Alkali Environmental

AIR QUALITY ASESSMENT UPDATE

AT

COLT - POWERGATE

AQ1040R1

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Prepared For

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EXECUTIVE SUMMARY

The following Dispersion Modelling Assessment has been updated by Alkali Environmental Ltd on behalf of HDR, in support of the Environmental Permit application (ref DP3107LF) for the Powergate Data Centre

The Data Centre will consist of 13 diesel generators, which have the potential to increase pollutant emissions within the vicinity of the site. Predicted impacts at all human and ecological sensitive receptors for all pollutant concentrations and both annual mean nitrogen and acid deposition rates, with the exception of 24-hour oxides of nitrogen concentrations, associated with maintenance and testing operation of the site (Scenario 1) can be considered not significant.

Predicted impacts for 1-hour mean NO and AEGL-1 NO_2 have been screened out as not significant for both Scenario 1 and 2.

It is important to note that the results for Scenario 1 (maintenance and testing) are considered to be overestimations. This is because the generators have been grouped together for modelling purposes. In reality, only 1 generator will be operational at a time. In addition, process conditions and emissions for some of the generators have been based on operation at 100% load.

Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Data Centre.

It has therefore been suggested that alternative testing operations are utilised to minimise the potential for exceedances and risks to public health. This could involve spacing out the testing of the generators, or other options which are to be agreed with the EA.

Based on the predictions and the use of worst case emissions, it is considered that the overall air quality impacts of the development following the alterations to testing operations would be **not significant**.

1 INTRODUCTION

1.1 BACKGROUND

Alkali Environmental ltd was commissioned by HDR on behalf of the operator Colt, to update the Dispersion Modelling Assessment previously prepared by Ensafe Consultants in support of the Environmental Permit (EP) application for the Powergate Data Centre, herein after referred to as the "Proposed Development".

1.2 SITE LOCATION AND CONTEXT

The Proposed Development is located at unit 9-13 Volt Avenue, Powergate Business Park, North Acton at approximate National Grid Reference (NGR): 520970, 182870.

Reference should be made to Figure 1 within Appendix A for a map of the site location, surrounding area, and the modelling domain.

The Data Centre will consist of 13 diesel generators, which have the potential to increase pollutant emissions within the vicinity of the site. Given the nature and size of the installation, an Air Quality Dispersion Modelling Assessment is required in order to EP application to the Environment Agency (EA). The purpose of the assessment is to quantify effects at sensitive locations and determine any significant impact upon local air quality. This is detailed in the following report.

1.3 LIMITATIONS

This report has been produced in accordance with Alkali Environmental Ltd standard terms of engagement. This report is solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Alkali Environmental Ltd at which point a charge may be levied against such approval.

2 LEGISLATION, GUIDANCE AND POLICY

2.1 LEGISLATION AND GUIDANCE

The following legislation and guidance will be considered and adhered to during the preparation of the Air Quality Dispersion Modelling Assessment:

- European Union (EU) Directive 2008/50/EC;
- Section 82 of the Environment Act (Part IV), updated 9th November 2021;
- The Air Quality Standards (Amendment) Regulations (2016)[1];
- London Local Air Quality Management (LLAQM) Technical Guidance 2016, LLAQM.TG (16), Greater London Authority (GLA), 2016; [2]
- Air emissions risk assessment for your environmental permit, EA, updated on 3rd September 2021[3];
- Specified generators: air dispersion modelling example short term statistical analysis, EA, updated on 4th October 2019[4];
- Environmental permitting: air dispersion modelling reports, EA, updated on 19th January 2021[5]; and
- AQTAG 06: Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air, EA, March 2014[6]

2.2 ENVIRONMENTAL STANDARDS – HUMAN EXPOSURE

The modelling assessment will be undertaken against the relevant long term and short-term environmental standards. The limits values and air quality objectives (AQOs) which are applicable to this assessment are summarised in Table 1 with relation to human health receptors. These criteria are collectively referred to as Environmental Quality Standards (EQSs).

Given that the installation will utilise gas oil as a fuel, emissions of sulphur dioxide (SO_2) are insignificant and have therefore, not been assessed further in accordance with the EA specified generators guidance[4].

Table 1: Environmental Quality Standards for Human Exposure

Pollutant	Environmental Quality Standard	
	Concentration (µg/m³)	Averaging Periods
Nitrogen dioxide (NO_2)	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
Nitric Oxide (NO)	4,400	1-hour mean
Carbon monoxide (CO)	10,000	8-hour running mean
Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10})	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007
[2] London Local Air Quality Management Technical Guidance 2016 LLAQM (TG16), GLA, 2016.
[3] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
[4] Specified generators: air dispersion modelling example short term statistical analysis, Environment Agency, 2019
[5] https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports
[6] AQTAG 06: Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air, EA, 2014

Pollutant	Environmental Quality Standard	
	Concentration (µg/m³)	Averaging Periods
Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$)	25	Annual mean
Benzene (C_6H_6)	5	Annual mean

Table 2 summarises the advice provided in the GLA publication LLAQM (TG16) on where the EQSs for the pollutants considered within this report apply.

Table 2: Examples of Where the Environmental Quality Standard Apply

Period	Objectives Should Apply At	Objectives Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour and 8-hour mean	All locations where the annual mean objective would apply, together with hotels and gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.3 ENVIRONMENTAL STANDARDS – ECOLOGICAL EXPOSURE

The modelling assessment will also be undertaken to compare ecological impacts against the relevant critical loads and levels. A critical load (CL) is defined by the UK Air Pollution Information System (APIS) as:

"A quantitative estimate of exposure to deposition of one or more pollutants, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge. The exceedance of a critical load is defined as the atmospheric deposition of the pollutant above the critical load."

A critical level is defined as:

"Threshold for direct effects of pollutant concentrations according to current knowledge. Exceedance of a critical level is defined as the atmospheric concentration of the pollutant above the critical level."

A critical load refers to deposition of a pollutant, while a critical level refers to pollutant concentrations in the atmosphere (which usually have direct effects on vegetation or human health).

When pollutant loads (or concentrations) exceed the critical load or level it is considered that there is a risk of harmful effects. The excess over the critical load or level is termed the exceedance. A larger exceedance is often considered to represent a greater risk of damage.

Maps of critical loads and levels and their exceedances have been used to show the potential extent of pollution damage and aid in developing strategies for reducing pollution. Decreasing deposition below the critical load is seen as means for preventing the risk of damage. However, even a decrease in the exceedance may infer that less damage will occur.
Critical loads have been designated within the UK based on the sensitivity of the receiving habitat and have been reviewed for the purpose of this assessment.

Table 3 presents the critical levels for the protection of vegetation for pollutants considered within this assessment. Again, the criteria has been referred to as EQS.

Table 3: Environmental Quality Standards for Vegetation

Pollutant	Environmental Quality Standard	Unit	Averaging Period
Oxides of nitrogen (NO_x)	30	µg/m^3	Annual mean
	75	µg/m^3	24-hour mean

2.4 US EPA ACUTE EXPOSURE GUIDELINES LEVELS

In addition to the above, the EA have requested the modelling assessment will also be undertaken against the relevant short-term United States based Acute Exposure Guidelines Levels (AEGL) for NO_2. The AEGL which are applicable to this assessment are summarised in Table 4 with relation to human health receptors.

Table 4: AEGL-1 for NO_2

Unit	Period				
	10 Minuet	30 Minuet	1 Hour	4 Hour	8 Hour
PPM	0.5	0.5	0.5	0.5	0.5
µg/m^3	1,026.74	1,026.74	1,026.74	1,026.74	1,026.74

3 METHODOLOGY

Emissions associated with the generators have the potential to cause increases in pollutant concentrations in the vicinity of the site. These have been quantified through dispersion modelling in accordance with the methodology outlined in the following Sections.

An industry standard atmospheric dispersion model, ADMS 6, was used to model releases of the identified substances. The dispersion modelling procedure was as follows:

- Information on stack dimensions were provided by HDR; Process conditions were obtained from HDR;
- Emission rates were provided by HDR based on technical data sheets for the generator specifications;
- Appropriate data to describe meteorological conditions in the vicinity of the site were obtained from Atmospheric Dispersion Modelling (ADM) Ltd;
- The above information was entered into the dispersion model;
- The dispersion model was run to determine pollutant concentrations in the vicinity of the site; and
- The study results were compared with the relevant assessment criteria.

It has been confirmed by the Client that two operating scenarios will need to be considered as part of the assessment Further details of these operating Scenarios are provided within Sections 3.2 and 3.6.

3.1 DISPERSION MODEL

Dispersion modelling was undertaken using ADMS 6 (v6.0.0.1), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-6 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

The model utilises hourly meteorological data to define conditions for plume rise, transport and diffusion. It estimates the concentration for each source and receptor combination for each hour of meteorological data input, and calculates user-selected long-term and short-term averages.

It should be noted the modelling prediction produce by the ADMS-6 are widely accepted by within the UK by the EA and DEFRA.

3.2 MODELLING SCENARIOS

Three operating scenarios will need to be considered as part of the modelling assessment and are outlined below:

- Scenario 1: Testing and maintenance – this will be at site load (assumed to be 50%) tests for 1 hour every month and 1 hour annually (this will typically replace one monthly test) with only 1 generator operating concurrently;
- Scenario 2: Emergency power outage – this will be at site load (assumed to be 50%) for 72 hours with all 13 generators operating cumulatively (typically only the generators required to carry site load would operate); and

To ensure a conservative approach was undertaken in order to assess both long-term and short-term emissions for Scenarios 1, emission points have been grouped together, which has been based on their locations, their emission characteristics (i.e. velocity, temperature, volume flow rate and emission rates)

and their release point characteristics (i.e. height of stack). Further details are provided within Section 3.3. This ensured a worst-case assessment as only 1 generator will be operating at a time.

To ensure a conservative approach was undertaken in order to assess both long-term and short-term emissions for Scenarios 2, the model has been ran for a full calendar year with all generators operating cumulatively. Further details are provided within Section 3.6.

Scenario 1 is for plant testing and is considered as the normal operation of the Proposed Development. As advised by the Client, Scenario 2 is representative of an emergency power outage, which is considered to be a highly rare event (1 every 10 years) and only the minimum number of generators required to meet the electrical load will operate for a maximum of 72 hours. As such, this is a highly short-term emergency event and it would not affect the overall operational significance of the impacts associated with the development site. Modelling based on conservative emissions has been undertaken for this scenario however, it should not determine the overall significance of the operation of the plant.

The modelled pollutant scenarios considered in the modelling assessment are summarised in Table 5

Table 5 Dispersion Modelling Scenarios

Pollutant	**Modelled As**	
	Short Term	**Long Term**
NO_2	99.79th percentile (%ile) EAL 1-hour mean	Annual mean
	99.9981th percentile (%ile) AEGL 10 minutes	
	99.9943th percentile (%ile) AEGL 30 minutes	
	99.9886th percentile (%ile) AEGL 60 minutes	
	99.9543th percentile (%ile) AEGL 4 hour	
	99.9087th percentile (%ile) AEGL 8 hour	
NO	99.79th percentile (%ile) old EAL 1-hour mean	Annual mean
CO	8-hour rolling mean	-
PM_{10}	90.41%ile 24-hour mean	Annual mean
$PM_{2.5}$		Annual mean
Total Hydrocarbons (HC) as C_6H_6		Annual mean

Some short-term air quality criteria are framed in terms of the number of occasions in a calendar year on which the concentration should not be exceeded. As such, the percentiles (%ile) shown in Table 5 were selected to represent the relationship between the permitted number of exceedances of short-period concentrations and the number of periods within a calendar year.

3.3 STACK INFORMATION

Combustion products associated with the generators will be emitted from dedicated stacks. The grouped stack details Scenario 1 are presented in Table 6. Reference should be made to Figure 1 within Appendix A for a graphical representation of the stack location.

Table 6: Stack Information – Scenario 1

Stack Reference	Stack Location NGR (m)		Height (m)	Diameter (m)
	X	Y		
EP1-3	520974.43	182925.15	10.50	0.60
EP4	520973.43	182941.31	10.50	0.60
EP5-6	520967.69	182892.86	10.50	0.60
EP7-8	520976.10	182911.55	10.50	0.60
EP9-10	520983.68	182782.51	13.63	0.60
EP11-13	520958.80	182776.44	13.63	0.60

Relevant stack details for Scenario 2 are presented in Table 7.

Table 7: Stack Information – Scenarios 2

Stack Reference	Stack Location NGR (m)		Height (m)	Diameter (m)
	X	Y		
EP1	520974.15	182930.54	10.50	0.60
EP2	520974.43	182925.15	10.50	0.60
EP3	520974.93	182919.62	10.50	0.60
EP4	520973.43	182941.31	10.50	0.60
EP5	520967.99	182891.60	10.50	0.60
EP6	520967.71	182894.07	10.50	0.60
EP7	520976.22	182912.71	10.50	0.60
EP8	520976.43	182910.59	10.50	0.60
EP9	520984.34	182782.19	13.63	0.60
EP10	520982.79	182782.38	13.63	0.60
EP11	520964.33	182777.66	13.63	0.60
EP12	520962.78	182777.47	13.63	0.60

3.4 PROCESS CONDITIONS

The process conditions for each generator that will be used were based off the relevant technical data sheets and from information obtained by the Client. Reference should be made to Table 8 for the process conditions associated with each generator manufacturer and specification. All generators within groups have the same process conditions.

Table 8: Process Conditions

Stack Reference	Flue Gas Efflux Velocity (m/s)	Volumetric Flow Rate (Actual) (m^3/s)	Temperature (˚C)
EP1-3	22.81	6.45	493.0
EP4	6.50	1.84	432.5
EP5-8	21.22	6.00	510.0
EP9-13 (100% load)	35.62	10.07	500.0
EP9-13 (75 - 80% load)	28.50	8.06	485.0
EP9-13 (50% load)	21.37	6.04	485.0
EP9-13 (10% load)	9.62	2.72	242.5

It is important to note that the process conditions for the Perkins (EP1-3) and the SDMO (X2200K) (EP5-8) are based on operation at 100%. This is because there was no information on process conditions at different loads. Subsequently, this is considered to be a worst-case assessment.

In addition, robust assumptions have been made to align the Kohler (EP9-13) generators to operate at 75-80%, 50% and 10% load. This includes an overestimation of the volumetric flow rate (approximately 80% (75-80% load), 60% (50% load) and 27% (10% load) of the flow rate for operation at 100% load) and temperature (approximately 97% (both 75-80% and 50% load) and 49% (10% load) of the temperature for operation at 100% load), which has been based off proportions for generator specifications where varying data for different loads has been specified.

3.5 EMISSIONS

The emission rates for the generators were based on emissions data and ELVs provided on the relevant technical data sheets and through discussions with the Client. Reference should be made to Table 9 for the emission rates associated with generator manufacturer and specification. All generators within groups have the same emission rates.

Table 9 Mass Emission Rates for the AVK Generators at 30% Load

Stack Reference	Pollutant	Emission Maximum $(mg/Nm3)_a$	Emission Maximum $(mg/m^3)_b$	Emission Rate (g/s)
EP1-3	NOx	2,158.00	527.43	3.402
	CO	283.00	69.17	0.446
	Particulate matter (PM)	80.00	19.55	0.126
	HC	64.00	15.64	0.101
EP4	NOx	1,846.00	449.41	0.826
	CO	185.90	45.26	0.083
	PM	35.50	8.64	0.016
	HC	72.20	17.58	0.032

Stack Reference	Pollutant	Emission Maximum (mg/Nm3)[a]	Emission Maximum (mg/m^3)[b]	Emission Rate (g/s)
EP5-8	NOx	2,000.00	478.21	2.869
	CO	650.00	155.42	0.933
	PM	130.00	31.08	0.187
	HC	150.00	35.87	0.215
EP9-13 (100% load)	NOx	1,983.00	480.27	4.837
	CO	113.00	27.37	0.276
	PM	7.00	1.70	0.017
	HC	101.00	24.46	0.246
EP9-13 (75-80% load)	NOx	1,880.00	455.82	3.673
	CO	165.00	40.01	0.322
	PM	7.00	1.70	0.014
	HC	125.00	30.31	0.244
EP9-13 (50% load)	NOx	1,475.00	334.23	2.020
	CO	521.00	118.06	0.713
	PM	33.00	7.48	0.045
	HC	140.00	31.72	0.192
EP9-13 (10% load)	NOx	N/Ac	267.38	0.727
	CO	N/Ac	330.56	0.899
	PM	N/Ac	11.96	0.033
	HC	N/Ac	88.82	0.242

a. **Reference conditions**: 5% Oxygen (for all generators), 273.15K (for all generators)

b. **Actual conditions**: 10% Oxygen (EP1-3, EP5-8 &EP-EP13 (100% load)), 10.2% Oxygen (EP9-EP13 (75-80% load)), 10.9% Oxygen (EP4 & EP9-13 (50% and 10% load)), 766.15K (EP1-3), 705.65K (EP4), 783.15K (EP5-8), 773.15K (EP9-EP13 (100% load)), 758.15K (EP9-13 (75-80% & 50% load)), 515.65K (EP9-EP13 (10% load))

c. There were no specified emission concentrations for 10% load on the technical data sheet. Robust assumptions have been made based on known proportions of actual concentrations for generators where this information has been specified.

Similar to the process conditions, emissions data for the Perkins (EP1-3) and the SDMO (X2200K) (EP5-8) are based on operation at 100%.

For the purposes of dispersion modelling, it was considered that the entire HC emission consisted of only C6H6 and the entire PM emission was used wholly for both PM10 and PM2.5. This allowed the maximum ground level impacts to be assessed with respect to the AQOs. Actual plant emissions of HCs and PM are unlikely to only consist of one species, resulting in a worst-case assessment and an overestimate of predicted concentrations.

3.6 TIME VARIED EMISSIONS

As mentioned in Section 3.2, three operating scenarios will need to be considered as part of the modelling. The total operational hours for a full calendar year for each scenario are outlined below. It is important to note that these are worst-case operational hours as testing may take place for less than an hour at each generator.

- **Scenario 1**: 156 hours in total per annum;
- **Scenario 2**: 72 hours in total per annum.

With relation to the annual mean assessment for both Scenarios 1 & 2, this has been undertaken in accordance with EA specified generators guidance4, which suggests the annual mean PCs can be calculated by scaling down long-term predictions by the total number of operational hours over the total number of hours in the operating envelope.

In this instance scaling factors of 0.0178 and 0.0082 has been applied to annual mean PC result for human and ecological receptor locations and grid results for Scenarios 1 and 2, respectively. The factor equates to the operational hours per year divided by the operational envelope of 8,760 hours. Annual mean PECs were then calculated by adding the annual mean background concentrations detailed in Table 16, Table 22 and Table 28.

For both Scenarios 1 & 2 specific operating hours are not known and total flexibly is required to reflect availability for testing, demand and the chances of a power outage. As such, it is therefore difficult to accurately assess the short-term impacts for NO2 concentrations, given that objectives are based on the number of allowances that can be exceeded for a specified averaging period.

Therefore, the ADMS model was run for a full calendar year (8,760 hours) of continuous operation to ensure that the varying hourly meteorological conditions were captured. However, as the annual operational hours for both Scenarios are significantly lower than the full calendar year (8,760 hours), an approach utilising hypergeometric probability distribution was undertaken for 1-hour NO2 concentrations. The methodology is provided within the EA specified generators guidance4. It should be noted that when the proposed operating period is continuous of more than 1-hour then the calculated probability is multiplied by a factor of 2.5.

In order to assess the short-term impacts, for both Scenarios 1 & 2, for the remaining pollutants at both human and ecological receptors, the impact assessment was based on operation of the grouped generators (Scenario 1) (as assessed for the long-term emissions assessment, see Section 3.3) and all 13 generators for Scenario 2 for a full calendar year. This ensured a worst-case emissions as predicted concentrations are significant overestimations of actual concentrations.

3.7 ASSESSMENT EXTENTS

Ambient concentrations were predicted over the following areas, relating to the modelling domain of human receptor locations:

- NGR: 520750, 182640 to 521170, 183060

One Cartesian grid with a resolution of 10m and a height of 1.5m was included in the model. Results were subsequently used to produce contour plots within the Surfer software package.

3.8 METEOROLOGICAL DATA

Meteorological data used in this assessment will be obtained from Heathrow Airport meteorological station over the period 1st January 2015 to 31st December 2019 (inclusive), to account for 5 years of data. Heathrow Airport meteorological station is located at approximate NGR: 507060, 176500, which is

approximately 16km south-west of the site and is considered to be representative of likely meteorological conditions at the Proposed Development.

All meteorological records used in the assessment will be provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 2 within Appendix A for wind roses of utilised meteorological data. The maximum emissions were utilised for the whole five years of meteorological data to ensure a worse case assessment. Hourly sequential formats were used with the dispersion modelling.

3.9 ROUGHNESS LENGTH

The specific roughness length (z0) values used to represent conditions in the vicinity of the development site, as well as conditions at the meteorological station are summarised in Table 10.

Table 10: Roughness Lengths

Location	Roughness Length, z0 (m)	ADMS Description
Proposed Development	1	Cities, woodlands
Meteorological station	0.5	Parkland, open suburbia

The value of z_0 specified in Table 10 is considered appropriate for the morphology of the assessment area.

3.10 MONIN-OBUKHOV LENGTH

The Monin-Obukhov length provides a measure of the stability of the atmosphere. The specific length values used to represent conditions in the vicinity of the development site, as well as conditions at the meteorological station are summarised in Table 11.

Table 11: Utilised Monin-Obukhov Lengths

Location	Monin-Obukhov Length (m)	ADMS Description
Proposed Development, Meteorological station	30	Mixed urban/industrial

The Monin-Obukhov value specified in Table 11 is considered appropriate for the morphology of the assessment area.

3.11 TERRAIN DATA

Ordnance Survey Landform Panorama terrain data was included for the site and surrounding area in order to take account of the specific flow field produced by variations in ground height throughout the assessment extents. This was pre-processed using the dedicated function within ADMS 6.

3.12 BUILDING EFFECTS

Analysis of the site and surrounding area indicated several buildings that will be included within the model in order to take account of effects on pollutant dispersion. Input geometries are shown in Table 12.

Table 12 Building Geometries

Building		NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
		X	Y				
1	Unit 13 Powergate Business Park	520950.6	182926.9	10.0	36.7	47.7	174.5
2	Unit 12 - 13 Powergate Business Park	520949.9	182883.6	10.0	50.1	38.3	174.7
3	Unit 12 Powergate Business Park	520958.0	182843.8	10.0	31.1	47.4	174.7
4	Unit 9 - 11 Powergate Business Park	520974.1	182810.8	9.1	30.9	71.8	169.0
5	Dooa House, North Acton Road	520864.1	182824.5	10.0	59.3	124.1	167.0
6	Unit 2 Powergate Business Park	521067.1	182849.3	11.1	150.6	81.3	169.9
7	Unit 3 - 5 Powergate Business Park	520990.6	182737.3	8.8	22.8	67.9	160.0
8	Unit 6 - 8 Powergate Business Park	520901.1	182727.3	8.8	71.7	30.6	158.4
9	Unit 1 – 11 Kingham Industrial Estate	520871.2	182784.4	5.4	10.7	126.8	166.4
10	Unit 11 Kingham Industrial Estate	520828.6	182763.4	5.4	10.8	51.9	167.6
11	Unit D Cunard Road	520938.8	182682.7	8.8	28.7	67.2	157.8

Reference should be made to Figure 1 within Appendix I for a graphical representation of the modelled building layout and the ADMS 6 model input.

3.13 NO_X TO NO_2 CONVERSION

Emissions of NO_x from combustion processes are predominantly in the form of NO. Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of NO to NO_2.

Ground level NO_x concentrations were predicted through dispersion modelling. NO_2 concentrations reported in the results section assume 70% conversion from NO_x to NO_2 for annual means and 35% conversion for 1-hour concentrations, based upon EA guidance[9].

3.14 DEPOSITION RATES

Deposition rates were calculated using the conversion factors provided within EA document. Predicted pollutant concentrations were multiplied by the relevant deposition velocity and conversion factor to calculate the speciated dry deposition flux. The conversion factors used are presented within Table 13.

Table 13 Conversion Factors to Determine Dry Deposition Flux

Pollutant	Grassland Deposition Velocity (m/s)	Forest Deposition Velocity (m/s)	Conversion Factor (µg/m^2/s to kg/ha/yr of pollutant species)
NO_2	0.0015	0.003	96.0

Acid deposition occurs as a result of NO_2 and SO_2. Predicted ground level pollutant concentrations were converted to kilo-equivalent ion depositions (keq/ha/yr) for comparison with the critical load for acid deposition at each of the identified ecological receptors.

The conversion to units of equivalents, a measure of the potential acidifying effect of a species, was undertaken by multiplying the dry deposition flux by the standard conversion factors shown in Table 14.

Table 14 Conversion Factors to Units of Equivalents

Species	Conversion Factor from kg/ha/yr to keq/ha/yr
N	Divide by 14

The total N proportion has been calculated from the NO2 concentrations in accordance with the methodology outlined in EA AQTAG 06 document[6]

3.15 SIGNIFICANCE OF PREDICTED IMPACTS

Predicted pollutant concentrations are summarised in the following formats:

- Process contribution (PC) - Predicted pollutant concentration as a result of emissions from the site only; and
- Predicted environmental concentration (PEC) - Total predicted pollutant concentration as a result of emissions from the site and existing baseline levels.

The significance of predicted impact has been assessed in accordance with EA criteria and through consideration of likely effects as a result of the proposals. EA guidance[6] states that process contributions can be considered insignificant if:

- the short-term PC is less than 10% of the short-term environmental standard; and
- the long-term PC is less than 1% of the long-term environmental standard.

If you meet both of these criteria you don't need to do any further assessment of the substance.

If these criteria are not met then a second stage of screening to determine the impact of the PEC is required.

- The short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration; and
- The long-term PEC is less than 70% of the long-term environmental standards.

If your emissions that affect SPAs, SACs, RAMSAR sites or SSSIs meet both of the following criteria, can be considered insignificant:

- the short-term PC is less than 10% of the short-term environmental standard for protected conservation areas; and
- the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas.

Should these criteria be exceeded then the PEC should be checked against the standard for protected conservation areas. PEC is not required for short-term targets. Should the short-term PC exceed the screening criteria, a detailed modelling is required.

If the predicted long-term PC is greater than 1% and the PEC is less than 70% of the long-term environmental standard, the emissions can be considered insignificant. Should the predicted PEC be greater than 70% of the long-term environmental standard, a detailed dispersion modelling is required.

When considering impacts at local nature sites and the emissions meet both of the following criteria, impacts can be considered insignificant and there is no further assessment required:

- The short-term PC is less than 100% of the short-term environmental standard; and
- The long-term PC is less than 100% of the long-term environmental standard.

Should the PC exceed the screening criteria, detailed dispersion modelling is required.

In addition, the EA guidance also states that the APIS site relevant critical load tool should be used to determine whether there is an exceedance of deposition of nutrient nitrogen or acidity, as the standard of exceedance is site-specific.

3.16 MODELLING UNCERTAINTY

Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- **Model uncertainty** - due to model limitations;
- **Data uncertainty** - due to errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and
- **Variability** - randomness of measurements used.

Potential uncertainties in model results were minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- **Choice of model** - ADMS 6 is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible; **Meteorological data** - Modelling was undertaken using five meteorological data sets from the closest observation site to the facility to take account of worst-case conditions;
- **Plant operating conditions** - Operational parameters were based off the relevant technical data sheets provided by the Client. As such, these are considered to be representative of likely operating conditions;
- **Emission rates** - were derived from the relevant emissions data and ELVs provided within the relevant technical data sheets and therefore, represent the maximum potential emissions. Emissions were also assumed to be constant throughout the modelling period, which does not allow for plant shut down or reduced load. These assumptions are likely to overestimate actual emissions and therefore result in a worst-case assessment.
- **Background concentrations** - Obtained from the DEFRA mapping study for human receptors and from APIS for ecological receptors. Although these may underestimate actual concentrations in the vicinity of pollutant sources, such as roads, they are considered suitable for an assessment of this nature;
- **Receptor locations** - A Cartesian Grid at a height of 1.5m, to replicate breathing height, was included in the model in order to predict concentrations throughout the assessment extents. Specified receptor points were also included at sensitive locations to provide additional consideration of these areas, varied heights were included to represent the window elevations of each associated building; and
- **Variability** - All model inputs are as accurate as possible and worst-case conditions have been considered where necessary in order to ensure a robust assessment of potential pollutant concentrations.

Results were considered in the context of the relevant EQSs detailed in Table 1 and Table 3. It is considered that the use of the stated measures to reduce uncertainty and the use of worst-case assumptions when necessary has resulted in model accuracy of an acceptable level.

4 BASELINE

Existing air quality conditions in the vicinity of the site were identified in order to provide a baseline for assessment. These are detailed in the following sections.

4.1 LOCAL AIR QUALITY MANAGEMENT

As required by the Environment Act (2021), the London Borough of Ealing (LBoE) has undertaken review and assessment of air quality within their area of administration. This process has indicated that annual mean concentrations of NO2 and 24-hour mean concentrations of PM10 are above their EQS's within this area. As such, one Air Quality Management Areas (AQMA) has been declared, being described as:

- Ealing AQMA - The whole borough

The application site is located within the Ealing AQMA. As such, there is potential for the development to cause air quality impacts when the Proposed Development is operational.

LBoE has concluded that concentrations of all other pollutants are currently below the relevant EQS's and as such, no further AQMA's have been designated.

4.2 LOCAL AIR QUALITY MONITORING

LBoE undertakes monitoring of pollutant concentrations using continuous techniques throughout their area of administration. A review of the most recent Annual Status Report7 indicates that there are no automatic analysers within the vicinity of the Proposed Development.

LBoE also utilise passive diffusion tubes to monitor NO2 concentrations throughout their area of administration. A review of the Annual Status Report7 indicated that there are 3 diffusion tubes sites located within the vicinity of the Proposed Development. Recent monitoring results at these locations are shown in Table 15. Exceedances of the annual mean EQS are shown in bold.

Table 15: Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m³)		
			X	Y		2018	2019	2020
EA40	94 North Acton Road, Park Royal	Roadside	520780	182775	212	33.4	33.1	30.6
EA41	1 Shaftesbury Gardens, Park Royal	Roadside	521312	182366	609	32.6	32.6	30.0
EA42	39 Old Oak Lane, Park Royal	Roadside	521587	182685	644	**45.3**	**44.4**	**45.9**

As indicated in Table 15, the annual mean EQS for NO2 was not exceeded at EA42 in recent years. Reference should be made to Figure 1 within Appendix I for a graphical representation of the diffusion tube monitoring locations.

4.3 BACKGROUND POLLUTANT CONCENTRATIONS

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The

[7] LBoE Air Quality Annual Status Report for 2020, LBoE, 2021

development site is located in grid square NGR: 520500, 182500. Data for this location was downloaded from the DEFRA website[5] for the purpose of this assessment and is summarised in Table 16

Table 16 Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m³)
NO_2	24.86
CO	501.00
PM_{10}	16.85
$PM_{2.5}$	11.16
C_6H_6	0.74

It should be noted that background concentrations of NO_2 were predicted for 2022. The background concentration CO and C_6H_6 was obtained from the 2001 DEFRA predictions8. These are the most recent predictions available from DEFRA and are therefore considered to provide a reasonable representation of background concentrations in the vicinity of the site.

The EA guidance[3] advises that an estimate of the background short-term concentration can be obtained by adding the maximum predicted short-term concentration due to emissions from the source to twice the annual mean background concentration. This approach will be adopted throughout the assessment.

4.4 SENSITIVE RECEPTORS

A sensitive receptor is defined as any location which may be affected by changes in air quality. These have been defined for human and ecological receptors in the following Sections.

4.4.1. SENSITIVE HUMAN RECEPTORS

A desk-top study was undertaken in order to identify any sensitive human receptor locations in the vicinity of the site that required specific consideration during the assessment and are summarised in Table 21 within appendix C.

Receptors that are modelled at 1.5m represent the average UK "breathing height" above ground level. Reference should be made to Figure 1 within Appendix B for a graphical representation of sensitive human receptor locations.

The pollutant background concentrations for each receptor location are detailed in Table 22 within appendix C. These have been sourced from the DEFRA background maps as detailed in Section4.3.

4.4.2. SENSITIVE ECOLOGICAL RECEPTORS

With regard to receptors of ecological sensitivity, EA guidance[6] states:

> *"Note that conservation sites need only be considered where they fall within set distances of the activity:*

[8] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2001

- *Special Protection Areas (SPAs), Special Areas of Conservation (SACs) or Ramsar sites within 10km of the installation (or 15km coal or oil-fired power station);*
- *Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserves (LNRs), Local Wildlife Sites (LWS) and Ancient Woodland (AW) within 2km of the location.*

A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the distances stated above. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service9, which draws information on key environmental schemes and designations.

Table 23 within appendix C details the ecological receptors that will be considered for the assessment. The receptor points chosen represent the closest points to the development site and are displayed in Figure 1 within Appendix A. All ecological receptors were modelled at a height of 0m. It should be noted that Sites of Importance for Nature Conservation (SINCs) are classified as LWS.

Habitat features/descriptions for all ecological receptors have been obtained from Magic Maps and the APIS website10. These have been used to apply the most suitable APIS habitat to each receptor to determine the critical loads. The APIS habitats are detailed in Table 24 within appendix C.

Critical loads have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the Air Pollution Information System (APIS) website[8] was undertaken in order to identify the most suitable habitat description and associated critical load for the designations considered within the model. The critical loads for nitrogen deposition are presented in Table 25.

Table 26 shows the relevant critical loads for acid deposition.

Background deposition rates at the ecological receptor location were downloaded from the APIS website[8] and are summarised in Table 27.

[9] Multi-Agency Geographic Information for the Countryside, www.magic.gov.uk.
[10] http://www.apis.ac.uk/

5 RESULTS

Dispersion modelling was undertaken with the inputs described in Section 3. Reference should be made to Figure 4 to Figure 10 within Appendix I for graphical representations of predicted pollutant concentrations throughout the assessment extents. Figures have been shown for Scenario 1 as this is the routine scenario. In addition, all short-term figures for this Scenario are based on operation for a full calendar year and as such, predicted concentrations are overestimations of actual concentrations.

The concentrations were predicted separately for 5 assessment years and the maximum concentration Assessed with the findings reported in the following section for each relevant substance and metric. A full comprehensive assessment is detailed in Appendix D for each of the pollutants.

5.1 HUMAN SENSITIVE RECEPTORS

5.1.1. SCENARIO 1

Scenario 1 modelling results for each pollutant considered are outlined in the following Sections.

Nitrogen Dioxide Annual Mean

Predicted annual mean NO_2 concentrations inclusive of baseline levels can be screened out as insignificant in accordance with the initial stage of the EA screening criteria. Annual mean NO_2 concentrations are detailed within Table 28 within appendix D

Nitrogen Dioxide 1-hour Mean

The 1-hour mean EQS for NO_2 is not predicted to exceeded at receptor locations during Scenario 1. 1-hour mean NO_2 concentrations are detailed within Table 29Table 28 within appendix D

Nitric Oxide 1-hour mean

Predicted 1-hour mean NO concentrations inclusive of baseline levels are summarised in Table 17.

Table 17 Predicted 1-Hour Mean NO Concentrations

Receptor		Predicted 99.99 %ile 1-hour Mean NO Concentration (µg/m³)		Proportion of EAL (%)	
		PC	PEC	PC	PEC
R1	Unit 6 - 8 Powergate Business Park	18.36	45.05	0.42	1.02
R2	Unit 6 - 8 Powergate Business Park	17.57	44.26	0.40	1.01
R3	Unit 3 - 5 Powergate Business Park	10.56	34.37	0.24	0.78
R4	Unit 3 - 5 Powergate Business Park	17.03	43.73	0.39	0.99
R5	Unit 2 Powergate Business Park	10.34	34.14	0.23	0.78
R6	Unit 1 Kingham Industrial Estate	17.95	44.65	0.41	1.01
R7	Unit 1 -5 Royal London Industrial Estate	5.52	33.65	0.13	0.76

Receptor		Predicted 99.99 %ile 1-hour Mean NO Concentration (µg/m^3)		Proportion of EAL (%)	
		PC	PEC	PC	PEC
R8	Unit 1 Powergate Business Park	8.51	32.32	0.19	0.73
R9	60 North Acton Road	4.57	31.27	0.10	0.71
R10	40 North Acton Road	3.92	30.61	0.09	0.70
R11	110 North Acton Road	6.47	33.17	0.15	0.75
R12	85 Harley Road	2.04	25.84	0.05	0.59
R13	15 Stephenson Street	2.10	25.90	0.05	0.59
R14	Bashley Road Caravan Site	2.92	26.73	0.07	0.61

As indicated in Table 17, predicted NO concentrations were below the relevant EQS all 14 sensitive receptor locations for all meteorological data sets.

The PC proportion of the EQS is less than 10% at all receptor locations sensitive to short term-term exposure. As such, impacts on 1-hour mean NO concentrations at this location can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Carbon Monoxide

Predicted CO concentrations at sensitive receptor locations has been screened out as insignificant in accordance with the initial stage of the EA screening criteria. 8-hour rolling CO concentrations are detailed within Table 31Table 28 within appendix D

Particulate Matter (PM10) – Annual Mean

Predicted annual mean PM10 concentrations at sensitive human receptor locations have been screened as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean PM_{10} concentrations are detailed within Table 32Table 28 within appendix D

Particulate Matter (PM10) – 24-Hour Mean

Predicted 24-hour mean PM_{10} concentrations at sensitive receptor locations are considered to be insignificant at 9 locations in accordance with the EA screening criteria. Impacts at the remaining 5 receptor locations falls below the EQS and has been overestimated due to model limitations. The overall impacts on 24-hour PM10 concentrations are therefore considered not significant. 24-hour PM_{10} concentrations are detailed within Table 33Table 28 within appendix D

Particulate Matter (PM2.5)

Predicted annual mean PM2.5 concentrations at sensitive human receptor locations have been screened as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean $PM_{2.5}$ concentrations are detailed within Table 34Table 28 within appendix D

Total Hydrocarbons

Predicted annual mean HC concentrations at sensitive human receptor locations have been screened as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean HC concentrations are detailed within Table 35Table 28 within appendix D

AEGL-1

Predicted AEGL-1 NO_2 concentrations inclusive of baseline levels are summarised in Table 18

Table 18 Predicted AEGL-1 NO_2 Concentrations

Receptor	Predicted NO_2 Concentration (µg/m³)				
	10 Minute 100%ile	30 Minute 99.99%ile	1 Hour 99.99%ile	4 Hour 99.95%ile	8 Hour 99.91%ile
R1	59.60	59.60	59.60	59.49	59.25
R2	59.18	59.18	59.18	59.10	59.00
R3	52.11	52.11	52.11	51.86	50.60
R4	58.89	58.89	58.89	58.55	58.46
R5	51.99	51.99	51.99	51.89	51.85
R6	59.39	59.39	59.39	59.21	59.14
R7	53.82	53.82	53.82	53.77	53.75
R8	51.01	51.01	51.01	50.86	50.70
R9	52.18	52.18	52.18	52.09	51.92
R10	51.83	51.83	51.83	51.79	51.76
R11	53.20	53.20	53.20	53.08	53.01
R12	47.53	47.53	47.53	47.52	47.45
R13	47.56	47.56	47.56	47.32	47.31
R14	48.00	48.00	48.00	47.97	47.95

As indicated in Table 18, predicted NO_2 concentrations were below the relevant AEGL-1 at all 14 sensitive receptor locations over the modelled 5 year period for all exposure periods considered.

5.1.2. SCENARIO 2

Scenario 2 modelling results for each pollutant considered are outlined in the following Sections. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Nitrogen Dioxide Annual Mean

Predicted annual mean NO_2 concentrations inclusive of baseline levels fall below the screening criteria to be screened out as insignificant in accordance with the initial stage of the EA screening criteria. Annual mean NO_2 concentrations are detailed within Table 37 within appendix D

Nitrogen Dioxide 1-hour Mean

The 1-hour mean EQS for NO_2 is not predicted to exceeded at receptor locations during Scenario 1. 1-hour mean NO_2 concentrations are detailed within Table 38Table 28 within appendix D

Nitric Oxide 1-hour mean

Predicted 1-hour mean NO concentrations inclusive of baseline levels are summarised in Table 19.

Table 19 Predicted 1-Hour Mean NO Concentrations

Receptor		Predicted 99.99 %ile 1-hour Mean NO Concentration (µg/m³)		Proportion of EAL (%)	
		PC	PEC	PC	PEC
R1	Unit 6 - 8 Powergate Business Park	16.05	42.75	0.36	0.97
R2	Unit 6 - 8 Powergate Business Park	15.58	42.27	0.35	0.96
R3	Unit 3 - 5 Powergate Business Park	10.72	34.52	0.24	0.78
R4	Unit 3 - 5 Powergate Business Park	16.04	42.74	0.36	0.97
R5	Unit 2 Powergate Business Park	10.55	34.36	0.24	0.78
R6	Unit 1 Kingham Industrial Estate	15.74	42.43	0.36	0.96
R7	Unit 1 -5 Royal London Industrial Estate	5.67	33.80	0.13	0.77
R8	Unit 1 Powergate Business Park	8.65	32.46	0.20	0.74
R9	60 North Acton Road	4.57	31.27	0.10	0.71
R10	40 North Acton Road	4.04	30.73	0.09	0.70
R11	110 North Acton Road	6.80	33.50	0.15	0.76
R12	85 Harley Road	2.13	25.93	0.05	0.59
R13	15 Stephenson Street	2.21	26.02	0.05	0.59
R14	Bashley Road Caravan Site	3.04	26.85	0.07	0.61

As indicated in Table 19, predicted NO concentrations were below the relevant EQS at all 14 sensitive receptor locations for all meteorological data sets.

The PC proportion of the EQS is less than 10% at all receptor locations sensitive to short term-term exposure. As such, impacts on 1-hour mean NO concentrations at this location can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Carbon Monoxide

Predicted CO concentrations at sensitive receptor locations fall below the screening criteria to be screened out as insignificant in accordance with the initial stage of the EA screening criteria. 8-hour rolling CO concentrations are detailed within **Table 40**Table 28 within appendix D

Particulate Matter (PM10) – Annual Mean

Predicted annual mean PM10 concentrations at sensitive human receptor locations fall below the screening criteria to be screened as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean PM_{10} concentrations are detailed within **Table 41**Table 28 within appendix D

Particulate Matter (PM10) – 24-Hour Mean

Predicted 24-hour mean PM_{10} concentrations at sensitive receptor locations are considered to be insignificant at 3 locations in accordance with the EA screening criteria. Impacts at 9 of the remaining 11 receptor locations falls below the EQS the remaining 2 receptors experience concentrations above the EQS. The model has been overestimated due to model limitations and as such overall impacts on 24-hour PM10 concentrations will likely be lower than predicted. 24-hour PM_{10} concentrations are detailed within **Table 42**Table 28 within appendix D

Particulate Matter (PM2.5)

Predicted annual mean PM2.5 concentrations at sensitive human receptor locations have been screened as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean $PM_{2.5}$ concentrations are detailed within **Table 43**Table 28 within appendix D

Total Hydrocarbons

Predicted annual mean HC concentrations at sensitive human receptor locations have been screened as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean HC concentrations are detailed within **Table 44**Table 28 within appendix D

AEGL-1

Predicted AEGL-1 NO_2 concentrations inclusive of baseline levels are summarised in Table 20.

Table 20 Predicted AEGL-1 NO_2 Concentrations

Receptor	Predicted NO_2 Concentration ($\mu g/m^3$)				
	10 Minute 100%ile	30 Minute 99.99%ile	1 Hour 99.99%ile	4 Hour 99.95%ile	8 Hour 99.91%ile
R1	58.36	58.36	58.36	58.22	58.15
R2	58.11	58.11	58.11	58.06	58.01
R3	52.20	52.20	52.20	51.87	50.70
R4	58.36	58.36	58.36	58.10	58.07
R5	52.11	52.11	52.11	52.01	51.96
R6	58.19	58.19	58.19	58.12	58.09

Receptor	Predicted NO_2 Concentration (µg/m³)				
	10 Minute 100%ile	30 Minute 99.99%ile	1 Hour 99.99%ile	4 Hour 99.95%ile	8 Hour 99.91%ile
R7	53.90	53.90	53.90	53.85	53.82
R8	51.09	51.09	51.09	50.96	50.84
R9	52.18	52.18	52.18	52.03	51.94
R10	51.89	51.89	51.89	51.85	51.81
R11	53.38	53.38	53.38	53.28	53.17
R12	47.58	47.58	47.58	47.56	47.49
R13	47.62	47.62	47.62	47.35	47.33
R14	48.07	48.07	48.07	48.04	48.01

As indicated in Table 20, predicted NO_2 concentrations were below the relevant AEGL-1 at all 14 sensitive receptor locations over the modelled 5 year period for all exposure periods considered.

5.2 SENSITIVE ECOLOGICAL RECEPTORS

Predicted concentrations and deposition rates of each pollutant for both scenarios at the ecological receptor locations identified in Table 23 are summarised in the following Sections.

5.2.1. SCENARIO 1

Scenario 1 modelling results for each pollutant considered are outlined in the following Sections.

Oxides of Nitrogen – Annual Mean

Predicted annual mean NOx concentrations at sensitive ecological receptors has been screened out as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean NO_x concentrations are detailed within Table 46Table 28 within appendix D

Oxides of Nitrogen – 24-Hour Mean

Predicted 24-hour mean NOx concentrations at 21 of the 26 sensitive ecological receptors have been screened out as insignificant in accordance with the initial stage of the EA screening criteria.

At the remaining 5 LNR/SINC receptor locations (ER5-ER9), the PC proportion of the EQS is above 100%. As such, impacts on 24-hour mean NOx concentrations cannot be screened as insignificant in accordance with the EA screening criteria.

It is important to note that the results are considered to be overestimations and as such, predicted concentrations are significant overestimations of actual concentrations. 24-hour NO_x concentrations are detailed within Table 48Table 28 within appendix D

Nitrogen Deposition

Predicted annual mean nitrogen deposition rates have been screened out as insignificant in accordance with the initial stage of the EA screening criteria. Annual mean Nitrogen concentrations are detailed within Table 48Table 28 within appendix D

Acid Deposition

Predicted annual mean acid deposition rates have been screened out as insignificant in accordance with the initial stage of the EA screening criteria.

In addition, the APIS site relevant critical load tool indicated that no receptors exceeded the CL function for acid deposition. Acid Deposition Rates are detailed within Table 49Table 28 within appendix D

5.2.2. SCENARIO 2

Scenario 2 modelling results for each pollutant considered are outlined in the following Sections.

Oxides of Nitrogen – Annual Mean

Predicted annual mean NOx concentrations at sensitive ecological receptors has been screened out as insignificant in accordance with the initial stage of the EA screening criteria. Annual Mean NO_x concentrations are detailed within Table 50Table 28 within appendix D

Oxides of Nitrogen – 24-Hour Mean

Predicted 24-hour mean NOx concentrations at 15 of the 26 sensitive ecological receptors have been screened out as insignificant in accordance with the initial stage of the EA screening criteria.

At the remaining 11 LNR/SINC receptor locations, the PC proportion of the EQS is above 100%. As such, impacts on 24-hour mean NOx concentrations cannot be screened as insignificant in accordance with the EA screening criteria.

It is important to note that the results are considered to be overestimations and as such, predicted concentrations are significant overestimations of actual concentrations. 24-hour NO_x concentrations are detailed within Table 51Table 28 within appendix D

Nitrogen Deposition

Predicted annual mean nitrogen deposition rates have been screened out as insignificant in accordance with the initial stage of the EA screening criteria. Annual mean Nitrogen concentrations are detailed within Table 52Table 28 within appendix D

Acid Deposition

Predicted annual mean acid deposition rates have been screened out as insignificant in accordance with the initial stage of the EA screening criteria.

In addition, the APIS site relevant critical load tool indicated that no receptors exceeded the CL function for acid deposition. Acid Deposition Rates are detailed within Table 53Table 28 within appendix D

6 CONCLUSION

Alkali Environmental Ltd was commissioned by HDR to undertake an updated Air Quality Dispersion Modelling Assessment in support of the EP application for the Proposed Development.

Dispersion modelling of the pollutants associated with the Proposed Development was undertaken using ADMS 6. Impacts at sensitive receptors were quantified and the results compared with the relevant EQSs.

Predicted impacts at all human sensitive receptors for all pollutant concentrations, with the exception of 1-hour NO2 concentrations, associated with normal operation of the site (Scenario 1) can be considered not significant. It was predicted that the 1-hour mean EQS for NO2 could be exceeded at 4 human receptor locations during Scenario 1.

Predicted impacts at all ecological sensitive receptors for annual mean NOx concentrations and both annual mean nitrogen and acid deposition rates, with the exception of 24-hour mean NOx concentrations, associated with normal operation of the site (Scenario 1) can be considered not significant.

It is important to note that the results for Scenario 1 are considered to be overestimations. This is because the generators have been grouped together for modelling purposes. In reality, only 1 generator will be operational at a time. In addition, process conditions and emissions for some of the generators have been based on operation at 100% load.

Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

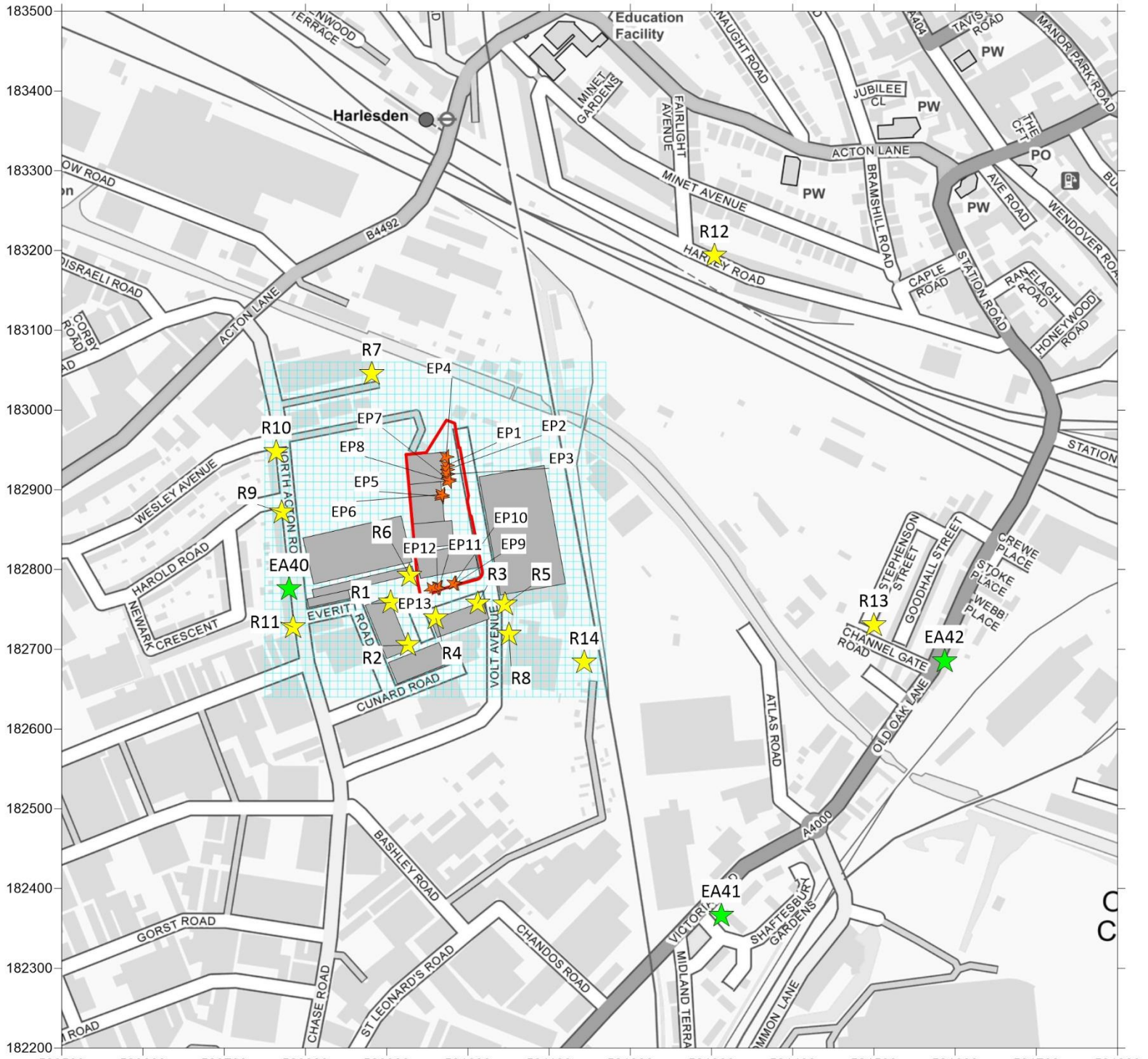
It has therefore been suggested that alternative testing operations are utilised to minimise the potential for exceedances and risks to public health. This could involve spacing out the testing of the generators, or other options which are to be agreed with the EA.

Based on the predictions and the use of worst case emissions, it is considered that the overall air quality impacts of the development following the alterations to testing operations would be **not significant**.

APPENDIX A – ABBREVIATIONS

ADM	Atmospheric Dispersion Modelling
APIS	Air Pollution Information System
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
AW	Ancient Woodland
C_6H_6	Benzene
CERC	Cambridge Environmental Research Consultants CL
CO	Carbon monoxide
DEFRA	Department for Environment, Food and Rural Affairs EA
ELV	Emission Limit Value
EP	Environmental Agency
EQS	Environmental Quality Standard
EU	European Union
GLA	Greater London Authority
HC	Total Hydrocarbons
LA	Local Authority
LBoH	London Borough of Hillingdon
LAQM	Local Air Quality Management
LNR	Local Nature Reserves
LWS	Local Wildlife Sites
NNR	National Nature Reserves
NGR	National Grid Reference
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
MAGIC	Multi-Agency Geographic Information for the Countryside PC
PEC	Predicted environmental concentration
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
REC	Resource and Environmental Consultants
SAC	Special Area of Conservation
SO_2	Sulphur dioxide
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
z_0	Roughness length

APPENDIX B - FIGURES



Legend

- Site Boundary
- Cartesian Grid
- Sensitive Human Receptor Locations
- Modelled point Sources
- Modelled Buildings
- Diffusion Tube Monitoring Locations

Title

Figure 1

Site Location and ADMS Inputs

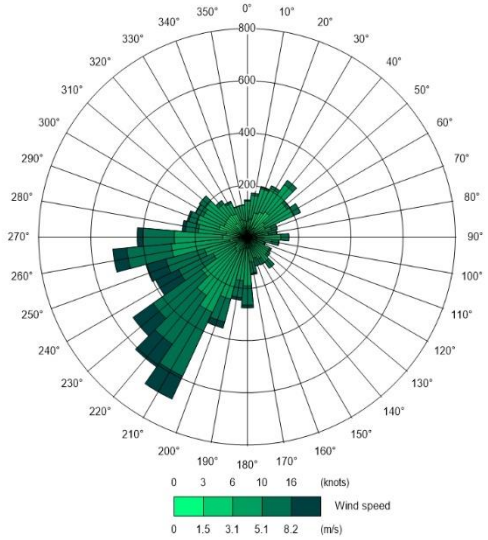
Project

Colt - Powergate

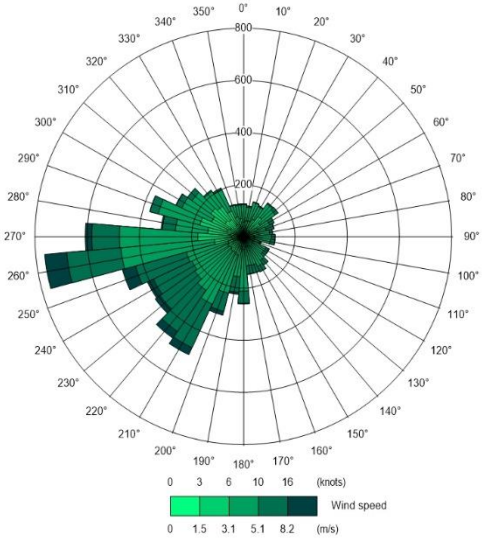
Project Number

AQ10079

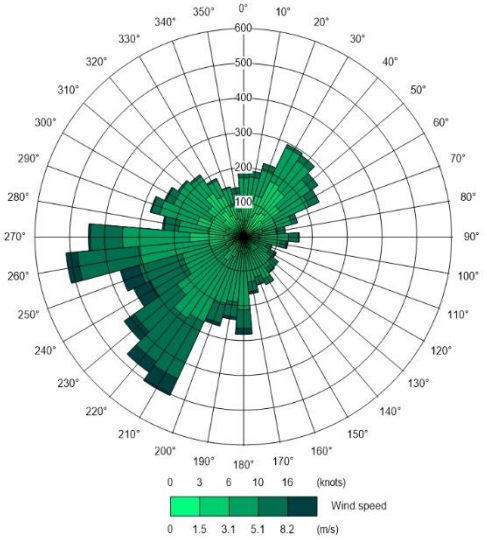
Alkali Environmental



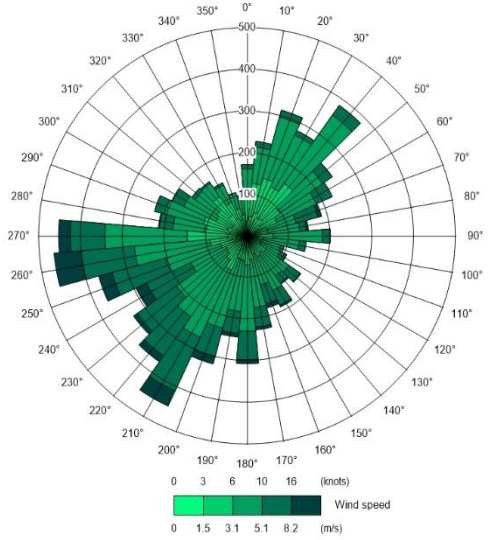
Wind Rose of 2015 Meteorological Data



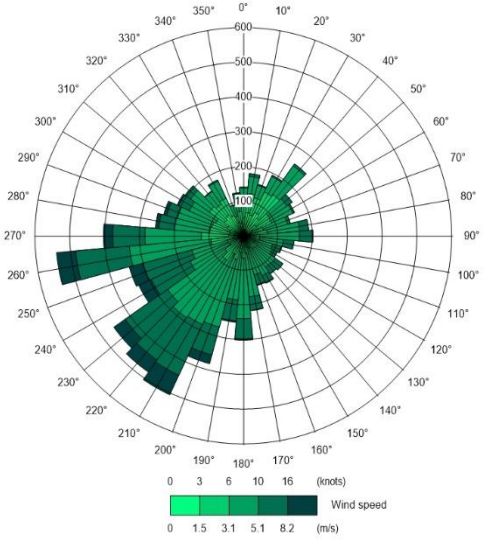
Wind Rose of 2017 Meteorological Data



Wind Rose of 2016 Meteorological Data



Wind Rose of 2018 Meteorological Data



Wind Rose of 2019 Meteorological Data

Legend

Title

Figure 2

2015 to 2019 Wind Roses
Heathrow Meteorological Data

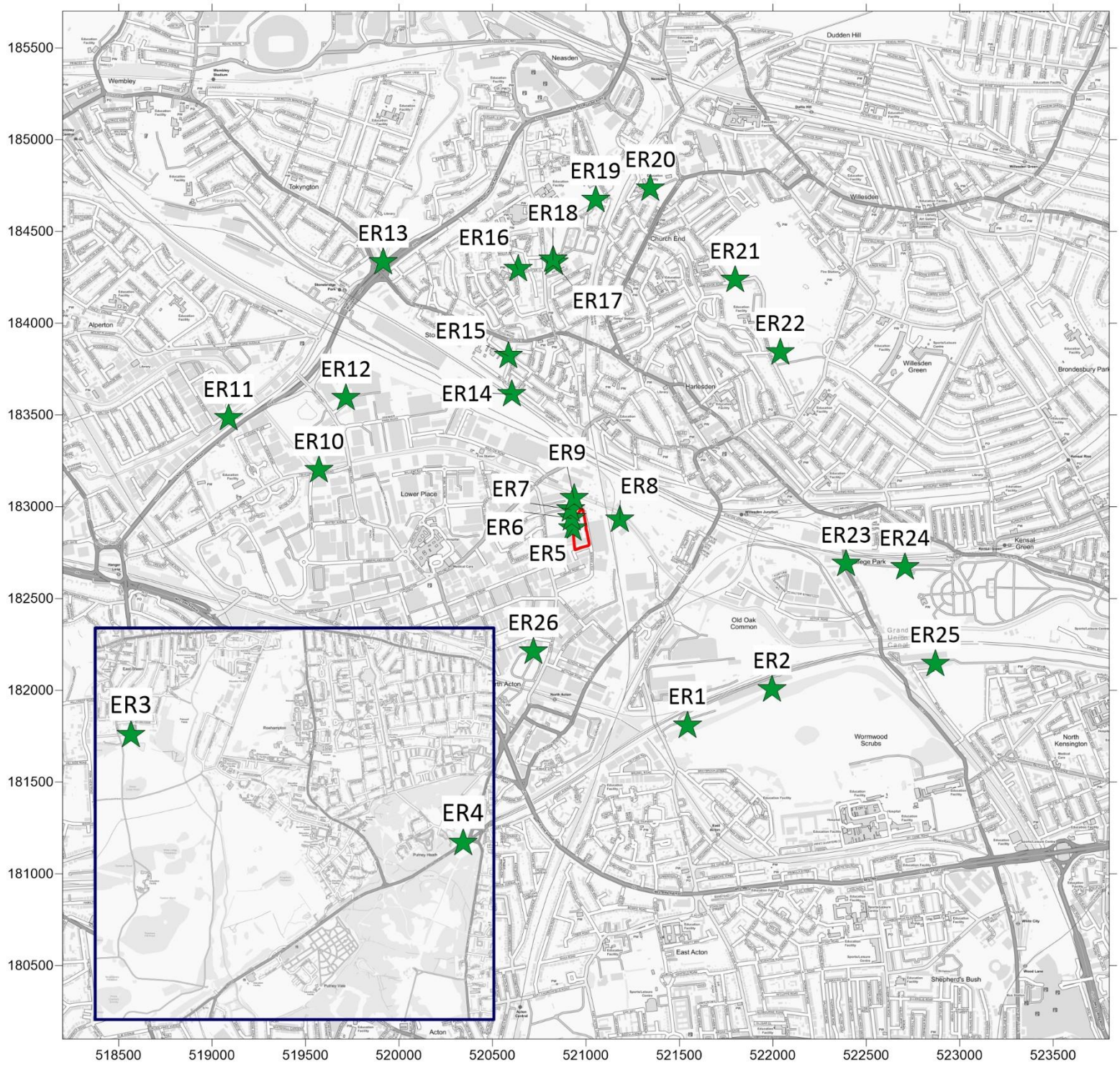
Project

Colt - Powergate

Project Number

AQ10079

Alkali Environmental



Legend

Site Boundary

Sensitive Ecological Receptors

Title

Figure 3

Sensitive Ecological Receptor Locations

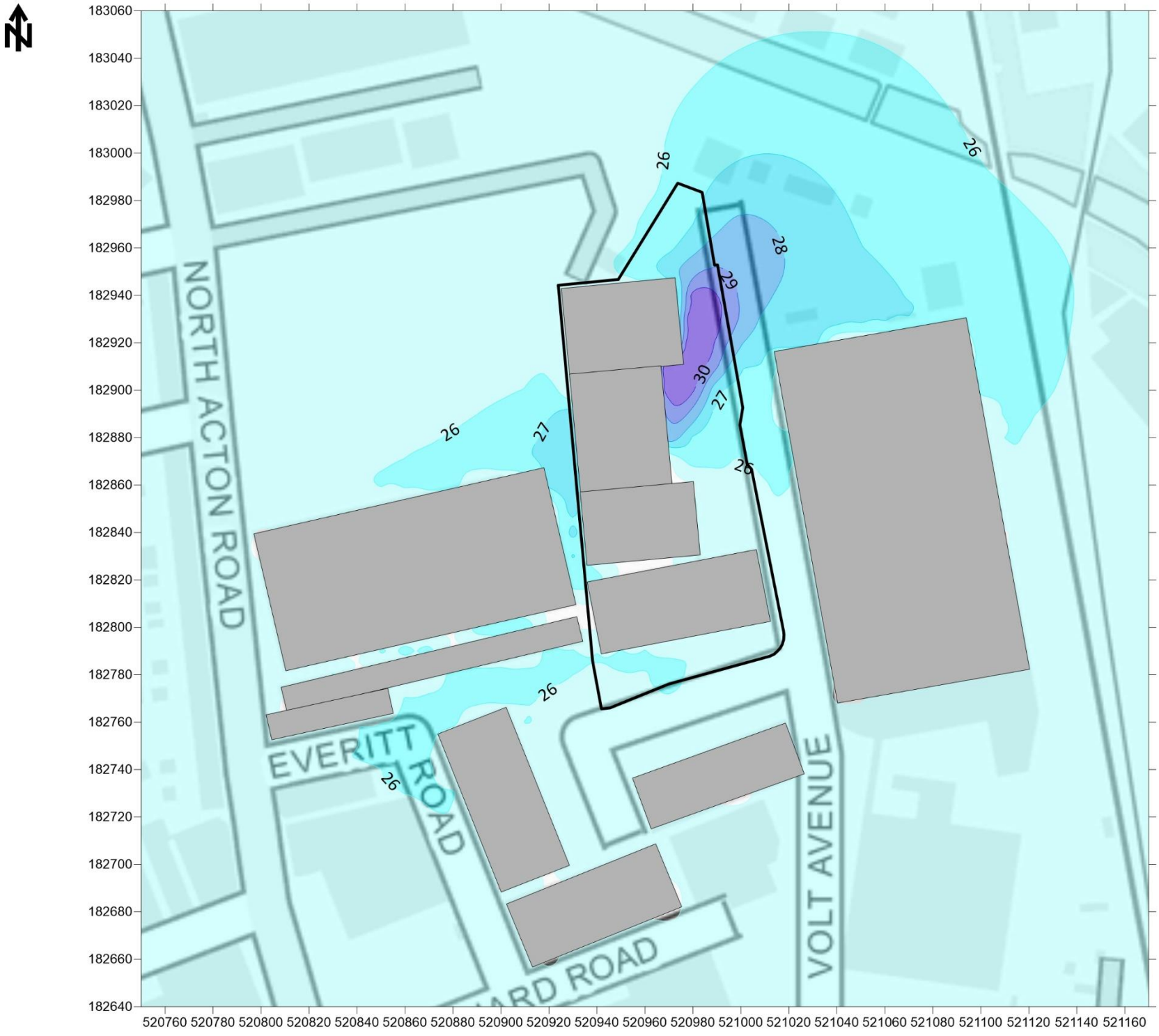
Project

Colt - Powergate

Project Number

AQ10079

Alkali Environmental



Legend

Site Boundary

30
29
28
27
26
25

Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)

Title

Figure 4

Predicted 5-Year Maximum Annual Mean NO_2 Concentrations ($\mu g/m^3$)

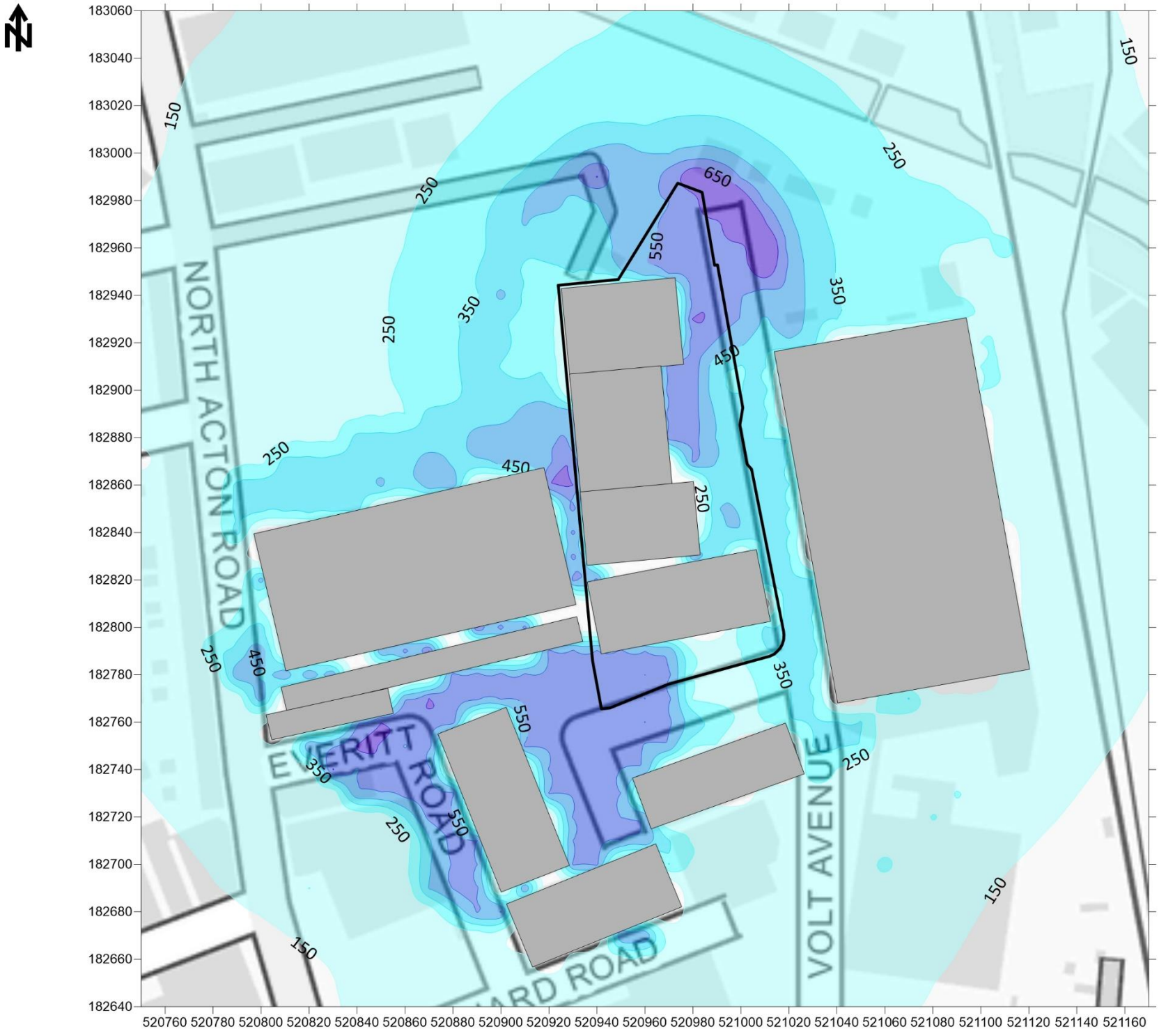
Project

Colt - Powergate

Project Number

AQ10079

Alkali Environmental



Legend

Site Boundary

650
550
450
350
250
150

Predicted 1-Hour Mean NO_2 Concentration ($\mu g/m^3$)

Title

Figure 5

Predicted 5-Year Maximum 1-Hour Mean NO_2 Concentrations ($\mu g/m^3$)

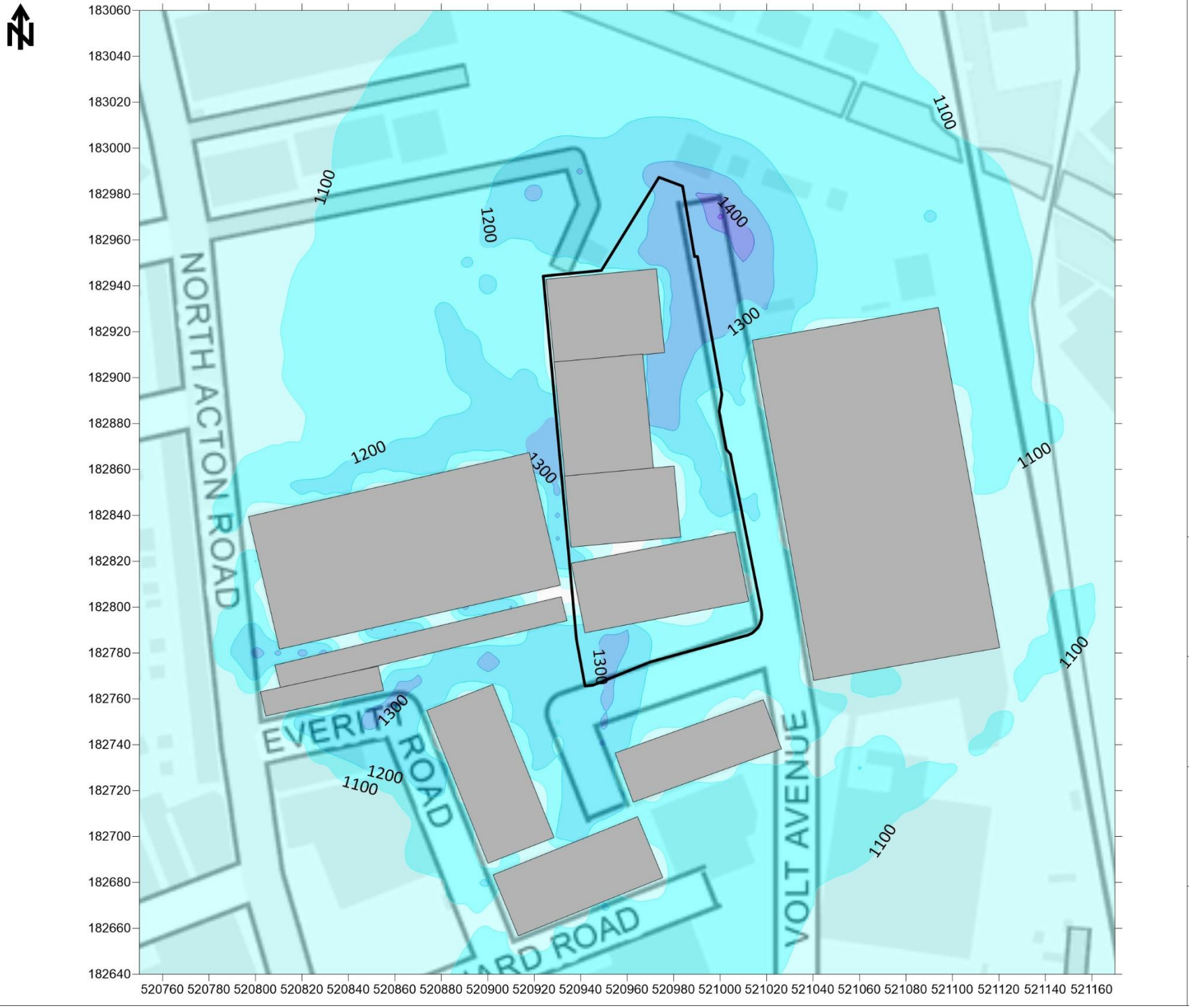
Project

Colt - Powergate

Project Number

AQ10079

Alkali Environmental



Legend

Site Boundary

1500
1400
1300
1200
1100
1000

Predicted 8-Hour Rolling Mean CO Concentration (µg/m³)

Title

Figure 6

Predicted 5-Year Maximum 8-Hour Rolling Mean CO Concentrations (µg/m³)

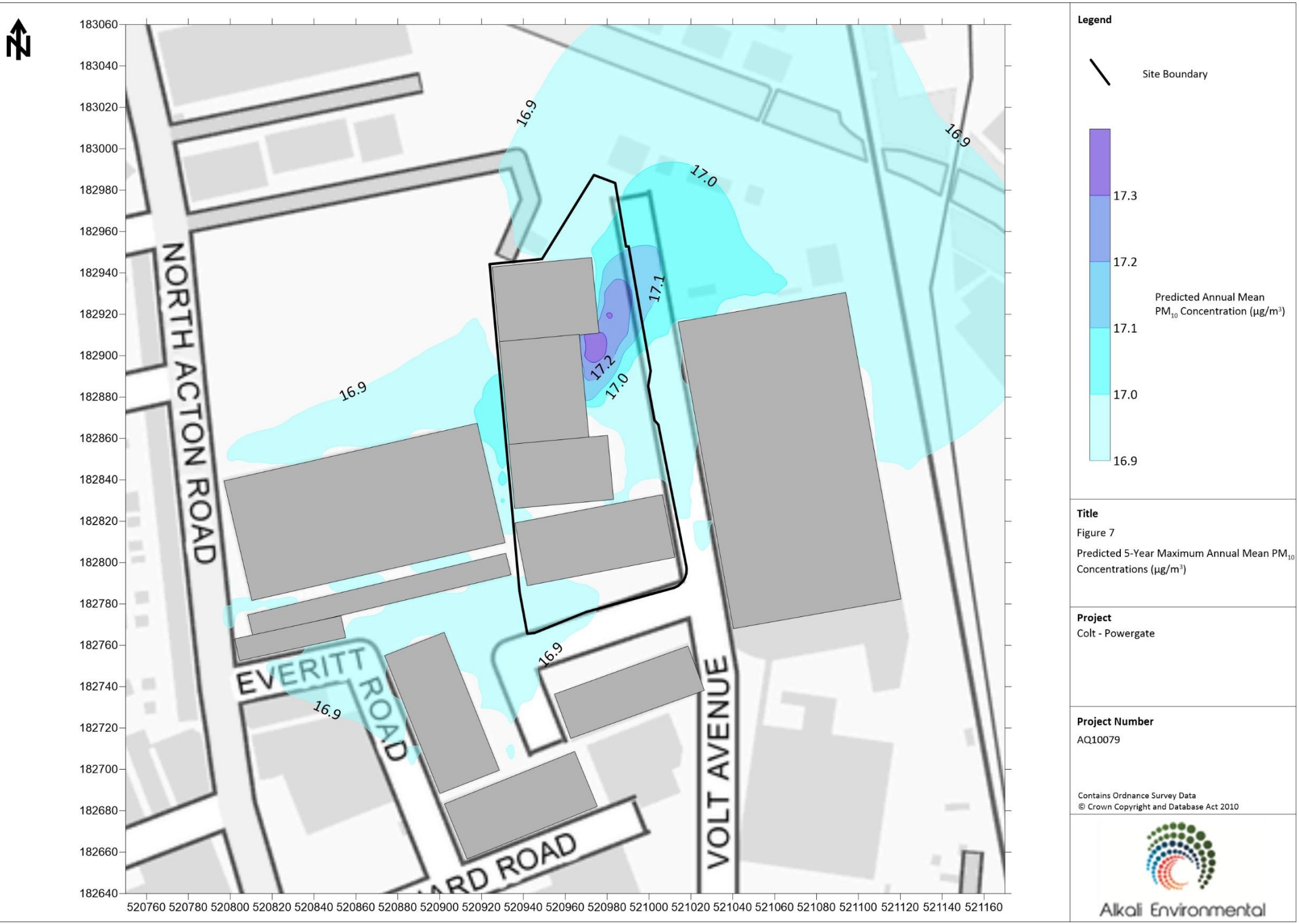
Project

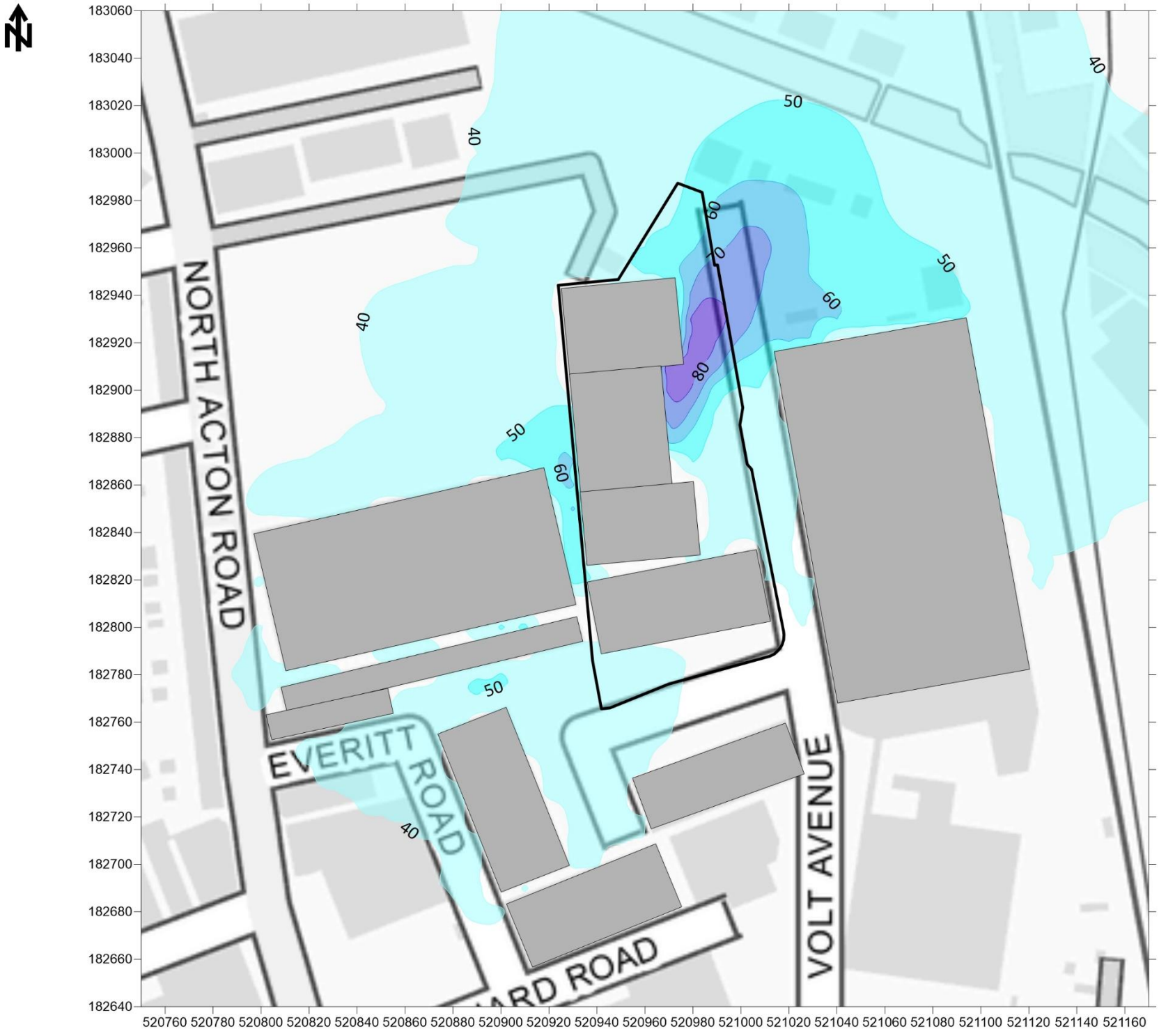
Colt - Powergate

Project Number

AQ10079

Alkali Environmental


183060
183040
183020
183000
182980
182960
182940
182920
182900
182880
182860
182840
182820
182800
182780
182760
182740
182720
182700
182680
182660
182640
520760 520780 520800 520820 520840 520860 520880 520900 520920 520940 520960 520980 521000 521020 521040 521060 521080 521100 521120 521140 521160
NORTH ACTON ROAD
EVERITT ROAD
VOLT AVENUE
16.9
17.0
17.1
17.2
17.3
Legend
Site Boundary
Predicted Annual Mean PM10 Concentration (µg/m3)
Title
Figure 7
Predicted 5-Year Maximum Annual Mean PM10 Concentrations (µg/m3)
Project
Colt - Powergate
Project Number
AQ10079
Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010
Alkali Environmental



Legend

Site Boundary

80
70
60
50
40

Predicted 24-Hour Mean PM_{10} Concentration (µg/m^3)

Title

Figure 8

Predicted 5-Year Maximum 24-Hour Mean PM_{10} Concentrations (µg/m^3)

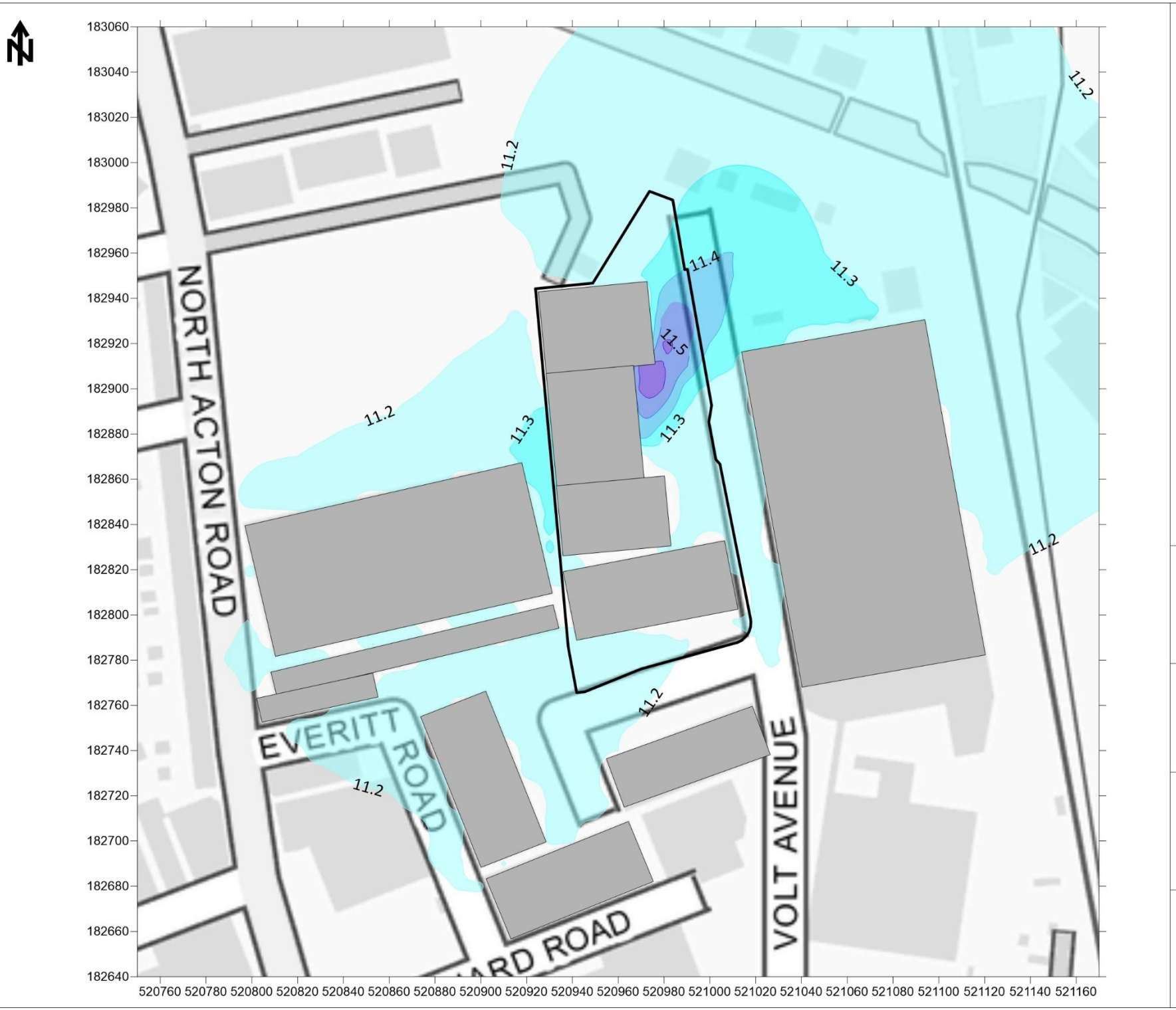
Project

Colt - Powergate

Project Number

AQ10079

Alkali Environmental



Legend

Site Boundary

Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)

11.6
11.5
11.4
11.3
11.2

Title

Figure 9

Predicted 5-Year Maximum Annual Mean $PM_{2.5}$ Concentrations (µg/m³)

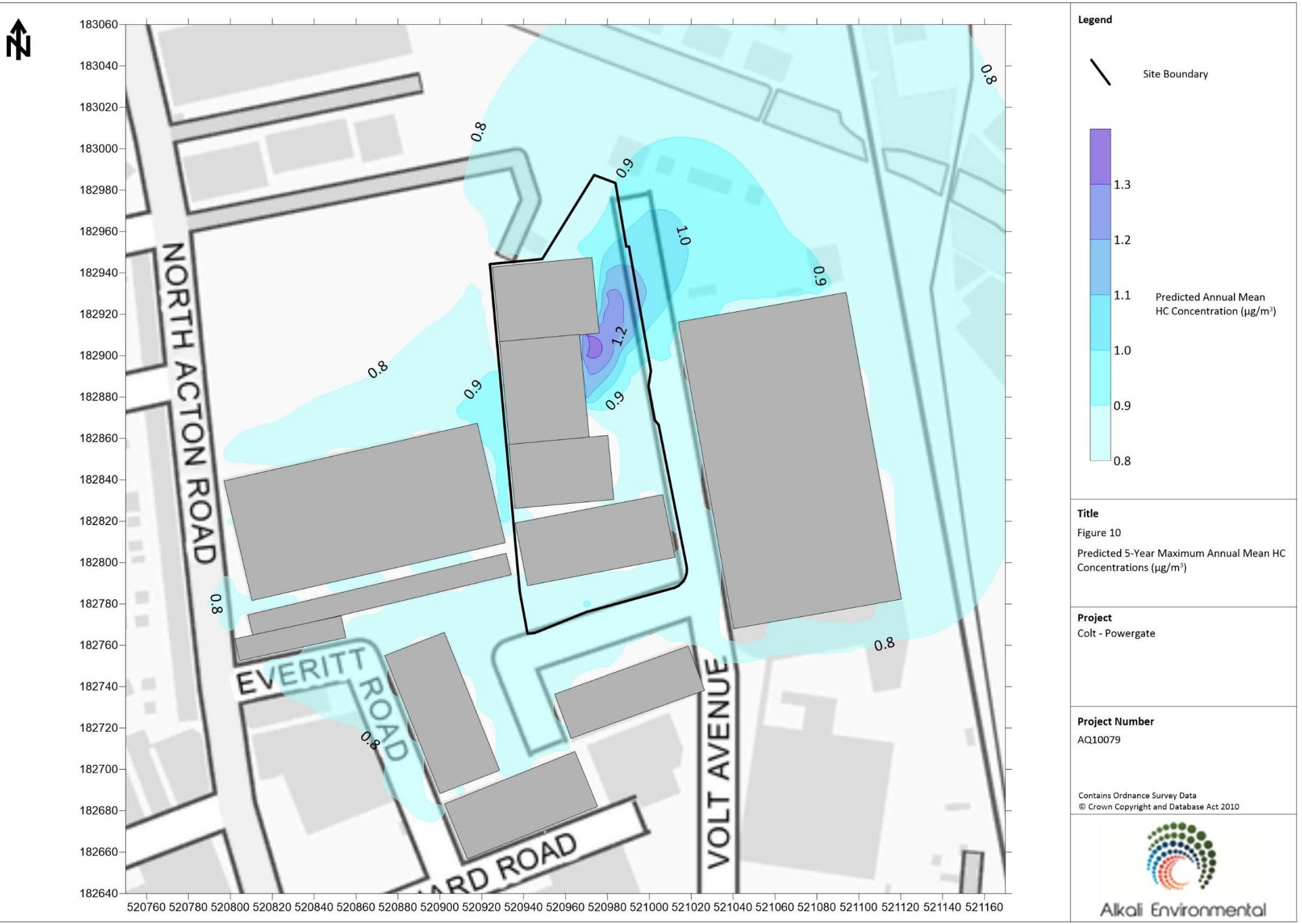
Project

Colt - Powergate

Project Number

AQ10079

Alkali Environmental



Title

Figure 10

Predicted 5-Year Maximum Annual Mean HC Concentrations (µg/m³)

Project

Colt - Powergate

Project Number

AQ10079

Alkali Environmental

APPENDIX C – BASELINE REPORT TABLES

Table 21 Sensitive Human Receptors

Receptor		use	Dist' to Site (m)	NGR (m)		Height (m)
				X	Y	
R1	Unit 6 - 8 Powergate Business Park	Commercial	129	520905.2	182758.7	1.5
R2	Unit 6 - 8 Powergate Business Park	Commercial	171	520926.4	182705.2	1.5
R3	Unit 3 - 5 Powergate Business Park	Commercial	120	521012.1	182757.5	1.5
R4	Unit 3 - 5 Powergate Business Park	Commercial	132	520960.6	182738.6	1.5
R5	Unit 2 Powergate Business Park	Commercial	137	521045.9	182756.1	1.5
R6	Unit 1 Kingham Industrial Estate	Commercial	88	520928.4	182792.3	1.5
R7	Unit 1 -5 Royal London Industrial Estate	Commercial	196	520882.0	183045.1	1.5
R8	Unit 1 Powergate Business Park	Commercial	172	521050.8	182718.0	4.5
R9	60 North Acton Road	Residential	199	520770.6	182871.8	1.5
R10	40 North Acton Road	Residential	220	520764.4	182947.2	1.5
R11	110 North Acton Road	Residential	234	520784.7	182727.8	1.5
R12	85 Harley Road	Residential	465	521303.8	183193.3	1.5
R13	15 Stephenson Street	Residential	548	521500.1	182730.3	1.5
R14	Bashley Road Caravan Site	Residential	255	521143.6	182683.3	1.5

Table 22: Sensitive Human Receptors Background Concentrations

Receptor		Predicated Background Concentration (µg/m³)				
		NO2	CO	PM10	PM2.5	C6H6
R1	Unit 6 - 8 Powergate Business Park	24.86	501.00	16.85	11.16	0.74
R2	Unit 6 - 8 Powergate Business Park	24.86	501.00	16.85	11.16	0.74
R3	Unit 3 - 5 Powergate Business Park	23.21	512.00	16.69	11.02	0.77
R4	Unit 3 - 5 Powergate Business Park	24.86	501.00	16.85	11.16	0.74
R5	Unit 2 Powergate Business Park	23.21	512.00	16.69	11.02	0.77
R6	Unit 1 Kingham Industrial Estate	24.86	501.00	16.85	11.16	0.74
R7	Unit 1 -5 Royal London Industrial Estate	25.42	497.00	17.08	11.33	0.73
R8	Unit 1 Powergate Business Park	23.21	512.00	16.69	11.02	0.77
R9	60 North Acton Road	24.86	501.00	16.85	11.16	0.74
R10	40 North Acton Road	24.86	501.00	16.85	11.16	0.74
R11	110 North Acton Road	24.86	501.00	16.85	11.16	0.74
R12	85 Harley Road	23.22	504.00	18.09	11.81	0.75
R13	15 Stephenson Street	23.21	512.00	16.69	11.02	0.77

Receptor		Predicated Background Concentration (µg/m³)				
		NO2	CO	PM10	PM2.5	C6H6
R14	Bashley Road Caravan Site	23.21	512.00	16.69	11.02	0.77

Table 23 Ecological Receptors

Ecological Receptor		Ecological Designation	NGR (m)		Dist' to Site (m)
			X	Y	
ER1	Wormwood Scrubs	LNR/SINC	521543	181807	1,208
ER2	Wormwood Scrubs	LNR/SINC	521996	182003	1,343
ER3	Richmond Park	SAC	520565	174540	8,340
ER4	Wimbledon Common	SAC	523480	173575	9,628
ER5	Wesley Playing Fields	SINC	520929	182879	42
ER6	Wesley Playing Fields	SINC	520923	182937	82
ER7	Wesley Playing Fields	SINC	520919	182985	126
ER8	Grand Union Canal	SINC	521181	182929	219
ER9	Grand Union Canal	SINC	520936	183047	180
ER10	Grand Union Canal	SINC	519571	183197	1,437
ER11	River Brent west of Stonebridge	SINC	519089	183481	1,978
ER12	Abbey Road Mound and Bestway Park	SINC	519717	183591	1,446
ER13	St. Raphael's Open Space	SINC	519916	184331	1,802
ER14	The Canal Feeder	SINC	520604	183613	828
ER15	Shakespeare Road Open Space	SINC	520586	183821	1,026
ER16	The Old Orchard	SINC	520637	184293	1,461
ER17	Brentfield Open Space	SINC	520830	184329	1,466
ER18	Brentfield Park	SINC	520824	184344	1,481
ER19	Gibbons Recreation Ground	SINC	521052	184671	1,803
ER20	St Mary's Church Willesden	SINC	521345	184733	1,900
ER21	Roundwood Park and Willesden Cemeteries	SINC	521799	184234	1,596
ER22	Roundwood Park	SINC	522040	183841	1,445
ER23	St Mary's Cemetery	SINC	522393	182687	1,435
ER24	Kensal Green Cemetery	SINC	522706	182670	1,747
ER25	Little Wormwood Scrubs Recreation Ground	SINC	522869	182143	2,033

Ecological Receptor		Ecological Designation	NGR (m)		Dist' to Site (m)
			X	Y	
ER26	North Acton Cemetery	SINC	520719	182210	706

Table 24: Ecological Habitats

Receptor		APIS Habitat
ER1	Wormwood Scrubs	Broadleaved, Mixed and Yew Woodland
ER2	Wormwood Scrubs	Broadleaved, Mixed and Yew Woodland
ER3	Richmond Park	Broadleaved, mixed and yew woodland
ER4	Wimbledon Common	Broadleaved, mixed and yew woodland
ER5	Wesley Playing Fields	Acid Grassland
ER6	Wesley Playing Fields	Acid Grassland
ER7	Wesley Playing Fields	Acid Grassland
ER8	Grand Union Canal	Broadleaved, Mixed and Yew Woodland
ER9	Grand Union Canal	Broadleaved, Mixed and Yew Woodland
ER10	Grand Union Canal	Broadleaved, Mixed and Yew Woodland
ER11	River Brent west of Stonebridge	Broadleaved, Mixed and Yew Woodland
ER12	Abbey Road Mound and Bestway Park	Broadleaved, Mixed and Yew Woodland
ER13	St. Raphael's Open Space	Acid Grassland
ER14	The Canal Feeder	Broadleaved, Mixed and Yew Woodland
ER15	Shakespeare Road Open Space	Broadleaved, Mixed and Yew Woodland
ER16	The Old Orchard	Acid Grassland
ER17	Brentfield Open Space	Acid Grassland
ER18	Brentfield Park	Acid Grassland
ER19	Gibbons Recreation Ground	Acid Grassland
ER20	St Mary's Church Willesden	Acid Grassland
ER21	Roundwood Park and Willesden Cemeteries	Acid Grassland
ER22	Roundwood Park	Acid Grassland
ER23	St Mary's Cemetery	Acid Grassland
ER24	Kensal Green Cemetery	Acid Grassland
ER25	Little Wormwood Scrubs Recreation Ground	Acid Grassland
ER26	North Acton Cemetery	Acid Grassland

Table 25 Nitrogen Critical Load

Receptor		Nitrogen Critical Load (kgN/ha/yr)	
		Min	Max
ER1	Wormwood Scrubs	10	20
ER2	Wormwood Scrubs	10	20
ER3	Richmond Park	10	20
ER4	Wimbledon Common	10	20
ER5	Wesley Playing Fields	15	25
ER6	Wesley Playing Fields	15	25
ER7	Wesley Playing Fields	15	25
ER8	Grand Union Canal	10	20
ER9	Grand Union Canal	10	20
ER10	Grand Union Canal	10	20
ER11	River Brent west of Stonebridge	10	20
ER12	Abbey Road Mound and Bestway Park	10	20
ER13	St. Raphael's Open Space	15	25
ER14	The Canal Feeder	10	20
ER15	Shakespeare Road Open Space	10	20
ER16	The Old Orchard	15	25
ER17	Brentfield Open Space	15	25
ER18	Brentfield Park	15	25
ER19	Gibbons Recreation Ground	15	25
ER20	St Mary's Church Willesden	15	25
ER21	Roundwood Park and Willesden Cemeteries	15	25
ER22	Roundwood Park	15	25
ER23	St Mary's Cemetery	15	25
ER24	Kensal Green Cemetery	15	25
ER25	Little Wormwood Scrubs Recreation Ground	15	25
ER26	North Acton Cemetery	15	25

Table 26 Acid Critical Load

Receptor		Critical Load (ke/ha/yr)	
		CLmaxN	CLminN
ER1	Wormwood Scrubs	0.357	2.678
ER2	Wormwood Scrubs	0.357	2.681
ER3	Richmond Park	0.142	1.009
ER4	Wimbledon Common	0.285	0.872
ER5	Wesley Playing Fields	0.438	2.068
ER6	Wesley Playing Fields	0.438	2.068
ER7	Wesley Playing Fields	0.438	2.068
ER8	Grand Union Canal	0.357	2.681
ER9	Grand Union Canal	0.357	2.686
ER10	Grand Union Canal	0.357	2.672
ER11	River Brent west of Stonebridge	0.357	2.672
ER12	Abbey Road Mound and Bestway Park	0.357	2.672
ER13	St. Raphael's Open Space	0.438	2.058
ER14	The Canal Feeder	0.357	2.686
ER15	Shakespeare Road Open Space	0.357	2.686
ER16	The Old Orchard	0.438	2.068
ER17	Brentfield Open Space	0.438	2.068
ER18	Brentfield Park	0.438	2.068
ER19	Gibbons Recreation Ground	0.438	2.068
ER20	St Mary's Church Willesden	0.438	2.068
ER21	Roundwood Park and Willesden Cemeteries	0.438	2.068
ER22	Roundwood Park	0.438	2.068
ER23	St Mary's Cemetery	0.438	2.068
ER24	Kensal Green Cemetery	0.438	2.068
ER25	Little Wormwood Scrubs Recreation Ground	0.438	2.068
ER26	North Acton Cemetery	0.438	2.068

Table 27 Background Deposition Rates

Receptor		NO_x Background Concentration ($\mu g/m^3$)
ER1	Wormwood Scrubs	39.24

Receptor		NO_x Background Concentration (µg/m^3)
ER2	Wormwood Scrubs	40.67
ER3	Richmond Park	26.77
ER4	Wimbledon Common	33.49
ER5	Wesley Playing Fields	44.52
ER6	Wesley Playing Fields	44.52
ER7	Wesley Playing Fields	44.52
ER8	Grand Union Canal	40.67
ER9	Grand Union Canal	46.67
ER10	Grand Union Canal	48.37
ER11	River Brent west of Stonebridge	48.37
ER12	Abbey Road Mound and Bestway Park	48.37
ER13	St. Raphael's Open Space	41.96
ER14	The Canal Feeder	46.67
ER15	Shakespeare Road Open Space	46.67
ER16	The Old Orchard	44.30
ER17	Brentfield Open Space	44.30
ER18	Brentfield Park	44.30
ER19	Gibbons Recreation Ground	39.22
ER20	St Mary's Church Willesden	39.22
ER21	Roundwood Park and Willesden Cemeteries	39.22
ER22	Roundwood Park	37.48
ER23	St Mary's Cemetery	41.02
ER24	Kensal Green Cemetery	41.02
ER25	Little Wormwood Scrubs Recreation Ground	41.02
ER26	North Acton Cemetery	44.52

APPENDIX D – COMPREHENSIVE ASSESSMENT RESULTS

HUMAN SENSITIVE RECEPTORS

SCENARIO 1

Scenario 1 modelling results for each pollutant considered are outlined in the following Sections.

Nitrogen Dioxide Annual Mean

Predicted annual mean NO_2 concentrations inclusive of baseline levels are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean NO_2 concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance[2].

Table 28 Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.26	25.12	0.7	63
R10	40 North Acton Road	0.24	25.10	0.6	63
R11	110 North Acton Road	0.32	25.18	0.8	63
R12	85 Harley Road	0.24	23.45	0.6	59
R13	15 Stephenson Street	0.16	23.37	0.4	58
R14	Bashley Road Caravan Site	0.23	23.45	0.6	59

Note: [a]Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 40µg/m^3.

As indicated in **Error! Reference source not found.**, predicted annual mean NO2 concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is less than 1% at all receptor locations sensitive to long-term exposure. As such, impacts on annual mean NO2 concentrations at this location can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Nitrogen Dioxide 1-hour Mean

As mentioned in Section 3.6, an approach utilising hypergeometric probability distribution was undertaken in order to assess the potential for exceedances of the 1-hour EQS based on the proposed annual operational hours (156 hours). The cumulative hypergeometric distribution for each sensitive receptor location is detailed in **Error! Reference source not found.**.

Table 29: 1-Hour Mean NO2 Concentrations - Hypergeometric Distribution

Receptor		Hypergeometric Distribution (%)	Hypergeometric Distribution for Continuous Operation (%)
R1	Unit 6 - 8 Powergate Business Park	100	100

Receptor		Hypergeometric Distribution (%)	Hypergeometric Distribution for Continuous Operation (%)
R2	Unit 6 - 8 Powergate Business Park	40	100
R3	Unit 3 - 5 Powergate Business Park	0	0
R4	Unit 3 - 5 Powergate Business Park	25	62
R5	Unit 2 Powergate Business Park	0	0
R6	Unit 1 Kingham Industrial Estate	100	100
R7	Unit 1 -5 Royal London Industrial Estate	0	0
R8	Unit 1 Powergate Business Park	0	0
R9	60 North Acton Road	0	0
R10	40 North Acton Road	0	0
R11	110 North Acton Road	0	0
R12	85 Harley Road	0	0
R13	15 Stephenson Street	0	0
R14	Bashley Road Caravan Site	0	0

Note: Predicted concentrations were considered against the relevant EQSs: Annual mean AQO of 200µg/m^3.

As indicated in **Error! Reference source not found.**, the cumulative hypergeometric distribution calculates the probability to be greater than 5% at 4 sensitive receptor locations considered (R1, R2, R4, R6). As such, the 1-hour mean EQS for NO2 could be exceeded at these receptor locations during Scenario 1.

It is important to note that the results are considered to be overestimations. This is because the generators have been grouped together (based on the reasons provided within Sections 3.2 and 3.3) for modelling purposes. In reality, only 1 generator will be operational at a time. In addition, process conditions and emissions for some of the generators have been based on operation at 100% load (further details are provided within Sections 3.4 and 3.5).

Nitric Oxide 1-hour mean

Predicted 1-hour mean NO concentrations inclusive of baseline levels are summarised in Table 17.

Table 30 Predicted 1-Hour Mean NO Concentrations

Receptor		Predicted 99.99 %ile 1-hour Mean NO Concentration (µg/m^3)		Proportion of EAL (%)	
		PC	PEC	PC	PEC
R1	Unit 6 - 8 Powergate Business Park	18.36	45.05	0.42	1.02
R2	Unit 6 - 8 Powergate Business Park	17.57	44.26	0.40	1.01
R3	Unit 3 - 5 Powergate Business Park	10.56	34.37	0.24	0.78
R4	Unit 3 - 5 Powergate Business Park	17.03	43.73	0.39	0.99
R5	Unit 2 Powergate Business Park	10.34	34.14	0.23	0.78

Receptor		Predicted 99.99 %ile 1-hour Mean NO Concentration (µg/m^3)		Proportion of EAL (%)	
		PC	PEC	PC	PEC
R6	Unit 1 Kingham Industrial Estate	17.95	44.65	0.41	1.01
R7	Unit 1 -5 Royal London Industrial Estate	5.52	33.65	0.13	0.76
R8	Unit 1 Powergate Business Park	8.51	32.32	0.19	0.73
R9	60 North Acton Road	4.57	31.27	0.10	0.71
R10	40 North Acton Road	3.92	30.61	0.09	0.70
R11	110 North Acton Road	6.47	33.17	0.15	0.75
R12	85 Harley Road	2.04	25.84	0.05	0.59
R13	15 Stephenson Street	2.10	25.90	0.05	0.59
R14	Bashley Road Caravan Site	2.92	26.73	0.07	0.61

As indicated in Table 17, predicted NO concentrations were below the relevant EQS all 14 sensitive receptor locations for all meteorological data sets.

The PC proportion of the EQS is less than 10% at all receptor locations sensitive to short term-term exposure. As such, impacts on 1-hour mean NO concentrations at this location can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Carbon Monoxide

Predicted CO concentrations at sensitive receptor locations are summarised in **Error! Reference source not found.**.

Table 31: Predicted 8-hour Rolling Mean CO Concentrations

Receptor		Predicted Maximum Daily Running 8-hour Mean CO Concentration (µg/m3)		Proportion of EQS (%)	
		PC	PEC	PC	PECa
R1	Unit 6 - 8 Powergate Business Park	210.59	1,212.59	2	2
R2	Unit 6 - 8 Powergate Business Park	168.67	1,170.67	2	2
R3	Unit 3 - 5 Powergate Business Park	96.02	1,120.02	1	1
R4	Unit 3 - 5 Powergate Business Park	210.67	1,212.67	2	2
R5	Unit 2 Powergate Business Park	88.39	1,112.39	1	1
R6	Unit 1 Kingham Industrial Estate	239.69	1,241.69	2	3
R7	Unit 1 -5 Royal London Industrial Estate	106.87	1,100.87	1	1
R8	Unit 1 Powergate Business Park	168.97	1,192.97	2	2
R9	60 North Acton Road	74.17	1,076.17	1	1

Receptor		Predicted Maximum Daily Running 8-hour Mean CO Concentration (µg/m3)		Proportion of EQS (%)	
		PC	PEC	PC	PECa
R10	40 North Acton Road	70.79	1,072.79	1	1
R11	110 North Acton Road	71.22	1,073.22	1	1
R12	85 Harley Road	33.25	1,041.25	0.3	0.4
R13	15 Stephenson Street	26.95	1,050.95	0.3	0.3
R14	Bashley Road Caravan Site	62.79	1,086.79	1	1

Note: Predicted concentrations were assessed against the relevant EQS: 8-hour rolling mean AQO of 10,000µg/m³.
a: PC proportion of the EQS minus twice the long-term background

As indicated in **Error! Reference source not found.**, predicted CO concentrations are below the relevant EQS at all sensitive receptor locations.

The PC proportion of the EQS is less than 10% at all receptor locations. As such, impacts on 8-hour rolling mean CO concentrations can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Particulate Matter (PM10) – Annual Mean

Predicted annual mean PM10 concentrations at sensitive human receptor locations are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean PM10 concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance2.

Table 32: Predicted Annual Mean PM10 Concentrations

Receptor		Predicted Annual Mean PM10 Concentration (µg/m3)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.02	16.87	<0.1	42
R10	40 North Acton Road	0.02	16.86	<0.1	42
R11	110 North Acton Road	0.02	16.87	<0.1	42
R12	85 Harley Road	0.01	18.11	<0.1	45
R13	15 Stephenson Street	0.01	16.70	<0.1	42
R14	Bashley Road Caravan Site	0.01	16.70	<0.1	42

Note: Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 40µg/m³.

As indicated in **Error! Reference source not found.**, predicted annual mean PM10 concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is below 1% at all receptor locations sensitive to long-term exposure. As such, impacts on annual mean PM10 PC concentrations at these locations can be screened as insignificant in accordance with the initial stage of the EA screening criteria.

Particulate Matter (PM10) – 24-Hour Mean

Predicted 24-hour mean PM10 concentrations at sensitive receptor locations are summarised in **Error! Reference source not found.**.

Table 33: Predicted 24-Hour Mean PM10 Concentrations

Receptor		Predicted 24-Hour Mean PM10 Concentration (µg/m3)		Proportion of EQS (%)		
		PC	PEC	PC	PEC_a	PEC_b
R1	Unit 6 - 8 Powergate Business Park	11.38	45.08	23	70	90
R2	Unit 6 - 8 Powergate Business Park	7.71	41.41	15	47	83
R3	Unit 3 - 5 Powergate Business Park	3.65	37.03	7	22	74
R4	Unit 3 - 5 Powergate Business Park	7.14	40.84	14	44	82
R5	Unit 2 Powergate Business Park	4.24	37.62	8	25	75
R6	Unit 1 Kingham Industrial Estate	13.27	46.97	27	81	94
R7	Unit 1 -5 Royal London Industrial Estate	5.26	39.42	11	33	79
R8	Unit 1 Powergate Business Park	3.58	36.96	7	22	74
R9	60 North Acton Road	3.96	37.66	8	24	75
R10	40 North Acton Road	3.62	37.32	7	22	75
R11	110 North Acton Road	4.34	38.04	9	27	76
R12	85 Harley Road	2.15	38.33	4	16	77
R13	15 Stephenson Street	1.40	34.78	3	8	70
R14	Bashley Road Caravan Site	2.30	35.68	5	14	71

Note: Predicted concentrations were assessed against the relevant EQSs: 24-hour mean AQO of 50µg/m³.
a: PC proportion of the EQS minus twice the long-term background
b: PEC proportion of the EQS

As indicated in **Error! Reference source not found.**, predicted 24-hour PM10 concentrations are below the relevant EQS at all sensitive receptor locations.

The PC proportion of the EQS is less than 10% at 9 receptor locations (R3, R5, R8-R14). As such, impacts on 24-hour mean PM10 concentrations are considered to be insignificant at these locations in accordance with the initial stage of the EA screening criteria.

During the secondary stage of assessment, the PEC proportion of the EQS is predicted to be above 20% at all 5 remaining receptor locations. As such, impacts on 24-hour mean PM10 concentrations at these locations cannot be screened as insignificant in accordance with the EA screening criteria. Critically, all 5 remaining receptor locations (R1, R2, R4, R6, R7) are below the 24-hour mean EQS.

It is also important to note that the results are considered to be overestimations. This is because the generators have been grouped together (based on the reasons provided within Sections 3.2 and 3.3) for modelling purposes. In reality, only 1 generator will be operational at a time. In addition, process conditions and emissions for some of the generators have been based on operation at 100% load (further details are provided within Sections 3.4 and 3.4).

Finally, the model has been ran for the full calendar year (8,760 hours) for the assessment of short-term impacts. Scenario 1 has an operational envelope of 156 hours and as such, predicted concentrations are significant overestimations. Overall, impacts on 24-hour PM10 concentrations are therefore considered not significant.

Particulate Matter (PM2.5)

Predicted annual mean PM2.5 concentrations at sensitive human receptor locations are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean PM2.5 concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance2.

Table 34: Predicted Annual Mean PM2.5 Concentrations

Receptor		Predicted Annual Mean PM2.5 Concentration (µg/m3)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.02	11.18	<0.1	45
R10	40 North Acton Road	0.02	11.17	<0.1	45
R11	110 North Acton Road	0.02	11.18	<0.1	45
R12	85 Harley Road	0.01	11.83	<0.1	47
R13	15 Stephenson Street	0.01	11.03	<0.1	44
R14	Bashley Road Caravan Site	0.01	11.04	<0.1	44

Note: Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 25µg/m³.

As indicated in **Error! Reference source not found.**, predicted PM2.5 concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is below 1% at all receptor locations sensitive to long-term exposure. As such, impacts on annual mean PM2.5 PC concentrations at these locations can be screened as insignificant in accordance with the initial stage of the EA screening criteria.

Total Hydrocarbons

Predicted annual mean HC concentrations at sensitive human receptor locations are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean HC concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance2.

Table 35: Predicted Annual Mean HC Concentrations

Receptor		Predicted Annual Mean HC Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.02	0.77	0.5	15
R10	40 North Acton Road	0.02	0.76	0.4	15
R11	110 North Acton Road	0.03	0.77	0.6	15
R12	85 Harley Road	0.02	0.77	0.4	15
R13	15 Stephenson Street	0.02	0.78	0.3	16
R14	Bashley Road Caravan Site	0.02	0.79	0.5	16

Note: Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 5µg/m³ (for C_6H_6).

As indicated in **Error! Reference source not found.**, predicted HC concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is below 1% at all receptor locations sensitive to long-term exposure. As such, impacts on annual mean HC PC concentrations at these locations can be screened as insignificant in accordance with the initial stage of the EA screening criteria.

AEGL-1

Predicted AEGL-1 NO_2 concentrations inclusive of baseline levels are summarised in Table 18

Table 36 Predicted AEGL-1 NO_2 Concentrations

Receptor	Predicted NO_2 Concentration (µg/m^3)				
	10 Minute 100%ile	30 Minute 99.99%ile	1 Hour 99.99%ile	4 Hour 99.95%ile	8 Hour 99.91%ile
R1	59.60	59.60	59.60	59.49	59.25
R2	59.18	59.18	59.18	59.10	59.00
R3	52.11	52.11	52.11	51.86	50.60
R4	58.89	58.89	58.89	58.55	58.46
R5	51.99	51.99	51.99	51.89	51.85
R6	59.39	59.39	59.39	59.21	59.14
R7	53.82	53.82	53.82	53.77	53.75
R8	51.01	51.01	51.01	50.86	50.70
R9	52.18	52.18	52.18	52.09	51.92
R10	51.83	51.83	51.83	51.79	51.76
R11	53.20	53.20	53.20	53.08	53.01
R12	47.53	47.53	47.53	47.52	47.45
R13	47.56	47.56	47.56	47.32	47.31
R14	48.00	48.00	48.00	47.97	47.95

As indicated in Table 18, predicted NO_2 concentrations were below the relevant AEGL-1 at all 14 sensitive receptor locations over the modelled 5 year period for all exposure periods considered.

SCENARIO 2

Scenario 2 modelling results for each pollutant considered are outlined in the following Sections.

Nitrogen Dioxide Annual Mean

Predicted annual mean NO_2 concentrations inclusive of baseline levels are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean NO_2 concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance[2].

Table 37 Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.27	25.13	0.7	63
R10	40 North Acton Road	0.25	25.11	0.6	63
R11	110 North Acton Road	0.34	25.20	0.8	63
R12	85 Harley Road	0.25	23.47	0.6	59
R13	15 Stephenson Street	0.16	23.38	0.4	58
R14	Bashley Road Caravan Site	0.25	23.46	0.6	59

Note: Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 40µg/m^3.

As indicated in **Error! Reference source not found.**, predicted annual mean NO2 concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is less than 1% at all receptor locations sensitive to long-term exposure. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Nitrogen Dioxide 1-hour Mean

As mentioned in Section 3.6, an approach utilising hypergeometric probability distribution was undertaken in order to assess the potential for exceedances of the 1-hour EQS based on the proposed annual operational hours (72 hours). The cumulative hypergeometric distribution for each sensitive receptor location is detailed in **Error! Reference source not found.**.

Table 38: 1-Hour Mean NO2 Concentrations - Hypergeometric Distribution

Receptor		Hypergeometric Distribution (%)	Hypergeometric Distribution for Continuous Operation (%)
R1	Unit 6 - 8 Powergate Business Park	100	100
R2	Unit 6 - 8 Powergate Business Park	96	100
R3	Unit 3 - 5 Powergate Business Park	31	76
R4	Unit 3 - 5 Powergate Business Park	74	100
R5	Unit 2 Powergate Business Park	43	100
R6	Unit 1 Kingham Industrial Estate	100	100
R7	Unit 1 -5 Royal London Industrial Estate	62	100
R8	Unit 1 Powergate Business Park	8	20
R9	60 North Acton Road	2	5
R10	40 North Acton Road	2	4
R11	110 North Acton Road	2	5
R12	85 Harley Road	0	0

Receptor		Hypergeometric Distribution (%)	Hypergeometric Distribution for Continuous Operation (%)
R13	15 Stephenson Street	0	0
R14	Bashley Road Caravan Site	0	0

Note: Predicted concentrations were considered against the relevant EQSs: Annual mean AQO of 200µg/m³.

As indicated in **Error! Reference source not found.**, the cumulative hypergeometric distribution calculates the probability to be greater than 5% at 8 sensitive receptor locations considered (R1-R8). As such, the 1-hour mean EQS for NO2 could be exceeded at these receptor locations during Scenario 2.

Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Nitric Oxide 1-hour mean

Predicted 1-hour mean NO concentrations inclusive of baseline levels are summarised in Table 19.

Table 39 Predicted 1-Hour Mean NO Concentrations

Receptor		Predicted 99.99 %ile 1-hour Mean NO Concentration (µg/m³)		Proportion of EAL (%)	
		PC	PEC	PC	PEC
R1	Unit 6 - 8 Powergate Business Park	16.05	42.75	0.36	0.97
R2	Unit 6 - 8 Powergate Business Park	15.58	42.27	0.35	0.96
R3	Unit 3 - 5 Powergate Business Park	10.72	34.52	0.24	0.78
R4	Unit 3 - 5 Powergate Business Park	16.04	42.74	0.36	0.97
R5	Unit 2 Powergate Business Park	10.55	34.36	0.24	0.78
R6	Unit 1 Kingham Industrial Estate	15.74	42.43	0.36	0.96
R7	Unit 1 -5 Royal London Industrial Estate	5.67	33.80	0.13	0.77
R8	Unit 1 Powergate Business Park	8.65	32.46	0.20	0.74
R9	60 North Acton Road	4.57	31.27	0.10	0.71
R10	40 North Acton Road	4.04	30.73	0.09	0.70
R11	110 North Acton Road	6.80	33.50	0.15	0.76
R12	85 Harley Road	2.13	25.93	0.05	0.59
R13	15 Stephenson Street	2.21	26.02	0.05	0.59
R14	Bashley Road Caravan Site	3.04	26.85	0.07	0.61

As indicated in Table 19, predicted NO concentrations were below the relevant EQS at all 14 sensitive receptor locations for all meteorological data sets.

The PC proportion of the EQS is less than 10% at all receptor locations sensitive to short term-term exposure. As such, impacts on 1-hour mean NO concentrations at this location can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Carbon Monoxide

Predicted CO concentrations at sensitive receptor locations are summarised in **Error! Reference source not found.**.

Table 40: Predicted 8-hour Rolling Mean CO Concentrations

Receptor		Predicted Maximum Daily Running 8-hour Mean CO Concentration (µg/m3)		Proportion of EQS (%)	
		PC	PEC	PC	PECa
R1	Unit 6 - 8 Powergate Business Park	390.47	1,392.47	3.9	4.3
R2	Unit 6 - 8 Powergate Business Park	325.37	1,327.37	3.3	3.6
R3	Unit 3 - 5 Powergate Business Park	201.10	1,225.10	2.0	2.2
R4	Unit 3 - 5 Powergate Business Park	444.43	1,446.43	4.4	4.9
R5	Unit 2 Powergate Business Park	189.39	1,213.39	1.9	2.1
R6	Unit 1 Kingham Industrial Estate	454.40	1,456.40	4.5	5.1
R7	Unit 1 -5 Royal London Industrial Estate	232.90	1,226.90	2.3	2.6
R8	Unit 1 Powergate Business Park	451.55	1,475.55	4.5	5.0
R9	60 North Acton Road	156.65	1,158.65	1.6	1.7
R10	40 North Acton Road	151.69	1,153.69	1.5	1.7
R11	110 North Acton Road	155.25	1,157.25	1.6	1.7
R12	85 Harley Road	73.05	1,081.05	0.7	0.8
R13	15 Stephenson Street	60.68	1,084.68	0.6	0.7
R14	Bashley Road Caravan Site	142.98	1,166.98	1.4	1.6

Note: Predicted concentrations were assessed against the relevant EQS: 8-hour rolling mean AQO of 10,000µg/m³.
a: PC proportion of the EQS minus twice the long-term background

As indicated in **Error! Reference source not found.**, predicted CO concentrations are below the relevant EQS at all sensitive receptor locations.

The PC proportion of the EQS is less than 10% at all receptor locations. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Particulate Matter (PM10) – Annual Mean

Predicted annual mean PM10 concentrations at sensitive human receptor locations are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean PM10 concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance2.

Table 41: Predicted Annual Mean PM10 Concentrations

Receptor		Predicted Annual Mean PM10 Concentration (µg/m3)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.02	16.87	<0.1	42
R10	40 North Acton Road	0.02	16.86	<0.1	42
R11	110 North Acton Road	0.02	16.87	0.1	42
R12	85 Harley Road	0.02	18.11	<0.1	45
R13	15 Stephenson Street	0.01	16.70	<0.1	42
R14	Bashley Road Caravan Site	0.01	16.70	<0.1	42

Note: Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 40µg/m³.

As indicated in **Error! Reference source not found.**, predicted annual mean PM10 concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is below 1% at all receptor locations sensitive to long-term exposure. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Particulate Matter (PM10) – 24-Hour Mean

Predicted 24-hour mean PM10 concentrations at sensitive receptor locations are summarised in **Error! Reference source not found.**.

Table 42: Predicted 24-Hour Mean PM10 Concentrations

Receptor		Predicted 24-Hour Mean PM10 Concentration (µg/m3)		Proportion of EQS (%)		
		PC	PEC	PC	PECa	PECb
R1	Unit 6 - 8 Powergate Business Park	21.77	55.47	44	134	111
R2	Unit 6 - 8 Powergate Business Park	16.29	49.98	33	100	99.97
R3	Unit 3 - 5 Powergate Business Park	7.95	41.33	16	48	83
R4	Unit 3 - 5 Powergate Business Park	15.54	49.23	31	95	98
R5	Unit 2 Powergate Business Park	9.20	42.58	18	55	85
R6	Unit 1 Kingham Industrial Estate	24.26	57.96	49	149	116
R7	Unit 1 -5 Royal London Industrial Estate	11.67	45.83	23	74	92
R8	Unit 1 Powergate Business Park	7.88	41.26	16	47	83
R9	60 North Acton Road	8.55	42.25	17	52	84
R10	40 North Acton Road	7.97	41.67	16	49	83
R11	110 North Acton Road	9.64	43.33	19	59	87
R12	85 Harley Road	4.78	40.96	10	35	82
R13	15 Stephenson Street	3.14	36.52	6	19	73
R14	Bashley Road Caravan Site	5.16	38.54	10	31	77

Note: Predicted concentrations were assessed against the relevant EQSs: 24-hour mean AQO of 50µg/m³.
a: PC proportion of the EQS minus twice the long-term background
b: PEC proportion of the EQS

As indicated in **Error! Reference source not found.**, predicted 24-hour PM10 concentrations are above the relevant EQS at 2 sensitive receptor locations (R1, R6).

The PC proportion of the EQS is greater than 10% at 11 receptor locations (R1-R11). It is important to note that the model has been ran for the full calendar year (8,760 hours) for the assessment of short-term impacts. Scenario 2 has an operational envelope of 72 hours and as such, predicted concentrations are significant overestimations.

Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Particulate Matter (PM2.5)

Predicted annual mean PM2.5 concentrations at sensitive human receptor locations are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean PM2.5 concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance2.

Table 43: Predicted Annual Mean PM2.5 Concentrations

Receptor		Predicted Annual Mean PM2.5 Concentration (µg/m3)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.02	11.18	0.1	45
R10	40 North Acton Road	0.02	11.18	0.1	45
R11	110 North Acton Road	0.02	11.18	0.1	45
R12	85 Harley Road	0.02	11.83	0.1	47
R13	15 Stephenson Street	0.01	11.03	<0.1	44
R14	Bashley Road Caravan Site	0.01	11.04	0.1	44

Note: Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 25µg/m³.

As indicated in **Error! Reference source not found.**, predicted PM2.5 concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is below 1% at all receptor locations sensitive to long-term exposure. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Total Hydrocarbons

Predicted annual mean HC concentrations at sensitive human receptor locations are summarised in **Error! Reference source not found.**. It should be noted that only residential receptors were considered for predicted changes in annual mean HC concentrations as they are considered sensitive to annual mean concentrations in accordance with the LLAQM.TG(16) guidance2.

Table 44: Predicted Annual Mean HC Concentrations

Receptor		Predicted Annual Mean HC Concentration (µg/m^3)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R9	60 North Acton Road	0.02	0.77	0.5	15
R10	40 North Acton Road	0.02	0.76	0.4	15
R11	110 North Acton Road	0.03	0.77	0.6	15
R12	85 Harley Road	0.02	0.77	0.5	15
R13	15 Stephenson Street	0.02	0.79	0.3	16
R14	Bashley Road Caravan Site	0.03	0.80	0.5	16

Note: Predicted concentrations were assessed against the relevant EQSs: Annual mean AQO of 5µg/m^3 (for C_6H_6).

As indicated in **Error! Reference source not found.**, predicted HC concentrations were below the relevant long term EQS at all sensitive receptor locations.

The PC proportion of the EQS is below 1% at all receptor locations sensitive to long-term exposure. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

AEGL-1

Predicted AEGL-1 NO_2 concentrations inclusive of baseline levels are summarised in Table 20.

Table 45 Predicted AEGL-1 NO_2 Concentrations

Receptor	Predicted NO_2 Concentration (µg/m^3)				
	10 Minute 100%ile	30 Minute 99.99%ile	1 Hour 99.99%ile	4 Hour 99.95%ile	8 Hour 99.91%ile
R1	58.36	58.36	58.36	58.22	58.15
R2	58.11	58.11	58.11	58.06	58.01
R3	52.20	52.20	52.20	51.87	50.70
R4	58.36	58.36	58.36	58.10	58.07
R5	52.11	52.11	52.11	52.01	51.96
R6	58.19	58.19	58.19	58.12	58.09
R7	53.90	53.90	53.90	53.85	53.82
R8	51.09	51.09	51.09	50.96	50.84
R9	52.18	52.18	52.18	52.03	51.94
R10	51.89	51.89	51.89	51.85	51.81
R11	53.38	53.38	53.38	53.28	53.17
R12	47.58	47.58	47.58	47.56	47.49
R13	47.62	47.62	47.62	47.35	47.33

Receptor	Predicted NO_2 Concentration (µg/m³)				
	10 Minute 100%ile	30 Minute 99.99%ile	1 Hour 99.99%ile	4 Hour 99.95%ile	8 Hour 99.91%ile
R14	48.07	48.07	48.07	48.04	48.01

As indicated in Table 20, predicted NO_2 concentrations were below the relevant AEGL-1 at all 14 sensitive receptor locations over the modelled 5 year period for all exposure periods considered.

SENSITIVE ECOLOGICAL RECEPTORS

Predicted concentrations and deposition rates of each pollutant for both scenarios at the ecological receptor locations identified in Table 23 are summarised in the following Sections.

SCENARIO 1

Scenario 1 modelling results for each pollutant considered are outlined in the following Sections.

Oxides of Nitrogen – Annual Mean

Predicted annual mean NOx concentrations at sensitive ecological receptors are summarised in **Error! Reference source not found.**.

Table 46: Predicted Annual Mean NOx Concentrations

Receptor		Ecological Designation	Predicted Annual Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER1	Wormwood Scrubs	LNR/SINC	0.04	39.28	0.1	131
ER2	Wormwood Scrubs	LNR/SINC	0.05	40.72	0.2	136
ER3	Richmond Park	SAC	<0.01	26.77	<0.1	89
ER4	Wimbledon Common	SAC	<0.01	33.49	<0.1	112
ER5	Wesley Playing Fields	SINC	3.85	48.37	13	161
ER6	Wesley Playing Fields	SINC	1.08	45.60	4	152
ER7	Wesley Playing Fields	SINC	1.04	45.56	3	152
ER8	Grand Union Canal	SINC	1.20	41.87	4	140
ER9	Grand Union Canal	SINC	0.93	47.60	3	159
ER10	Grand Union Canal	SINC	0.02	48.39	0.1	161
ER11	River Brent west of Stonebridge	SINC	0.01	48.38	<0.1	161
ER12	Abbey Road Mound and Bestway Park	SINC	0.02	48.39	0.1	161
ER13	St. Raphael's Open Space	SINC	0.02	41.98	0.1	140
ER14	The Canal Feeder	SINC	0.06	46.73	0.2	156
ER15	Shakespeare Road Open Space	SINC	0.05	46.72	0.2	156
ER16	The Old Orchard	SINC	0.03	44.33	0.1	148
ER17	Brentfield Open Space	SINC	0.04	44.34	0.1	148
ER18	Brentfield Park	SINC	0.04	44.34	0.1	148

Receptor		Ecological Designation	Predicted Annual Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER19	Gibbons Recreation Ground	SINC	0.03	39.25	0.1	131
ER20	St Mary's Church Willesden	SINC	0.03	39.25	0.1	131
ER21	Roundwood Park and Willesden Cemeteries	SINC	0.06	39.28	0.2	131
ER22	Roundwood Park	SINC	0.05	37.53	0.2	125
ER23	St Mary's Cemetery	SINC	0.07	41.09	0.2	137
ER24	Kensal Green Cemetery	SINC	0.06	41.08	0.2	137
ER25	Little Wormwood Scrubs Recreation Ground	SINC	0.04	41.06	0.1	137
ER26	North Acton Cemetery	SINC	0.11	44.63	0.4	149

As indicated in **Error! Reference source not found.**, predicted annual mean NOx concentrations are above the relevant EQS at all but one (ER3) sensitive receptor locations. The exceedances at all receptor locations are due to the high background NOx concentration, which exceed the EQSs as a base condition.

The PC proportion of the EQS is less than 1% at both SAC receptor locations (ER3, ER4) and less than 100% at all LNR/SINC receptor locations. As such, impacts on annual mean NOx concentrations at these locations can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Oxides of Nitrogen – 24-Hour Mean

Predicted 24-hour mean NOx concentrations at sensitive ecological receptors are summarised in **Error! Reference source not found.**.

Table 47: Predicted 24-Hour Mean NOx Concentrations

Receptor		Ecological Designation	Predicted 24-Hour Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER1	Wormwood Scrubs	LNR/SINC	35.45	113.93	47	152
ER2	Wormwood Scrubs	LNR/SINC	26.79	108.13	36	144
ER3	Richmond Park	SAC	4.44	57.98	6	77
ER4	Wimbledon Common	SAC	3.06	70.04	4	93
ER5	Wesley Playing Fields	SINC	1,071.89	1,160.93	1429	1548
ER6	Wesley Playing Fields	SINC	553.28	642.32	738	856
ER7	Wesley Playing Fields	SINC	622.15	711.19	830	948
ER8	Grand Union Canal	SINC	239.05	320.39	319	427
ER9	Grand Union Canal	SINC	413.37	506.71	551	676
ER10	Grand Union Canal	SINC	26.13	122.87	35	164
ER11	River Brent west of Stonebridge	SINC	18.17	114.91	24	153

Receptor		Ecological Designation	Predicted 24-Hour Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER12	Abbey Road Mound and Bestway Park	SINC	24.23	120.97	32	161
ER13	St. Raphael's Open Space	SINC	13.63	97.55	18	130
ER14	The Canal Feeder	SINC	47.26	140.60	63	187
ER15	Shakespeare Road Open Space	SINC	41.29	134.63	55	180
ER16	The Old Orchard	SINC	16.17	104.77	22	140
ER17	Brentfield Open Space	SINC	17.14	105.74	23	141
ER18	Brentfield Park	SINC	16.94	105.54	23	141
ER19	Gibbons Recreation Ground	SINC	13.06	91.50	17	122
ER20	St Mary's Church Willesden	SINC	13.70	92.14	18	123
ER21	Roundwood Park and Willesden Cemeteries	SINC	19.22	97.66	26	130
ER22	Roundwood Park	SINC	20.63	95.59	28	127
ER23	St Mary's Cemetery	SINC	29.64	111.68	40	149
ER24	Kensal Green Cemetery	SINC	24.44	106.48	33	142
ER25	Little Wormwood Scrubs Recreation Ground	SINC	21.26	103.30	28	138
ER26	North Acton Cemetery	SINC	73.99	163.03	99	217

As indicated in **Error! Reference source not found.**, predicted 24-hour mean NOx concentrations are above the relevant EQS at 24 sensitive receptor locations. Some of these exceedances can be attributed to the high background NOx concentration, which exceed the EQSs as a base condition.

The PC proportion of the EQS is less than 10% at both SAC receptor locations (ER3, ER4) and less than 100% at 19 (out of 24) LNR/SINC receptor locations. As such, impacts on 24-hour mean NOx concentrations at these locations can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

At the remaining 5 LNR/SINC receptor locations (ER5-ER9), the PC proportion of the EQS is above 100%. As such, impacts on 24-hour mean NOx concentrations cannot be screened as insignificant in accordance with the EA screening criteria.

It is important to note that the results are considered to be overestimations. This is because the generators have been grouped together (based on the reasons provided within Sections 3.2 and 3.3) for modelling purposes. In reality, only 1 generator will be operational at a time. In addition, process conditions and emissions for some of the generators have been based on operation at 100% load (further details are provided within Sections 3.4 and 3.5).

Finally, the model has been ran for the full calendar year (8,760 hours) for the assessment of short-term impacts. Scenario 1 has an operational envelope of 156 hours and as such, predicted concentrations are significant overestimations of actual concentrations.

Nitrogen Deposition

Predicted annual mean nitrogen deposition rates are summarised in **Error! Reference source not found.**.

Table 48: Predicted Annual Mean Nitrogen Deposition Rates

Receptor		Ecological Designation	Predicted Annual Mean Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
					Low EQS		High EQS	
			PC	PEC	PC	PEC	PC	PEC
ER1	Wormwood Scrubs	LNR/SINC	0.01	36.83	0.1	368	0.1	184
ER2	Wormwood Scrubs	LNR/SINC	0.01	36.83	0.1	368	0.1	184
ER3	Richmond Park	SAC	<0.01	30.24	<0.1	302	<0.1	151
ER4	Wimbledon Common	SAC	<0.01	30.24	<0.1	302	<0.1	151
ER5	Wesley Playing Fields	SINC	0.55	20.99	4	140	2	84
ER6	Wesley Playing Fields	SINC	0.16	20.60	1	137	0.6	82
ER7	Wesley Playing Fields	SINC	0.15	20.59	1	137	0.6	82
ER8	Grand Union Canal	SINC	0.35	37.17	3	372	2	186
ER9	Grand Union Canal	SINC	0.27	37.09	3	371	1	185
ER10	Grand Union Canal	SINC	0.01	34.45	0.1	344	<0.1	172
ER11	River Brent west of Stonebridge	SINC	<0.01	34.44	<0.1	344	<0.1	172
ER12	Abbey Road Mound and Bestway Park	SINC	0.01	34.45	0.1	344	<0.1	172
ER13	St. Raphael's Open Space	SINC	0.00	18.90	<0.1	126	<0.1	76
ER14	The Canal Feeder	SINC	0.02	36.84	0.2	368	0.1	184
ER15	Shakespeare Road Open Space	SINC	0.01	36.83	0.1	368	<0.1	184
ER16	The Old Orchard	SINC	<0.01	20.44	<0.1	136	<0.1	82
ER17	Brentfield Open Space	SINC	0.01	20.45	<0.1	136	<0.1	82
ER18	Brentfield Park	SINC	0.01	20.45	<0.1	136	<0.1	82
ER19	Gibbons Recreation Ground	SINC	<0.01	20.44	<0.1	136	<0.1	82

Receptor		Ecological Designation	Predicted Annual Mean Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
					Low EQS		High EQS	
			PC	PEC	PC	PEC	PC	PEC
ER20	St Mary's Church Willesden	SINC	<0.01	20.44	<0.1	136	<0.1	82
ER21	Roundwood Park and Willesden Cemeteries	SINC	0.01	20.45	0.1	136	<0.1	82
ER22	Roundwood Park	SINC	0.01	20.45	0.1	136	<0.1	82
ER23	St Mary's Cemetery	SINC	0.01	20.45	0.1	136	<0.1	82
ER24	Kensal Green Cemetery	SINC	0.01	20.45	0.1	136	<0.1	82
ER25	Little Wormwood Scrubs Recreation Ground	SINC	0.01	20.45	<0.1	136	<0.1	82
ER26	North Acton Cemetery	SINC	0.02	20.46	0.1	136	0.1	82

As indicated in **Error! Reference source not found.**, predicted annual mean nitrogen deposition rates are above the relevant Low EQS at all receptor locations. In addition, predicted annual mean nitrogen deposition rates are above the relevant High EQS at 11 receptor locations. The exceedances are due to the high background deposition rates, which exceed the EQSs as a base condition.

The PC proportion of the Low and High EQSs is less than 1% at both SAC receptor locations (ER3, ER4) and less than 100% at all LNR/SINC receptor locations. As such, impacts on annual mean nitrogen deposition rates at these locations can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

Acid Deposition

Predicted annual mean nitrogen deposition rates are summarised in **Error! Reference source not found.**.

Table 49: Predicted Annual Mean Acid Deposition Rates

Receptor		Ecological Designation	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)	Proportion of EQS (%)		Exceedance of CL Function (keq/ha/yr)
				PC	PEC	
ER1	Wormwood Scrubs	LNR/SINC	<0.01	<0.1	164	No Exceedance
ER2	Wormwood Scrubs	LNR/SINC	<0.01	0.1	262	No Exceedance
ER3	Richmond Park	SAC	<0.01	<0.1	36	No Exceedance
ER4	Wimbledon Common	SAC	<0.01	<0.1	49	No Exceedance

Receptor		Ecological Designation	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)	Proportion of EQS (%)		Exceedance of CL Function (keq/ha/yr)
				PC	PEC	
ER5	Wesley Playing Fields	SINC	0.04	2.3	100	No Exceedance
ER6	Wesley Playing Fields	SINC	0.01	0.7	98	No Exceedance
ER7	Wesley Playing Fields	SINC	0.01	0.2	25	No Exceedance
ER8	Grand Union Canal	SINC	0.02	0.5	59	No Exceedance
ER9	Grand Union Canal	SINC	0.02	0.3	44	No Exceedance
ER10	Grand Union Canal	SINC	<0.01	<0.1	158	No Exceedance
ER11	River Brent west of Stonebridge	SINC	<0.01	<0.1	158	No Exceedance
ER12	Abbey Road Mound and Bestway Park	SINC	<0.01	<0.1	40	No Exceedance
ER13	St. Raphael's Open Space	SINC	<0.01	<0.1	111	No Exceedance
ER14	The Canal Feeder	SINC	<0.01	<0.1	43	No Exceedance
ER15	Shakespeare Road Open Space	SINC	<0.01	<0.1	169	No Exceedance
ER16	The Old Orchard	SINC	<0.01	<0.1	97	No Exceedance
ER17	Brentfield Open Space	SINC	<0.01	<0.1	97	No Exceedance
ER18	Brentfield Park	SINC	<0.01	<0.1	97	No Exceedance
ER19	Gibbons Recreation Ground	SINC	<0.01	<0.1	150	No Exceedance
ER20	St Mary's Church Willesden	SINC	<0.01	<0.1	25	No Exceedance
ER21	Roundwood Park and Willesden Cemeteries	SINC	<0.01	<0.1	53	No Exceedance
ER22	Roundwood Park	SINC	<0.01	<0.1	54	No Exceedance
ER23	St Mary's Cemetery	SINC	<0.01	<0.1	54	No Exceedance
ER24	Kensal Green Cemetery	SINC	<0.01	<0.1	55	No Exceedance
ER25	Little Wormwood Scrubs Recreation Ground	SINC	<0.01	<0.1	55	No Exceedance
ER26	North Acton Cemetery	SINC	<0.01	<0.1	56	No Exceedance

As indicated in **Error! Reference source not found.**, predicted annual mean acid deposition rates are above the relevant EQS's at 8 receptor locations. The exceedances at these receptor locations are due to the high background deposition rates, which exceed the EQSs as a base condition.

The PC proportion of the Low and High EQSs is less than 1% at both SAC receptor locations (ER3, ER4) and less than 100% at all LNR/SINC receptor locations. As such, impacts on annual mean acid deposition rates at these locations can be screened out as insignificant in accordance with the initial stage of the EA screening criteria.

In addition, the APIS site relevant critical load tool indicated that no receptors exceeded the CL function for acid deposition.

6.1.1. SCENARIO 2

Scenario 2 modelling results for each pollutant considered are outlined in the following Sections.

Oxides of Nitrogen – Annual Mean

Predicted annual mean NOx concentrations at sensitive ecological receptors are summarised in **Error! Reference source not found.**.

Table 50: Predicted Annual Mean NOx Concentrations

Receptor		Ecological Designation	Predicted Annual Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER1	Wormwood Scrubs	LNR/SINC	0.04	39.28	0.1	131
ER2	Wormwood Scrubs	LNR/SINC	0.05	40.72	0.2	136
ER3	Richmond Park	SAC	<0.01	26.77	<0.1	89
ER4	Wimbledon Common	SAC	<0.01	33.49	<0.1	112
ER5	Wesley Playing Fields	SINC	3.46	47.98	12	160
ER6	Wesley Playing Fields	SINC	1.02	45.54	3	152
ER7	Wesley Playing Fields	SINC	1.04	45.56	3	152
ER8	Grand Union Canal	SINC	1.26	41.93	4	140
ER9	Grand Union Canal	SINC	0.95	47.62	3	159
ER10	Grand Union Canal	SINC	0.02	48.39	0.1	161
ER11	River Brent west of Stonebridge	SINC	0.01	48.38	<0.1	161
ER12	Abbey Road Mound and Bestway Park	SINC	0.02	48.39	0.1	161
ER13	St. Raphael's Open Space	SINC	0.02	41.98	0.1	140
ER14	The Canal Feeder	SINC	0.07	46.74	0.2	156
ER15	Shakespeare Road Open Space	SINC	0.05	46.72	0.2	156
ER16	The Old Orchard	SINC	0.04	44.34	0.1	148
ER17	Brentfield Open Space	SINC	0.04	44.34	0.1	148
ER18	Brentfield Park	SINC	0.04	44.34	0.1	148
ER19	Gibbons Recreation Ground	SINC	0.03	39.25	0.1	131
ER20	St Mary's Church Willesden	SINC	0.03	39.25	0.1	131
ER21	Roundwood Park and Willesden Cemeteries	SINC	0.06	39.28	0.2	131
ER22	Roundwood Park	SINC	0.06	37.54	0.2	125
ER23	St Mary's Cemetery	SINC	0.08	41.10	0.3	137
ER24	Kensal Green Cemetery	SINC	0.06	41.08	0.2	137

Receptor		Ecological Designation	Predicted Annual Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER25	Little Wormwood Scrubs Recreation Ground	SINC	0.04	41.06	0.1	137
ER26	North Acton Cemetery	SINC	0.12	44.64	0.4	149

As indicated in **Error! Reference source not found.**, predicted annual mean NOx concentrations are above the relevant EQS at all but one (ER3) sensitive receptor locations. The exceedances at all receptor locations are due to the high background NOx concentration, which exceed the EQSs as a base condition.

The PC proportion of the EQS is less than 1% at both SAC receptor locations (ER3, ER4) and less than 100% at all LNR/SINC receptor locations. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Oxides of Nitrogen – 24-Hour Mean

Predicted 24-hour mean NOx concentrations at sensitive ecological receptors are summarised in **Error! Reference source not found.**.

Table 51: Predicted 24-Hour Mean NOx Concentrations

Receptor		Ecological Designation	Predicted 24-Hour Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER1	Wormwood Scrubs	LNR/SINC	80.11	158.59	107	211
ER2	Wormwood Scrubs	LNR/SINC	61.29	142.63	82	190
ER3	Richmond Park	SAC	10.34	63.88	14	85
ER4	Wimbledon Common	SAC	7.10	74.08	9	99
ER5	Wesley Playing Fields	SINC	2,190.40	2,279.44	2,921	3,039
ER6	Wesley Playing Fields	SINC	1,217.16	1,306.20	1,623	1,742
ER7	Wesley Playing Fields	SINC	1,363.14	1,452.18	1,818	1,936
ER8	Grand Union Canal	SINC	540.13	621.47	720	829
ER9	Grand Union Canal	SINC	922.37	1,015.71	1,230	1,354
ER10	Grand Union Canal	SINC	59.31	156.05	79	208
ER11	River Brent west of Stonebridge	SINC	41.12	137.86	55	184
ER12	Abbey Road Mound and Bestway Park	SINC	55.93	152.67	75	204
ER13	St. Raphael's Open Space	SINC	31.21	115.13	42	154
ER14	The Canal Feeder	SINC	104.75	198.09	140	264
ER15	Shakespeare Road Open Space	SINC	93.13	186.47	124	249
ER16	The Old Orchard	SINC	37.26	125.86	50	168

Receptor		Ecological Designation	Predicted 24-Hour Mean NOx Concentration (µg/m3)		Proportion of EQS (%)	
			PC	PEC	PC	PEC
ER17	Brentfield Open Space	SINC	39.41	128.01	53	171
ER18	Brentfield Park	SINC	38.96	127.56	52	170
ER19	Gibbons Recreation Ground	SINC	29.97	108.41	40	145
ER20	St Mary's Church Willesden	SINC	31.46	109.90	42	147
ER21	Roundwood Park and Willesden Cemeteries	SINC	44.17	122.61	59	163
ER22	Roundwood Park	SINC	47.36	122.32	63	163
ER23	St Mary's Cemetery	SINC	67.52	149.56	90	199
ER24	Kensal Green Cemetery	SINC	55.88	137.92	75	184
ER25	Little Wormwood Scrubs Recreation Ground	SINC	49.02	131.06	65	175
ER26	North Acton Cemetery	SINC	170.98	260.02	228	347

As indicated in **Error! Reference source not found.**, predicted 24-hour mean NOx concentrations are above the relevant EQS at 24 sensitive receptor locations.

The PC proportion of the EQS is less than 10% at 1 SAC receptor locations (ER4) and less than 100% at 15 (out of 24) LNR/SINC receptor locations. At the remaining 1 SAC (ER3) and the 9 LNR/SINC receptor locations (ER1, ER5-ER9, ER14, ER15, ER26), the PC proportion of the EQS are above 1% and 100%. respectively.

It is important to note that the model has been ran for the full calendar year (8,760 hours) for the assessment of short-term impacts. Scenario 2 has an operational envelope of 72 hours and as such, predicted concentrations are significant overestimations.
Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Nitrogen Deposition

Predicted annual mean nitrogen deposition rates are summarised in **Error! Reference source not found.**.

Table 52: Predicted Annual Mean Nitrogen Deposition Rates

Receptor		Ecological Designation	Predicted Annual Mean Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
					Low EQS		High EQS	
			PC	PEC	PC	PEC	PC	PEC
ER1	Wormwood Scrubs	LNR/SINC	0.01	36.83	0.1	368	0.1	184
ER2	Wormwood Scrubs	LNR/SINC	0.01	36.83	0.1	368	0.1	184
ER3	Richmond Park	SAC	<0.01	30.24	<0.1	302	<0.1	151

Receptor		Ecological Designation	Predicted Annual Mean Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
					Low EQS		High EQS	
			PC	PEC	PC	PEC	PC	PEC
ER4	Wimbledon Common	SAC	<0.01	30.24	<0.1	302	<0.1	151
ER5	Wesley Playing Fields	SINC	0.50	20.94	3	140	2	84
ER6	Wesley Playing Fields	SINC	0.15	20.59	1	137	0.6	82
ER7	Wesley Playing Fields	SINC	0.15	20.59	1	137	0.6	82
ER8	Grand Union Canal	SINC	0.36	37.18	4	372	2	186
ER9	Grand Union Canal	SINC	0.27	37.09	3	371	1	185
ER10	Grand Union Canal	SINC	0.01	34.45	0.1	344	<0.1	172
ER11	River Brent west of Stonebridge	SINC	<0.01	34.44	<0.1	344	<0.1	172
ER12	Abbey Road Mound and Bestway Park	SINC	0.01	34.45	0.1	344	<0.1	172
ER13	St. Raphael's Open Space	SINC	<0.01	18.90	<0.1	126	<0.1	76
ER14	The Canal Feeder	SINC	0.02	36.84	0.2	368	0.1	184
ER15	Shakespeare Road Open Space	SINC	0.01	36.83	0.1	368	<0.1	184
ER16	The Old Orchard	SINC	0.01	20.45	<0.1	136	<0.1	82
ER17	Brentfield Open Space	SINC	0.01	20.45	<0.1	136	<0.1	82
ER18	Brentfield Park	SINC	0.01	20.45	<0.1	136	<0.1	82
ER19	Gibbons Recreation Ground	SINC	<0.01	20.44	<0.1	136	<0.1	82
ER20	St Mary's Church Willesden	SINC	<0.01	20.44	<0.1	136	<0.1	82
ER21	Roundwood Park and Willesden Cemeteries	SINC	0.01	20.45	0.1	136	<0.1	82
ER22	Roundwood Park	SINC	0.01	20.45	0.1	136	<0.1	82
ER23	St Mary's Cemetery	SINC	0.01	20.45	0.1	136	<0.1	82
ER24	Kensal Green Cemetery	SINC	0.01	20.45	0.1	136	<0.1	82

Receptor		Ecological Designation	Predicted Annual Mean Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
					Low EQS		High EQS	
			PC	PEC	PC	PEC	PC	PEC
ER25	Little Wormwood Scrubs Recreation Ground	SINC	0.01	20.45	<0.1	136	<0.1	82
ER26	North Acton Cemetery	SINC	0.02	20.46	0.1	136	0.1	82

As indicated in **Error! Reference source not found.**, predicted annual mean nitrogen deposition rates are above the relevant Low EQS at all receptor locations. In addition, predicted annual mean nitrogen deposition rates are above the relevant High EQS at 11 receptor locations. The exceedances are due to the high background deposition rates, which exceed the EQSs as a base condition.

The PC proportion of the Low and High EQSs is less than 1% at both SAC receptor locations (ER3, ER4) and less than 100% at all LNR/SINC receptor locations. Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

Acid Deposition

Predicted annual mean nitrogen deposition rates are summarised in **Error! Reference source not found.**.

Table 53: Predicted Annual Mean Acid Deposition Rates

Receptor		Ecological Designation	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)	Proportion of EQS (%)		Exceedance of CL Function (keq/ha/yr)
				PC	PEC	
ER1	Wormwood Scrubs	LNR/SINC	<0.01	<0.1	164	No Exceedance
ER2	Wormwood Scrubs	LNR/SINC	<0.01	0.1	262	No Exceedance
ER3	Richmond Park	SAC	<0.01	<0.1	36	No Exceedance
ER4	Wimbledon Common	SAC	<0.01	<0.1	49	No Exceedance
ER5	Wesley Playing Fields	SINC	0.04	2.1	99	No Exceedance
ER6	Wesley Playing Fields	SINC	0.01	0.6	98	No Exceedance
ER7	Wesley Playing Fields	SINC	0.01	0.2	25	No Exceedance
ER8	Grand Union Canal	SINC	0.03	0.5	59	No Exceedance
ER9	Grand Union Canal	SINC	0.02	0.3	44	No Exceedance
ER10	Grand Union Canal	SINC	<0.01	<0.1	158	No Exceedance

Receptor		Ecological Designation	Predicted Annual Mean Acid Deposition Rate (keq/ha/yr)	Proportion of EQS (%)		Exceedance of CL Function (keq/ha/yr)
				PC	PEC	
ER11	River Brent west of Stonebridge	SINC	<0.01	<0.1	158	No Exceedance
ER12	Abbey Road Mound and Bestway Park	SINC	<0.01	<0.1	40	No Exceedance
ER13	St. Raphael's Open Space	SINC	<0.01	<0.1	111	No Exceedance
ER14	The Canal Feeder	SINC	<0.01	<0.1	43	No Exceedance
ER15	Shakespeare Road Open Space	SINC	<0.01	<0.1	169	No Exceedance
ER16	The Old Orchard	SINC	<0.01	<0.1	97	No Exceedance
ER17	Brentfield Open Space	SINC	<0.01	<0.1	97	No Exceedance
ER18	Brentfield Park	SINC	<0.01	<0.1	97	No Exceedance
ER19	Gibbons Recreation Ground	SINC	<0.01	<0.1	150	No Exceedance
ER20	St Mary's Church Willesden	SINC	<0.01	<0.1	25	No Exceedance
ER21	Roundwood Park and Willesden Cemeteries	SINC	<0.01	<0.1	53	No Exceedance
ER22	Roundwood Park	SINC	<0.01	<0.1	54	No Exceedance
ER23	St Mary's Cemetery	SINC	<0.01	<0.1	54	No Exceedance
ER24	Kensal Green Cemetery	SINC	<0.01	<0.1	55	No Exceedance
ER25	Little Wormwood Scrubs Recreation Ground	SINC	<0.01	<0.1	55	No Exceedance
ER26	North Acton Cemetery	SINC	<0.01	<0.1	56	No Exceedance

As indicated in **Error! Reference source not found.**, predicted annual mean acid deposition rates are above the relevant EQS's at 7 receptor locations. The exceedances at these receptor locations are due to the high background deposition rates, which exceed the EQSs as a base condition.

The PC proportion of the Low and High EQSs is less than 1% at both SAC receptor locations (ER3, ER4) and less than 100% at all LNR/SINC receptor locations. In addition, the APIS site relevant critical load tool indicated that no receptors exceeded the CL function for acid deposition.

Scenario 2 is representative of a power outage (1 in every 10 years) and only the generators required to meet the electrical load will operate for a maximum of 72 hours. Therefore, the modelling results indicated above cannot determine the significance of impacts of the Proposed Development.

APPENDIX E – ASSESSORS CV

Lewis Ellison

Technical Director

MOcean, AMIEnvSc, MIAQM

KEY EXPERIENCE

Lewis is a Technical Director with specialist experience in the air quality sectors. His key capabilities include:

- Production of Air Quality Assessments to the Department for Environment, Food and Rural Affairs (DEFRA), Environment Agency and Environmental Protection UK (EPUK) methodologies for clients from the residential, retail and commercial sectors.
- Detailed dispersion modelling of road vehicle emissions using ADMS-Roads. Studies have included impact assessment of pollutant concentrations at various floor levels and assessment of suitability of development sites for proposed end-use.
- Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- Assessment of Odour Impact from commercial and industrial processes in line with Environment Agency (EA) and IAQM methodologies and guidance
- Quantification of Ecological Impacts associated with Nitrogen and Acid Deposition from industrial processes
- Production of air quality mitigation strategies for developments throughout the UK.

SELECT PROJECTS SUMMARY

Permit Application Support

- Elliot Hire Salford
- Elliot Hire Wakefield
- Elliot Hire Scunthorpe

ES Chapters

- Lyle Park West, Newham – residential development in close proximity to an active industrial estate.
- Deansgate, Manchester – residential multistorey development in the centre of Manchester.
- Land West of Stevenage – 1350 residential unit development with the potential to negatively impact local air quality

Air Quality

- Goulton Street Hull – Outline planning permission for 7 industrial units within Hull
- Empire Cinema, Birmingham – Diffusion tube survey and air quality assessment for an assisted living accommodation
- Tirrell's Lane, Tenbury Wells – residential assessment in the village of Tenbury Wells.

Odour Assessments

- Gowanbank, Forfar – Odour survey to support a residential development in close proximity to Gowanbank recycling centre
- Squires Close, Pocklington – Odour risk assessment in support of a residential in close proximity to a sewage treatment works
- Hawthorn Fields, Rufforth - Odour risk assessment in support of a residential in close proximity to a waste water treatment works

Dust Assessment

- Liverpool Docks – Construction dust monitoring survey
- Lyle Park West – Dust impact assessment from adjacent concrete batching plant
- High Street, Burton – Construction dust risk assessment

London Experience

- Gurnell Leisure Centre – mixed use development including residential, sports and commercial land use
- Springfield Village Wandsworth – residential development and extension to the existing hospital building
- Evelyn House, Greenwich – residential apartment block

Monitoring & Surveying Experience

- Liverpool Waters – Frisbee Dust gauge monitoring
- Gownbank, Forfar – Field odour survey "sniff test"
- Empire Cinema Birmingham – Diffusion tube survey

QUALIFICATIONS

- Masters of Geological Oceanography
- Odour Acuity Certified Master of Science