Allotments	Connell_Cres	0.002	1	0.2%
Silverlink Metro and Dudding Hill Loop railsides in Ealing	DHL_02	0.012	1	1.2%
Silverlink Metro and Dudding Hill Loop railsides in Ealing	DHL_03	0.015	1	1.5%
Diageo Lake & Coronation Gardens	DiageoLake_North	0.001	1	0.1%
Diageo Lake & Coronation Gardens	DiageoLake_South	0.001	1	0.1%
Elmwood Green	Elmwood	0.003	1	0.3%
London's Canals	GUC_EAST_DHL_01	0.009	1	0.9%
London's Canals	GUC_North	0.005	1	0.5%
London's Canals	GUC_Tow	0.020	1	2.0%
London's Canals	GUC_West	0.003	1	0.3%
Former Guinness Mounds	GuinnessMound	0.002	1	0.2%
Harlesden to Wembley Central railsides, including the Wembley Brook	Harl_Wem_Brook	0.001	1	0.1%
Harlesden to Wembley Central railsides, including the Wembley Brook	HarlWebCen	0.004	1	0.4%
Kensal Green Cemetery	KensalGrnCem	0.003	1	0.3%
Little Wormwood Scrubs Park	LilWormScrubs	0.002	1	0.2%
London's Canals	LonCanal	0.021	1	2.1%
Mason's Green Lane	MasonGreenLn	0.002	1	0.2%
North Acton Cemetery	NorthActon	0.003	1	0.3%
North Acton Cemetery	NorthActonCem	0.009	1	0.9%
Old Oak Sidings	OldOak_Sidings	0.029	1	2.9%
Old Oak Common Sidings Birch Wood	OldOak_Sidings_02	0.025	1	2.5%
Piccadilly and District Lines in Ealing	Picc_Dist_Ealing	0.001	1	0.1%

Table F.8: Predicted Annual mean NH_3 Concentrations ($\mu g / m^3$)				
Ecological Habitat	Model ID	Annual Mean NH_3 PC	EAL	% Change in concentration relative to EAL
London's Canals	RailSideHab_01	0.015	1	1.5%
London's Canals	RailSideHab_02	0.009	1	0.9%
River Brent at Hanger Lane	RiverBrentHang	0.001	1	0.1%
River Brent west of Stonebridge	RiverBrentWest	0.001	1	0.1%
Roundwood Park and Willesden Cemeteries	RndWdPk_WilsCem	0.004	1	0.4%
Silverlink Metro between Brondesbury and Willesden Junction	SilMet	0.009	1	0.9%
St Mary's Churchyard, Willesden	StMaryChurchYrd	0.001	1	0.1%
St Mary's Cemetery	StMarysCem	0.001	1	0.1%
St Mary's Cemetery	StMarysRC_Cem	0.003	1	0.3%
The Old Orchard	TheOldOrch	0.002	1	0.2%
Trinity Way Recreation Ground	Trinity_Way	0.001	1	0.1%
Twyford Abbey Grounds	Twyford_AbGround	0.001	1	0.1%
Harlesden to Wembley Central railsides, including the Wembley Brook	WemBrook	0.001	1	0.1%
Wesley Playing fields	WesleyPlaying	0.007	1	0.7%
Central line west of White City	WhiteCityGar	0.001	1	0.1%

Nitrogen Deposition Results

Nitrogen deposition for all local wildlife sites is shown in Table F.9 below.

Table F.9: Predicted Nitrogen Deposition analysis for all modelled local nature sites.						
Site	Model ID	Nitrogen Deposition (kgN / ha / yr)				PC % of Critical Load
		Critical Load	NO_2 deposition PC	NH_3 Deposition PC	Total PC	
Wormwood Scrubs (Forest)	WSLNR	10	0.0077	0.0241	0.0318	0.32%
Wormwood Scrubs (Grassland)	WSLNR	5	0.0039	0.0161	0.0199	0.40%
Abbey Road Mound and	AbRdMount	10	0.0027	0.0083	0.0110	0.11%

Site	Model ID	Nitrogen Deposition (kgN / ha / yr)				PC % of Critical Load
		Critical Load	NO_2 deposition PC	NH_3 Deposition PC	Total PC	
Bestway Park (Forest)						
Abbey Road Mound and Bestway Park (Grassland)	AbRdMount	5	0.0013	0.0056	0.0069	0.14%
Acton Park & Acton Lane Sports Ground (Forest)	ActonPark	10	0.0031	0.0096	0.0127	0.13%
Acton Park & Acton Lane Sports Ground (Grassland)	ActonPark	5	0.0015	0.0064	0.0079	0.16%
Acton Railsides (Forest)	ActonRail_01	10	0.0153	0.0479	0.0631	0.63%
Acton Railsides (Grassland)	ActonRail_01	5	0.0076	0.0319	0.0396	0.79%
Acton Railsides (Forest)	ActonRail_02	10	0.0176	0.0551	0.0727	0.73%
Acton Railsides (Grassland)	ActonRail_02	5	0.0088	0.0367	0.0455	0.91%
Acton Railsides (Forest)	ActonRail_03	10	0.0134	0.0421	0.0555	0.56%
Acton Railsides (Grassland)	ActonRail_03	5	0.0067	0.0281	0.0348	0.70%
Acton Railsides (Forest)	ActonRail_04	10	0.0076	0.0239	0.0316	0.32%
Acton Railsides (Grassland)	ActonRail_04	5	0.0038	0.0159	0.0198	0.40%
Canal Feeder (Forest)	BrentCanFeeder	10	0.0059	0.0186	0.0245	0.25%
Canal Feeder (Grassland)	BrentCanFeeder	5	0.0030	0.0124	0.0154	0.31%
Brentfield Open Space (Forest)	BrentOpenSpace	10	0.0041	0.0130	0.0171	0.17%
Brentfield Open Space (Grassland)	BrentOpenSpace	5	0.0021	0.0087	0.0107	0.21%
Canal Feeder (Forest)	CanalFeeder	10	0.0052	0.0163	0.0215	0.22%
Canal Feeder (Grassland)	CanalFeeder	5	0.0026	0.0109	0.0135	0.27%
Central line west of White City (Forest)	Central_WWhiteC	10	0.0088	0.0274	0.0362	0.36%
Central line west of White City (Grassland)	Central_WWhiteC	5	0.0044	0.0183	0.0226	0.45%
Central line west of White City (Forest)	CentralWest_01	10	0.0038	0.0120	0.0159	0.16%
Central line west of White City (Grassland)	CentralWest_01	5	0.0019	0.0080	0.0099	0.20%
Central Line and Castle Bar (Forest)	CentralWest_02	10	0.0082	0.0257	0.0340	0.34%
Central Line and Castle Bar (Grassland)	CentralWest_02	5	0.0041	0.0172	0.0213	0.43%
Silverlink Metro between	CentralWestRuis	10	0.0012	0.0036	0.0048	0.05%

Site	Model ID	Nitrogen Deposition (kgN / ha / yr)				PC % of Critical Load
		Critical Load	NO_2 deposition PC	NH_3 Deposition PC	Total PC	
Brondesbury and Willesden Junction (Forest)						
Silverlink Metro between Brondesbury and Willesden Junction (Grassland)	CentralWestRuis	5	0.0006	0.0024	0.0030	0.06%
Connell Crescent Allotments (Forest)	Connell_Cres	10	0.0062	0.0194	0.0256	0.26%
Connell Crescent Allotments (Grassland)	Connell_Cres	5	0.0031	0.0129	0.0160	0.32%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Forest)	DHL_02	10	0.0309	0.0968	0.1277	1.28%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Grassland)	DHL_02	5	0.0155	0.0645	0.0800	1.60%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Forest)	DHL_03	10	0.0373	0.1169	0.1543	1.54%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Grassland)	DHL_03	5	0.0187	0.0779	0.0966	1.93%
Diageo Lake & Coronation Gardens (Forest)	DiageoLake_North	10	0.0027	0.0084	0.0110	0.11%
Diageo Lake & Coronation Gardens (Grassland)	DiageoLake_North	5	0.0013	0.0056	0.0069	0.14%
Diageo Lake & Coronation Gardens (Forest)	DiageoLake_South	10	0.0028	0.0088	0.0116	0.12%
Diageo Lake & Coronation Gardens (Grassland)	DiageoLake_South	5	0.0014	0.0059	0.0073	0.15%
Elmwood Green (Forest)	Elmwood	10	0.0069	0.0215	0.0284	0.28%
Elmwood Green (Grassland)	Elmwood	5	0.0034	0.0143	0.0178	0.36%
London's Canals (Forest)	GUC_EAST_DHL_01	10	0.0217	0.0679	0.0896	0.90%
London's Canals (Grassland)	GUC_EAST_DHL_01	5	0.0108	0.0453	0.0561	1.12%

Site	Model ID	Nitrogen Deposition (kgN / ha / yr)				PC % of Critical Load
		Critical Load	NO_2 deposition PC	NH_3 Deposition PC	Total PC	
London's Canals (Forest)	GUC_North	10	0.0120	0.0375	0.0495	0.50%
London's Canals (Grassland)	GUC_North	5	0.0060	0.0250	0.0310	0.62%
London's Canals (Forest)	GUC_Tow	10	0.0486	0.1522	0.2008	2.01%
London's Canals (Grassland)	GUC_Tow	5	0.0243	0.1015	0.1258	2.52%
London's Canals (Forest)	GUC_West	10	0.0065	0.0205	0.0270	0.27%
London's Canals (Grassland)	GUC_West	5	0.0033	0.0137	0.0169	0.34%
Former Guinness Mounds (Forest)	GuinnessMound	10	0.0041	0.0128	0.0169	0.17%
Former Guinness Mounds (Grassland)	GuinnessMound	5	0.0020	0.0085	0.0106	0.21%
Harlesden to Wembley Central railsides, including the Wembley Brook (Forest)	Harl_Wem_Brook	10	0.0022	0.0070	0.0092	0.09%
Harlesden to Wembley Central railsides, including the Wembley Brook (Grassland)	Harl_Wem_Brook	5	0.0011	0.0046	0.0058	0.12%
Harlesden to Wembley Central railsides, including the Wembley Brook (Forest)	HarlWebCen	10	0.0088	0.0276	0.0365	0.36%
Harlesden to Wembley Central railsides, including the Wembley Brook (Grassland)	HarlWebCen	5	0.0044	0.0184	0.0228	0.46%
Kensal Green Cemetery (Forest)	KensalGrnCem	10	0.0064	0.0200	0.0264	0.26%
Kensal Green Cemetery (Grassland)	KensalGrnCem	5	0.0032	0.0134	0.0166	0.33%
Little Wormwood Scrubs Park (Forest)	LilWormScrubs	10	0.0053	0.0167	0.0221	0.22%
Little Wormwood	LilWormScrubs	5	0.0027	0.0112	0.0138	0.28%

Site	Model ID	Nitrogen Deposition (kgN / ha / yr)				PC % of Critical Load
		Critical Load	NO_2 deposition PC	NH_3 Deposition PC	Total PC	
Scrubs Park (Grassland)						
London's Canals (Forest)	LonCanal	10	0.0512	0.1603	0.2115	2.11%
London's Canals (Grassland)	LonCanal	5	0.0256	0.1068	0.1324	2.65%
Mason's Green Lane (Forest)	MasonGreenLn	10	0.0042	0.0132	0.0175	0.17%
Mason's Green Lane (Grassland)	MasonGreenLn	5	0.0021	0.0088	0.0109	0.22%
North Acton Cemetery (Forest)	NorthActon	10	0.0068	0.0212	0.0280	0.28%
North Acton Cemetery (Grassland)	NorthActon	5	0.0034	0.0141	0.0175	0.35%
North Acton Cemetery (Forest)	NorthActonCem	10	0.0216	0.0677	0.0894	0.89%
North Acton Cemetery (Grassland)	NorthActonCem	5	0.0108	0.0452	0.0560	1.12%
Old Oak Sidings (Forest)	OldOak_Slidings	10	0.0715	0.2239	0.2954	2.95%
Old Oak Sidings (Grassland)	OldOak_Slidings	5	0.0357	0.1492	0.1850	3.70%
Old Oak Common Sidings Birch Wood (Forest)	OldOak_Slidings_02	10	0.0619	0.1940	0.2559	2.56%
Old Oak Common Sidings Birch Wood (Grassland)	OldOak_Slidings_02	5	0.0310	0.1293	0.1603	3.21%
Piccadilly and District Lines in Ealing (Forest)	Picc_Dist_Ealing	10	0.0031	0.0098	0.0130	0.13%
Piccadilly and District Lines in Ealing (Grassland)	Picc_Dist_Ealing	5	0.0016	0.0066	0.0081	0.16%
London's Canals (Forest)	RailSideHab_01	10	0.0374	0.1172	0.1546	1.55%
London's Canals (Grassland)	RailSideHab_01	5	0.0187	0.0781	0.0968	1.94%
London's Canals (Forest)	RailSideHab_02	10	0.0214	0.0670	0.0884	0.88%
London's Canals (Grassland)	RailSideHab_02	5	0.0107	0.0447	0.0554	1.11%
River Brent at Hanger Lane (Forest)	RiverBrentHang	10	0.0014	0.0045	0.0059	0.06%
River Brent at Hanger Lane (Grassland)	RiverBrentHang	5	0.0007	0.0030	0.0037	0.07%
River Brent west of	RiverBrentWest	10	0.0014	0.0043	0.0056	0.06%

Site	Model ID	Nitrogen Deposition (kgN / ha / yr)				PC % of Critical Load
		Critical Load	NO_2 deposition PC	NH_3 Deposition PC	Total PC	
Stonebridge (Forest)						
River Brent west of Stonebridge (Grassland)	RiverBrentWest	5	0.0007	0.0029	0.0035	0.07%
Roundwood Park and Willesden Cemeteries (Forest)	RndWdPk_WilsCem	10	0.0089	0.0280	0.0369	0.37%
Roundwood Park and Willesden Cemeteries (Grassland)	RndWdPk_WilsCem	5	0.0045	0.0187	0.0231	0.46%
Silverlink Metro between Brondesbury and Willesden Junction (Forest)	SilMet	10	0.0213	0.0668	0.0881	0.88%
Silverlink Metro between Brondesbury and Willesden Junction (Grassland)	SilMet	5	0.0107	0.0445	0.0552	1.10%
St Mary's Churchyard, Willesden (Forest)	StMaryChurchYrd	10	0.0037	0.0115	0.0151	0.15%
St Mary's Churchyard, Willesden (Grassland)	StMaryChurchYrd	5	0.0018	0.0076	0.0095	0.19%
St Mary's Cemetery (Forest)	StMarysCem	10	0.0037	0.0116	0.0153	0.15%
St Mary's Cemetery (Grassland)	StMarysCem	5	0.0019	0.0077	0.0096	0.19%
St Mary's Cemetery (Forest)	StMarysRC_Cem	10	0.0077	0.0242	0.0319	0.32%
St Mary's Cemetery (Grassland)	StMarysRC_Cem	5	0.0039	0.0161	0.0200	0.40%
The Old Orchard (Forest)	TheOldOrch	10	0.0038	0.0119	0.0157	0.16%
The Old Orchard (Grassland)	TheOldOrch	5	0.0019	0.0079	0.0098	0.20%
Trinity Way Recreation Ground (Forest)	Trinity_Way	10	0.0024	0.0076	0.0100	0.10%
Trinity Way Recreation Ground (Grassland)	Trinity_Way	5	0.0012	0.0050	0.0062	0.12%
Twyford Abbey Grounds (Forest)	Twyford_AbGround	10	0.0019	0.0060	0.0079	0.08%

Site	Model ID	Nitrogen Deposition (kgN / ha / yr)				PC % of Critical Load
		Critical Load	NO_2 deposition PC	NH_3 Deposition PC	Total PC	
Twyford Abbey Grounds (Grassland)	Twyford_AbGround	5	0.0010	0.0040	0.0050	0.10%
Harlesden to Wembley Central railsides, including the Wembley Brook (Forest)	WemBrook	10	0.0022	0.0070	0.0092	0.09%
Harlesden to Wembley Central railsides, including the Wembley Brook (Grassland)	WemBrook	5	0.0011	0.0047	0.0058	0.12%
Wesley Playing fields (Forest)	WesleyPlaying	10	0.0180	0.0564	0.0744	0.74%
Wesley Playing fields (Grassland)	WesleyPlaying	5	0.0090	0.0376	0.0466	0.93%
Central line west of White City (Forest)	WhiteCityGar	10	0.0022	0.0069	0.0091	0.09%
Central line west of White City (Grassland)	WhiteCityGar	5	0.0011	0.0046	0.0057	0.11%

Acid Deposition Analysis

Acid deposition for all local wildlife sites is shown in Table F.10 below.

Table F.10: Predicted Acid Deposition analysis for all modelled local nature sites.

Site	Model ID	Acidity Critical Load (keq/ha/yr)		Acid Disposition PC (keq/ha/yr)			PC % of Critical Load
		N	S	NO_2	NH_3	Total	
Wormwood Scrubs (Forest)	WSLNR	0.357 -2.672	2.315	0.0005	0.0017	0.0023	0.08%
Wormwood Scrubs (Grassland)	WSLNR	0.714 - 2.334	1.620	0.0003	0.0011	0.0014	0.06%
Abbey Road Mound and Bestway Park (Forest)	AbRdMount	0.142 - 1.714	1.572	0.0002	0.0006	0.0008	0.03%
Abbey Road Mound and Bestway Park (Grassland)	AbRdMount	0.892 - 1.772	0.880	0.0001	0.0004	0.0005	0.02%
Acton Park & Acton Lane Sports Ground (Forest)	ActonPark	0.357 - 2.678	2.321	0.0002	0.0007	0.0009	0.05%
Acton Park & Acton Lane Sports Ground (Grassland)	ActonPark	0.714 - 2.344	1.630	0.0001	0.0005	0.0006	0.03%
Acton Railsides (Forest)	ActonRail_01	0.357 - 2.683	2.326	0.0011	0.0034	0.0045	0.17%
Acton Railsides (Grassland)	ActonRail_01	0.714 - 2.344	1.630	0.0005	0.0023	0.0028	0.12%
Acton Railsides (Forest)	ActonRail_02	0.357 - 2.683	2.326	0.0013	0.0039	0.0052	0.19%

Table F.10: Predicted Acid Deposition analysis for all modelled local nature sites.

Site	Model ID	Acidity Critical Load (keq/ha/yr)		Acid Disposition PC (keq/ha/yr)			PC % of Critical Load
		N	S	NO_2	NH_3	Total	
Acton Railsides (Grassland)	ActonRail_02	0.714 - 2.344	1.630	0.0006	0.0026	0.0032	0.14%
Acton Railsides (Forest)	ActonRail_03	0.357 - 2.683	2.326	0.0010	0.0030	0.0040	0.15%
Acton Railsides (Grassland)	ActonRail_03	0.714 - 2.344	1.630	0.0005	0.0020	0.0025	0.11%
Acton Railsides (Forest)	ActonRail_04	0.357 - 2.686	2.329	0.0005	0.0017	0.0022	0.08%
Acton Railsides (Grassland)	ActonRail_04	0.714 - 2.344	1.630	0.0003	0.0011	0.0014	0.06%
Canal Feeder (Forest)	BrentCanFeeder	0.357 - 2.69	2.333	0.0004	0.0013	0.0017	0.06%
Canal Feeder (Grassland)	BrentCanFeeder	0.714 - 2.344	1.630	0.0002	0.0009	0.0011	0.05%
Brentfield Open Space (Forest)	BrentOpenSpace	0.357 - 2.686	2.329	0.0003	0.0009	0.0012	0.05%
Brentfield Open Space (Grassland)	BrentOpenSpace	0.714 - 2.344	1.630	0.0001	0.0006	0.0008	0.03%
Canal Feeder (Forest)	CanalFeeder	0.357 - 2.681	2.324	0.0004	0.0012	0.0015	0.06%
Canal Feeder (Grassland)	CanalFeeder	0.714 - 2.344	1.630	0.0002	0.0008	0.0010	0.04%
Central line west of White City (Forest)	Central_WWhiteC	0.357 - 2.67	2.313	0.0006	0.0019	0.0026	0.10%
Central line west of White City (Grassland)	Central_WWhiteC	0.714 - 2.334	1.620	0.0003	0.0013	0.0016	0.07%
Central line west of White City (Forest)	CentralWest_01	0.357 - 2.683	2.326	0.0003	0.0009	0.0011	0.04%
Central line west of White City (Grassland)	CentralWest_01	0.714 - 2.344	1.630	0.0001	0.0006	0.0007	0.03%
Central Line and Castle Bar (Forest)	CentralWest_02	0.357 - 2.673	2.316	0.0006	0.0018	0.0024	0.09%
Central Line and Castle Bar (Grassland)	CentralWest_02	0.714 - 2.334	1.620	0.0003	0.0012	0.0015	0.06%
Silverlink Metro between Brondesbury and Willesden Junction (Forest)	CentralWestRuis	0.357 - 2.678	2.321	0.0001	0.0003	0.0003	0.01%
Silverlink Metro between Brondesbury and Willesden Junction (Grassland)	CentralWestRuis	0.714 - 2.344	1.630	0.0000	0.0002	0.0002	0.01%
Connell Crescent Allotments (Forest)	Connell_Cres	0.357 - 2.681	2.234	0.0004	0.0014	0.0018	0.07%
Connell Crescent Allotments (Grassland)	Connell_Cres	0.714 - 2.344	1.630	0.0002	0.0009	0.0011	0.05%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Forest)	DHL_02	0.357 - 2.681	2.324	0.0022	0.0069	0.0091	0.34%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Grassland)	DHL_02	0.714 - 2.344	1.630	0.0011	0.0046	0.0057	0.24%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Forest)	DHL_03	0.357 - 2.67	2.313	0.0027	0.0083	0.0110	0.41%
Silverlink Metro and Dudding Hill Loop railsides in Ealing (Grassland)	DHL_03	0.714 - 2.334	1.620	0.0013	0.0055	0.0069	0.29%

Table F.10: Predicted Acid Deposition analysis for all modelled local nature sites.

Site	Model ID	Acidity Critical Load (keq/ha/yr)		Acid Disposition PC (keq/ha/yr)			PC % of Critical Load
		N	S	NO_2	NH_3	Total	
Diageo Lake & Coronation Gardens (Forest)	DiageoLake_North	0.357 - 2.67	2.313	0.0002	0.0006	0.0008	0.03%
Diageo Lake & Coronation Gardens (Grassland)	DiageoLake_North	0.714 - 2.334	1.620	0.0001	0.0004	0.0005	0.02%
Diageo Lake & Coronation Gardens (Forest)	DiageoLake_South	0.357 - 2.683	2.326	0.0002	0.0006	0.0008	0.03%
Diageo Lake & Coronation Gardens (Grassland)	DiageoLake_South	0.714 - 2.344	1.630	0.0001	0.0004	0.0005	0.02%
Elmwood Green (Forest)	Elmwood	0.357 - 2.681	2.324	0.0005	0.0015	0.0020	0.08%
Elmwood Green (Grassland)	Elmwood	0.714 - 2.344	1.630	0.0002	0.0010	0.0013	0.05%
London's Canals (Forest)	GUC_EAST_DHL_01	0.357 - 2.686	2.329	0.0015	0.0048	0.0064	0.24%
London's Canals (Grassland)	GUC_EAST_DHL_01	0.714 - 2.344	1.630	0.0008	0.0032	0.0040	0.17%
London's Canals (Forest)	GUC_North	0.357 - 2.681	2.324	0.0009	0.0027	0.0035	0.13%
London's Canals (Grassland)	GUC_North	0.714 - 2.344	1.630	0.0004	0.0018	0.0022	0.09%
London's Canals (Forest)	GUC_Tow	0.357 - 2.686	2.329	0.0035	0.0108	0.0143	0.53%
London's Canals (Grassland)	GUC_Tow	0.714 - 2.344	1.630	0.0017	0.0072	0.0090	0.38%
London's Canals (Forest)	GUC_West	0.357 - 2.67	2.313	0.0005	0.0015	0.0019	0.07%
London's Canals (Grassland)	GUC_West	0.714 - 2.334	1.620	0.0002	0.0010	0.0012	0.05%
Former Guinness Mounds (Forest)	GuinnessMound	0.357 - 2.674	2.317	0.0003	0.0009	0.0012	0.05%
Former Guinness Mounds (Grassland)	GuinnessMound	0.714 - 2.334	1.620	0.0001	0.0006	0.0008	0.03%
Harlesden to Wembley Central railsides, including the Wembley Brook (Forest)	Harl_Wem_Brook	0.357 - 2.686	2.329	0.0002	0.0005	0.0007	0.02%
Harlesden to Wembley Central railsides, including the Wembley Brook (Grassland)	Harl_Wem_Brook	0.714 - 2.344	1.630	0.0001	0.0003	0.0004	0.02%
Harlesden to Wembley Central railsides, including the Wembley Brook (Forest)	HarlWebCen	0.357 - 2.679	2.322	0.0006	0.0020	0.0026	0.10%
Harlesden to Wembley Central railsides, including the Wembley Brook (Grassland)	HarlWebCen	0.714 - 2.344	1.630	0.0003	0.0013	0.0016	0.07%
Kensal Green Cemetery (Forest)	KensalGrnCem	0.357 - 2.677	2.320	0.0005	0.0014	0.0019	0.07%
Kensal Green Cemetery (Grassland)	KensalGrnCem	0.714 - 2.344	1.630	0.0002	0.0010	0.0012	0.05%
Little Wormwood Scrubs Park (Forest)	LilWormScrubs	0.357 - 2.681	2.324	0.0004	0.0012	0.0016	0.06%

Table F.10: Predicted Acid Deposition analysis for all modelled local nature sites.

Site	Model ID	Acidity Critical Load (keq/ha/yr)		Acid Disposition PC (keq/ha/yr)			PC % of Critical Load
		N	S	NO_2	NH_3	Total	
Little Wormwood Scrubs Park (Grassland)	LilWormScrubs	0.714 - 2.344	1.630	0.0002	0.0008	0.0010	0.04%
London's Canals (Forest)	LonCanal	0.357 - 2.667	2.310	0.0037	0.0114	0.0151	0.56%
London's Canals (Grassland)	LonCanal	0.714 - 2.334	1.620	0.0018	0.0076	0.0094	0.40%
Mason's Green Lane (Forest)	MasonGreenLn	0.357 - 2.681	2.324	0.0003	0.0009	0.0012	0.05%
Mason's Green Lane (Grassland)	MasonGreenLn	0.714 - 2.344	1.630	0.0002	0.0006	0.0008	0.03%
North Acton Cemetery (Forest)	NorthActon	0.357 - 2.683	2.326	0.0005	0.0015	0.0020	0.07%
North Acton Cemetery (Grassland)	NorthActon	0.714 - 2.344	1.630	0.0002	0.0010	0.0012	0.05%
North Acton Cemetery (Forest)	NorthActonCem	0.357 - 2.681	2.324	0.0015	0.0048	0.0064	0.24%
North Acton Cemetery (Grassland)	NorthActonCem	0.714 - 2.344	1.630	0.0008	0.0032	0.0040	0.17%
Old Oak Sidings (Forest)	OldOak_Slidings	0.357 - 2.681	2.324	0.0051	0.0159	0.0210	0.78%
Old Oak Sidings (Grassland)	OldOak_Slidings	0.714 - 2.344	1.630	0.0025	0.0106	0.0132	0.56%
Old Oak Common Sidings Birch Wood (Forest)	OldOak_Slidings_02	0.357 - 2.67	2.313	0.0044	0.0138	0.0182	0.68%
Old Oak Common Sidings Birch Wood (Grassland)	OldOak_Slidings_02	0.714 - 2.334	1.620	0.0022	0.0092	0.0114	0.49%
Piccadilly and District Lines in Ealing (Forest)	Picc_Dist_Ealing	0.357 - 2.681	2.324	0.0002	0.0007	0.0009	0.03%
Piccadilly and District Lines in Ealing (Grassland)	Picc_Dist_Ealing	0.714 - 2.344	1.630	0.0001	0.0005	0.0006	0.02%
London's Canals (Forest)	RailSideHab_01	0.357 - 2.681	2.324	0.0027	0.0083	0.0110	0.41%
London's Canals (Grassland)	RailSideHab_01	0.714 - 2.344	1.630	0.0013	0.0056	0.0069	0.29%
London's Canals (Forest)	RailSideHab_02	0.357 - 2.73	2.316	0.0015	0.0048	0.0063	0.23%
London's Canals (Grassland)	RailSideHab_02	0.714 - 2.334	1.620	0.0008	0.0032	0.0039	0.17%
River Brent at Hanger Lane (Forest)	RiverBrentHang	0.357 - 2.673	2.316	0.0001	0.0003	0.0004	0.02%
River Brent at Hanger Lane (Grassland)	RiverBrentHang	0.714 - 2.334	1.620	0.0001	0.0002	0.0003	0.01%
River Brent west of Stonebridge (Forest)	RiverBrentWest	0.357 - 2.683	2.326	0.0001	0.0003	0.0004	0.02%
River Brent west of Stonebridge (Grassland)	RiverBrentWest	0.714 - 2.344	1.630	0.0000	0.0002	0.0003	0.01%
Roundwood Park and Willesden Cemeteries (Forest)	RndWdPk_WilsCem	0.357 - 2.681	2.324	0.0006	0.0020	0.0026	0.10%
Roundwood Park and Willesden Cemeteries (Grassland)	RndWdPk_WilsCem	0.714 - 2.344	1.630	0.0003	0.0013	0.0016	0.07%
Silverlink Metro between Brondesbury and Willesden Junction (Forest)	SilMet	0.357 - 2.69	2.333	0.0015	0.0048	0.0063	0.23%

Table F.10: Predicted Acid Deposition analysis for all modelled local nature sites.

Site	Model ID	Acidity Critical Load (keq/ha/yr)		Acid Disposition PC (keq/ha/yr)			PC % of Critical Load
		N	S	NO_2	NH_3	Total	
Silverlink Metro between Brondesbury and Willesden Junction (Grassland)	SilMet	0.714 - 2.344	1.630	0.0008	0.0032	0.0039	0.17%
St Mary's Churchyard, Willesden (Forest)	StMaryChurchYrd	0.357 - 2.69	2.333	0.0003	0.0008	0.0011	0.04%
St Mary's Churchyard, Willesden (Grassland)	StMaryChurchYrd	0.714 - 2.344	1.630	0.0001	0.0005	0.0007	0.03%
St Mary's Cemetery (Forest)	StMarysCem	0.357 - 2.679	2.322	0.0003	0.0008	0.0011	0.04%
St Mary's Cemetery (Grassland)	StMarysCem	0.714 - 2.344	1.630	0.0001	0.0006	0.0007	0.03%
St Mary's Cemetery (Forest)	StMarysRC_Cem	0.357 - 2.69	2.333	0.0006	0.0017	0.0023	0.08%
St Mary's Cemetery (Grassland)	StMarysRC_Cem	0.714 - 2.344	1.630	0.0003	0.0011	0.0014	0.06%
The Old Orchard (Forest)	TheOldOrch	0.357 - 2.047	1.690	0.0003	0.0008	0.0011	0.04%
The Old Orchard (Grassland)	TheOldOrch	0.714 - 1.594	0.880	0.0001	0.0006	0.0007	0.03%
Trinity Way Recreation Ground (Forest)	Trinity_Way	0.357 - 2.672	2.315	0.0002	0.0005	0.0007	0.03%
Trinity Way Recreation Ground (Grassland)	Trinity_Way	0.714 - 2.334	1.620	0.0001	0.0004	0.0004	0.03%
Twyford Abbey Grounds (Forest)	Twyford_AbGround	0.357 - 2.674	2.317	0.0001	0.0004	0.0006	0.02%
Twyford Abbey Grounds (Grassland)	Twyford_AbGround	0.714 - 2.334	1.620	0.0001	0.0003	0.0004	0.02%
Harlesden to Wembley Central railsides, including the Wembley Brook (Forest)	WemBrook	0.357 - 2.683	2.325	0.0002	0.0005	0.0007	0.02%
Harlesden to Wembley Central railsides, including the Wembley Brook (Grassland)	WemBrook	0.714 - 2.344	1.630	0.0001	0.0003	0.0004	0.02%
Wesley Playing fields (Forest)	WesleyPlaying	0.357 - 2.046	1.689	0.0013	0.0040	0.0053	0.20%
Wesley Playing fields (Grassland)	WesleyPlaying	0.714 - 1.594	0.880	0.0006	0.0027	0.0033	0.14%
Central line west of White City (Forest)	WhiteCityGar	0.357 - 2.046	0.002	0.0002	0.0005	0.0006	0.03%
Central line west of White City (Grassland)	WhiteCityGar	0.714 - 1.594	0.001	0.0001	0.0003	0.0004	0.03%

Maximum 100th percentile Daily Mean NO_x Results

Maximum 100th daily mean NO_x results for all local wildlife sites is shown in Table F.11 below.

Table F.11: Predicted Maximum 100thile Daily Mean NOx for all modelled Ecological habitat

Model ID	100th %ile Daily Mean NOx PC	Critical Level	PC % of Critical Level
RPSAC	4.30	75	6%
WCSAC	4.46	75	6%

Table F.11: Predicted Maximum 100thile Daily Mean NOx for all modelled Ecological habitat

Model ID	100th %ile Daily Mean NOx PC	Critical Level	PC % of Critical Level
WSLNR	86.39	75	115%
AbRdMount	22.19	75	30%
ActonPark	25.16	75	34%
ActonRail_01	150.87	75	201%
ActonRail_02	129.17	75	172%
ActonRail_03	85.50	75	114%
ActonRail_04	71.06	75	95%
BrentCanFeeder	42.23	75	56%
BrentOpenSpace	19.49	75	26%
CanalFeeder	30.60	75	41%
Central_WWhiteC	48.60	75	65%
CentralWest_01	36.00	75	48%
CentralWest_02	63.72	75	85%
CentralWestRuis	9.69	75	13%
Connell_Cres	42.44	75	57%
DHL_02	134.21	75	179%
DHL_03	240.49	75	321%
DiageoLake_North	23.51	75	31%
DiageoLake_South	26.44	75	35%
Elmwood	23.91	75	32%
GUC_EAST_DHL_01	98.69	75	132%
GUC_North	70.17	75	94%
GUC_Tow	159.07	75	212%
GUC_West	47.19	75	63%
GuinnessMound	37.05	75	49%
Harl_Wem_Brook	21.11	75	28%
HarlWebCen	50.78	75	68%
KensalGrnCem	34.00	75	45%
LilWormScrubs	29.78	75	40%
LonCanal	150.08	75	200%
MasonGreenLn	42.17	75	56%
NorthActon	42.40	75	57%
NorthActonCem	139.93	75	187%
OldOak_Slidings	235.40	75	314%
OldOak_Slidings_02	254.74	75	340%
Picc_Dist_Ealing	27.51	75	37%
RailSideHab_01	139.60	75	186%
RailSideHab_02	65.21	75	87%

Table F.11: Predicted Maximum 100thile Daily Mean NOx for all modelled Ecological habitat			
Model ID	100th %ile Daily Mean NOx PC	Critical Level	PC % of Critical Level
RiverBrentHang	12.40	75	17%
RiverBrentWest	11.35	75	15%
RndWdPk_WilsCem	28.77	75	38%
SilMet	62.67	75	84%
StMaryChurchYrd	16.82	75	22%
StMarysCem	16.41	75	21%
StMarysRC_Cem	39.07	75	50%
TheOldOrch	18.96	75	24%
Trinity_Way	24.68	75	31%
Twyford_AbGround	18.12	75	22%
WemBrook	18.47	75	23%
WesleyPlaying	105.74	75	127%
WhiteCityGar	23.57	75	28%

Testing Scenario Results

Annual Mean Ammonia NH_3

Table F.12: Predicted Annual mean NH_3 Concentrations ($\mu g/m^3$)				
Ecological Habitat	Model ID	Annual Mean NH_3 PC	EAL	% Change in concentration relative to EAL
Wormwood Scrubs	WSLNR	0.003	1	0.3%
Abbey Road Mound and Bestway Park	AbRdMount	0.001	1	0.1%
Acton Park & Acton Lane Sports Ground	ActonPark	0.001	1	0.1%
Acton Railsides	ActonRail_01	0.006	1	0.6%
Acton Railsides	ActonRail_02	0.007	1	0.7%
Acton Railsides	ActonRail_03	0.005	1	0.5%
Acton Railsides	ActonRail_04	0.003	1	0.3%
Canal Feeder	BrentCanFeeder	0.002	1	0.2%
Brentfield Open Space	BrentOpenSpace	0.002	1	0.2%
Canal Feeder	CanalFeeder	0.002	1	0.2%
Central line west of White City	Central_WWhiteC	0.004	1	0.4%

Table F.12: Predicted Annual mean NH_3 Concentrations ($\mu g/m^3$)

Ecological Habitat	Model ID	Annual Mean NH_3 PC	EAL	% Change in concentration relative to EAL
Central line west of White City	CentralWest_01	0.002	1	0.2%
Central Line and Castle Bar	CentralWest_02	0.003	1	0.3%
Silverlink Metro between Brondesbury and Willesden Junction	CentralWestRuis	0.000	1	0.0%
Connell Crescent Allotments	Connell_Cres	0.002	1	0.2%
Silverlink Metro and Dudding Hill Loop railsides in Ealing	DHL_02	0.012	1	1.2%
Silverlink Metro and Dudding Hill Loop railsides in Ealing	DHL_03	0.015	1	1.5%
Diageo Lake & Coronation Gardens	DiageoLake_North	0.001	1	0.1%
Diageo Lake & Coronation Gardens	DiageoLake_South	0.001	1	0.1%
Elmwood Green	Elmwood	0.003	1	0.3%
London's Canals	GUC_EAST_DHL_01	0.009	1	0.9%
London's Canals	GUC_North	0.005	1	0.5%
London's Canals	GUC_Tow	0.020	1	2.0%
London's Canals	GUC_West	0.003	1	0.3%
Former Guinness Mounds	GuinnessMound	0.002	1	0.2%
Harlesden to Wembley Central railsides, including the Wembley Brook	Harl_Wem_Brook	0.001	1	0.1%
Harlesden to Wembley Central railsides, including the Wembley Brook	HarlWebCen	0.004	1	0.4%
Kensal Green Cemetery	KensalGrnCem	0.003	1	0.3%
Little Wormwood Scrubs Park	LilWormScrubs	0.002	1	0.2%
London's Canals	LonCanal	0.021	1	2.1%
Mason's Green Lane	MasonGreenLn	0.002	1	0.2%
North Acton Cemetery	NorthActon	0.003	1	0.3%
North Acton Cemetery	NorthActonCem	0.009	1	0.9%
Old Oak Sidings	OldOak_Slidings	0.029	1	2.9%

Table F.12: Predicted Annual mean NH_3 Concentrations ($\mu g/m^3$)				
Ecological Habitat	Model ID	Annual Mean NH_3 PC	EAL	% Change in concentration relative to EAL
Old Oak Common Sidings Birch Wood	OldOak_Slidings_02	0.025	1	2.5%
Piccadilly and District Lines in Ealing	Picc_Dist_Ealing	0.001	1	0.1%
London's Canals	RailSideHab_01	0.015	1	1.5%
London's Canals	RailSideHab_02	0.009	1	0.9%
River Brent at Hanger Lane	RiverBrentHang	0.001	1	0.1%
River Brent west of Stonebridge	RiverBrentWest	0.001	1	0.1%
Roundwood Park and Willesden Cemeteries	RndWdPk_WilsCem	0.004	1	0.4%
Silverlink Metro between Brondesbury and Willesden Junction	SilMet	0.009	1	0.9%
St Mary's Churchyard, Willesden	StMaryChurchYrd	0.001	1	0.1%
St Mary's Cemetery	StMarysCem	0.001	1	0.1%
St Mary's Cemetery	StMarysRC_Cem	0.003	1	0.3%
The Old Orchard	TheOldOrch	0.002	1	0.2%
Trinity Way Recreation Ground	Trinity_Way	0.001	1	0.1%
Twyford Abbey Grounds	Twyford_AbGround	0.001	1	0.1%
Harlesden to Wembley Central railsides, including the Wembley Brook	WemBrook	0.001	1	0.1%
Wesley Playing fields	WesleyPlaying	0.007	1	0.7%
Central line west of White City	WhiteCityGar	0.001	1	0.1%

100th Percentile NO_2 Results

100th Percentile NO2 results during the testing scenario are shown below in Table F.12 below.

Table F.13: Predicted 100th percentile NO_2 Concentrations for Emergency Operation ($\mu g/m^3$)						
Receptor	Height (m)	100th Percentile NO_2 PC ($\mu g/m^3$)	Background NO_2	PEC NO_2 ($\mu g/m^3$)	AEGL	DAQI
BRT1	0	14.7	50.2	64.9	Below AEGL-1	1
BRT2	0	19.9	50.2	70.1	Below AEGL-1	2
BRT3	0	14.1	50.2	64.3	Below AEGL-1	1

Table F.13: Predicted 100th percentile NO_2 Concentrations for Emergency Operation ($\mu g/m^3$)

Receptor	Height (m)	100th Percentile NO_2 PC ($\mu g/m^3$)	Background NO_2	PEC NO_2 ($\mu g/m^3$)	AEGL	DAQI
BRT4	0	13.1	50.2	63.3	Below AEGL-1	1
BRT5	0	15.3	50.2	65.5	Below AEGL-1	1
MT1	0	21.6	50.2	71.8	Below AEGL-1	2
MT2	0	20.5	50.2	70.7	Below AEGL-1	2
SG1	0	19.1	50.2	69.3	Below AEGL-1	2
SG2	0	15.1	50.2	65.3	Below AEGL-1	1
SG3	0	14.3	50.2	64.5	Below AEGL-1	1
SG4	0	14.1	50.2	64.3	Below AEGL-1	1
C2GF	0	6.6	50.2	56.8	Below AEGL-1	1
C2TF	18	6.6	50.2	56.8	Below AEGL-1	1
OOCL	0	12.5	50.2	62.7	Below AEGL-1	1
C1GF	0	10.7	50.2	60.9	Below AEGL-1	1
C1TF	18	11.0	50.2	61.2	Below AEGL-1	1
GR	0	5.9	50.2	56.1	Below AEGL-1	1
WHR	0	9.0	50.2	59.2	Below AEGL-1	1
TH1GF	0	18.1	50.2	68.3	Below AEGL-1	2
TH1TF	9	18.1	50.2	68.3	Below AEGL-1	2
TH2GF	0	13.9	50.2	64.1	Below AEGL-1	1
TH2TF	9	14.1	50.2	64.3	Below AEGL-1	1
IB1GF	0	12.5	50.2	62.7	Below AEGL-1	1
IB1TF	11	13.8	50.2	64.0	Below AEGL-1	1
IB2GF	0	13.7	50.2	63.9	Below AEGL-1	1
IB2TF	11	13.7	50.2	63.9	Below AEGL-1	1
IB3GF1	0	13.5	50.2	63.7	Below AEGL-1	1
IB3TF1	9	14.2	50.2	64.4	Below AEGL-1	1
IB3GF2	0	10.7	50.2	60.9	Below AEGL-1	1
IB3TF2	9	11.1	50.2	61.3	Below AEGL-1	1
IB3GF3	0	7.1	50.2	57.3	Below AEGL-1	1

Table F.13: Predicted 100th percentile NO_2 Concentrations for Emergency Operation ($\mu g/m^3$)

Receptor	Height (m)	100th Percentile NO_2 PC ($\mu g/m^3$)	Background NO_2	PEC NO_2 ($\mu g/m^3$)	AEGL	DAQI
IB3TF3	9	7.2	50.2	57.4	Below AEGL-1	1
IB3GF4	0	7.2	50.2	57.4	Below AEGL-1	1
IB3TF4	9	7.3	50.2	57.5	Below AEGL-1	1
CRGF1	0	12.9	50.2	63.1	Below AEGL-1	1
CRTF1	4	13.0	50.2	63.2	Below AEGL-1	1
CRGF2	0	16.1	50.2	66.3	Below AEGL-1	1
CRTF2	4	16.3	50.2	66.5	Below AEGL-1	1
CRGF3	0	22.1	50.2	72.3	Below AEGL-1	2
CRTF3	4	22.2	50.2	72.4	Below AEGL-1	2
CRGF4	0	24.2	50.2	74.4	Below AEGL-1	2
CRTF4	4	24.3	50.2	74.5	Below AEGL-1	2
CRGF5	0	24.3	50.2	74.5	Below AEGL-1	2
CRTF5	4	24.4	50.2	74.6	Below AEGL-1	2
CRGF6	0	22.9	50.2	73.1	Below AEGL-1	2
CRTF6	15	23.5	50.2	73.7	Below AEGL-1	2
CRGF7	0	24.4	50.2	74.6	Below AEGL-1	2
CRTF7	15	24.6	50.2	74.8	Below AEGL-1	2
VA1GF	0	12.8	50.2	63.0	Below AEGL-1	1
VA1TF	7	12.8	50.2	63.0	Below AEGL-1	1
VA2GF	0	13.1	50.2	63.3	Below AEGL-1	1
VA2TF	7	13.2	50.2	63.4	Below AEGL-1	1
VA3GF	0	13.4	50.2	63.6	Below AEGL-1	1
VA3TF	7	13.5	50.2	63.7	Below AEGL-1	1
VA4GF	0	14.5	50.2	64.7	Below AEGL-1	1
VA4TF	7	14.5	50.2	64.7	Below AEGL-1	1
VA5GF	0	14.3	50.2	64.5	Below AEGL-1	1
VA5TF	7	14.4	50.2	64.6	Below AEGL-1	1
VA6GF	0	14.7	50.2	64.9	Below AEGL-1	1

Table F.13: Predicted 100th percentile NO_2 Concentrations for Emergency Operation ($\mu g/m^3$)

Receptor	Height (m)	100th Percentile NO_2 PC ($\mu g/m^3$)	Background NO_2	PEC NO_2 ($\mu g/m^3$)	AEGL	DAQI
VA6TF	7	14.8	50.2	65.0	Below AEGL-1	1
BHGF	0	8.0	50.2	58.2	Below AEGL-1	1
BHTF	15	8.0	50.2	58.2	Below AEGL-1	1
SRGF	0	11.5	50.2	61.7	Below AEGL-1	1
SRTF	7	11.5	50.2	61.7	Below AEGL-1	1
VRIBGF	0	20.9	50.2	71.1	Below AEGL-1	2
VRIBTF	6	20.9	50.2	71.1	Below AEGL-1	2
HS2	0	26.2	50.2	76.4	Below AEGL-1	2
WU_1 GF	0	18.3	50.2	68.5	Below AEGL-1	2
WU_1 TF	9	19.2	50.2	69.4	Below AEGL-1	2
WU_2 GF	0	23.8	50.2	74.0	Below AEGL-1	2
WU_2 TF	9	24.1	50.2	74.3	Below AEGL-1	2
OR1GF	0	10.4	50.2	60.6	Below AEGL-1	1
OR1TF	48	15.6	50.2	65.8	Below AEGL-1	1
OR2GF	0	11.1	50.2	61.3	Below AEGL-1	1
OR2TF	48	17.6	50.2	67.8	Below AEGL-1	1