Air Quality Assessment

Ridgeway Distribution Centre, Iver

Client: Amazon Data Services UK Limited

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Executive Summary

Redmore Environmental Ltd was commissioned by Amazon Data Services UK Limited to undertake an Air Quality Assessment in relation to a proposed emergency back-up power generation facility at Ridgeway Data Centre, Iver.

Atmospheric emissions from diesel-fired/ Hydrotreated Vegetable Oil (HVO) standby generators at the site have the potential to cause air quality impacts at sensitive locations. As such, an Air Quality Assessment was undertaken in order to quantify potential effects during the following Events:

- Event 1 - Biweekly service test;
- Event 2 - Biannual service test;
- Event 3 - Maintenance test; and,
- Event 4 - Emergency Blackout Event.

Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the relevant sources. The results indicated that impacts were not predicted to be significant during any of the four Events.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Amazon Data Services UK Limited to undertake an Air Quality Assessment in relation to a proposed emergency back-up power generation facility at Ridgeway Data Centre, Iver.

1.1.2 Atmospheric emissions from standby generators at the site have the potential to cause air quality impacts at sensitive locations. As such, an Air Quality Assessment was undertaken in order to quantify potential effects during different operating scenarios.

1.2 Site Location and Context

1.2.1 The proposed scheme is located at Ridgeway Distribution Centre, The Ridgeway, Iver, at National Grid Reference (NGR): 503477, 180470. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposed installation is part of a wider data centre development. This Environmental Permit Application is for the operation of the emergency back-up generators and associated fuel storage only.

1.2.3 Due to the need to ensure availability of uninterrupted power supply at all times, the data centre will incorporate 26 main standby generators and one smaller generator to supply office buildings in the event of mains power outage.

1.2.4 Reference should be made to Figure 2 for a site layout plan.

1.2.5 Operation of the generators has the potential to cause air quality impacts at existing sensitive receptor locations in the vicinity of the site. As such, an Air Quality Assessment has been undertaken. This is provided in the following report.

1.3 Report Amendments

1.3.1 Following submission of the Air Quality Assessment in support of the Environmental Permit Application for the installation, a number of comments were provided by the Environment

Agency (EA). A summary of each comment and the Section of the report where it has been addressed is provided in Table 1.

Table 1 EA Comments

ID	Comment	Response
1	Stack emission parameters: - Actual volumetric flow rate (Am^3/s) - Normalised volumetric flow rate (Nm^3/s) - Actual and reference moisture and oxygen content (%) - Emission concentration (mg/m^3) used to calculate emission rates for NO_x, PM_{10}, $PM_{2.5}$ and SO_2 *Reason: We require these emission parameters and source terms in order to independently verify the emission rates provided*	**Actual volumetric flow rate** - 11.20Am3/s **Normalised volumetric flow rate** - 3.970Nm^3s **Actual and reference moisture content** - not provided as emission concentration calculated based on engine rating of generators **Engine rating** - 3,090kW **Emission rates**: - Oxides of nitrogen (NO_x) - 6,460mg/kWh - Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}) - 30mg/kWh - Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$) - 30mg/kWh - Sulphur dioxide (SO_2) - 4mg/kWh
2	Results shown as the numerical process contributions (PCs) and the PC as the percentage of the relevant environmental standard *Reason: this assists independent verification of the screening and significance conclusions and is consistent with the expectations set out in the 'Environmental Permitting: Air Dispersion Modelling Reports*[1]	Results provided in Section 5.0
3	Clarification of short-term NO_2 assessment methodology for scenarios 1 and 2 *Reason: the Air Quality Assessment references both the 83.68th percentile (%ile and 80.54th %ile in different sections of the report. Confirmation of which %ile is used and that it demonstrates there would not be more than 18 exceedences of the short term NO_2 environmental standard is needed*	The assessment was undertaken utilising the 83.68th percentile (%ile)

1 https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports#explain-emission-parameters.

ID	Comment	Response
4	Maximum NO_2 and NO concentrations for acute exposure assessment (100th %ile 10-minute NO_2 PCs, 1-hour NO_2 PCs and 1-hour NO PCs) *Reason: The EA guidance states that AEGL assessment should be based on 100th %ile concentrations. The basis of the results presented in the report is currently unclear and it is not possible to determine whether the correct concentrations have been used for the acute exposure assessment*	Provided within Table 21
5	Clarification as to whether benzene was assessed or not *Reason: benzene is initially included, and background concentrations are presented, however no benzene results are reported*	Benzene (C_6H_6) was considered but not modelled separately. Formaldehyde (CH_2O) was assessed as the representative Volatile Organic Compound (VOC) as it is formed extensively as an intermediate product of incomplete fuel oxidation, particularly during low-load, start-up and other relatively low-temperature operating conditions, resulting in higher expected exhaust concentrations during routine testing programmes
6	Daily NO_x PCs at ecological receptors for scenario 1 (testing) should be included. You can refer to the data centre guidance for details on how 24-hour PCs can be post-processed (section 6). Statistical analysis should not be applied to the assessment of the 24-hour NO_x critical level. Where exceedences of the 75µg/m^3 critical level are predicted, assessment against the alternative 200µg/m^3 critical level may be undertaken in accordance with the EA guidance[2] *Reason: We cannot accept the statistical analysis for daily NO_x assessments because there are no permitted exceedences of the daily ecological critical level*	Provided within Section 5.2
7	Confirmation of the number of hours used to assess the emergency scenarios *Reason: In section 2.6 of the Non-Technical Summary, 60 'electrical grid outage' operational hours are referenced, whereas in the Air Quality Assessment 72 hours are used in the emergency scenario*	It is confirmed that the emergency scenario considered 72-hour operation

2 https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports#explain-emission-parameters.

Redmore environmental

ID	Comment	Response
8	Annual and maximum 1-hour NO PCs *Please refer to Table 1 in the EA guidance for the list of pollutants and averaging periods assessed for Data Centres*	Annual mean nitric oxide (NO) PCs provided within Table 32 Maximum 1-hour mean NO PCs provided within Table 21
9	Information on the commission phases of the plant *Reason: A description of the commissioning test will allow us to determine if the risks have been captured by the test modelling*	Details of the commission phases of the plant, including a description of the test, will be provided by the Applicant under a pre-operational condition of the Environmental Permit
10	PCs at the following local wildlife sites (LWS) within 2km of the proposed installation: - Beeches LWS - Lower Colne LWS - Little Britain LWS - London's Canals LWS	Receptors E18 to E26 have been included within the assessment to represent the Beeches, Lower Colne and Little Britain LWSs. The London's Canals LWS are represented by receptors E8 to E11. PCs for all receptors are provided in Table 24, Table 36 and Table 37 Due to the increase in assessment area, the terrain file associated with the dispersion modelling has also been updated. As such, there may be some minor changes to predicted concentrations when compared to the previously submitted Air Quality Assessment. This has not affected the report conclusions
11	As stated in the Environmental Permitting guidance[3], contour plots must be provided for any PCs above the insignificant criteria	Contour plots have been provided for the relevant pollutants and averaging periods. Reference should be made to Figures 8 to 14
12	Updated modelling files and an updated Air Quality Assessment should be submitted once these comments have been addressed	The following report provides an updated Air Quality Assessment. Modelling files have been provided accordingly

3 https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports#explain-emission-parameters.

2.0 LEGISLATION AND POLICY

2.1 Legislation

2.1.1 The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- NO_2;
- SO_2;
- Lead;
- PM_{10};
- $PM_{2.5}$;
- C_6H_6; and,
- Carbon monoxide (CO).

2.1.2 Air Quality Target Values were also provided for several additional pollutants. It should be noted that the AQLV for $PM_{2.5}$ stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28th April 2023[4]. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 The Environmental Improvement Plan 2025[5] was published in December 2025, providing long term and Interim Targets in order to reduce population exposure to $PM_{2.5}$. The concentration target for 2040 was adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

[4] The AQS: Framework for Local Authority Delivery, DEFRA, 2023.

[5] Environmental Improvement Plan 2025, DEFRA, 2025.

2.1.5 Table 2 presents the AQOs and Interim Target for pollutants considered within this assessment.

Table 2 Air Quality Objectives/ Interim Target

Pollutant	Air Quality Objective/Interim Target	
	Concentration (μg/m³)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
$PM_{2.5}$	10[(a)]	Annual mean
	10[(b)]	Annual mean
SO_2	125	24-hour mean; not to be exceeded more than 3 times per annum
	350	1-hour mean; not to be exceeded more than 24 times per annum
	266	15-minute mean; not to be exceeded more than 35 times per annum
CO	10,000	8-hour running mean

Note: (a) Interim Target to be achieved by 2030.
(b) Concentration Target to be achieved by 2040.

2.2 Local Air Quality Management

2.2.1 Local Authorities are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure are likely to be exceeded, the Local Authority is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Industrial Pollution Control Legislation

2.3.1 Atmospheric emissions from industry are controlled in England through the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. The operations undertaken at the site are included within the Regulations and as such the facility is required to operate in accordance with an Environmental Permit issued by the Environment Agency (EA). Compliance with any conditions of the permit must be demonstrated through periodic monitoring requirements, which have been set in order to limit potential impacts in the surrounding area.

2.4 Environmental Assessment Levels

2.4.1 An Environmental Assessment Level (EAL) is the concentration of a substance, which, in a particular environmental medium, the regulators regard as an appropriate value to enable a comparison between the environmental effects of different substances in that medium and between environmental effects in different media, enabling the summation of those effects.

2.4.2 Ideally EALs to fulfil this objective would be defined for each pollutant:

- Based on the sensitivity of particular habitats or receptors (in particular three main types of receptor should be considered, protection of human health, protection of natural ecosystems and protection of specific sensitive receptors, e.g. materials, commercial activities requiring a particular environmental quality);
- Be produced according to a standardised protocol to ensure that they are consistent, reproducible and readily understood;
- Provide similar measure of protection for different receptors both within and between media; and,
- Take account of habitat specific environmental factors such as pH, nutrient status, bioaccumulation, transfer and transformation processes where necessary.

2.4.3 EALs used in this assessment were obtained from EA guidance[6] and are summarised in Table 3.

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

Table 3 Environmental Assessment Levels

Pollutant	Environmental Assessment Level	
	Concentration (μg/m^3)	Averaging Period
CH_2O	5	Annual mean
	100	1-hour mean
NO	310	Annual mean
	4,400	1-hour mean

2.5 Acute Exposure Guideline Levels

2.5.1 The United States Environmental Protection Agency (US EPA) has developed Acute Exposure Guideline Levels (AEGLs) which are used by emergency planners and responders worldwide as guidance in dealing with rare, usually accidental, releases of chemicals into the air. AEGLs are expressed as specific concentrations of airborne pollutants at which health effects may occur. They are designed to protect the elderly and children, and other individuals who may be susceptible and are sensitive to atmospheric pollution.

2.5.2 AEGLs are calculated for five short exposure periods with 'levels' ranging from 1 to 3 based on the severity of the toxic effects caused by the exposure. These are described as follows:

- Level 1: Notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure;
- Level 2: Irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape; and,
- Level 3: Life-threatening health effects or death.

2.5.3 The relevant AEGLs are summarised in Table 4.

Table 4 Acute Exposure Guideline Levels

Pollutant	Acute Exposure Guideline Level (ppm)					
	Level	Averaging Period				
		10-minutes	30-minutes	60-minutes	4-hours	8-hours
NO_2	1	0.5	0.5	0.5	0.5	0.5
	2	20.0	15.0	12.0	8.2	6.7
	3	34.0	25.0	20.0	14.0	11.0
SO_2	1	0.2	0.2	0.2	0.2	0.2
	2	0.75	0.75	0.75	0.75	0.75
	3	30.0	30.0	30.0	30.0	30.0
CO	1	N/A	N/A	N/A	N/A	N/A
	2	420	150	83	33	27
	3	1,700	600	330	150	130
CH_2O	1	0.9	0.9	0.9	0.9	0.9
	2	14.0	14.0	14.0	14.0	14.0
	3	100	70.0	56.0	35.0	35.0

2.6 Critical Loads and Levels

2.6.1 A critical load is defined by the UK Air Pollution Information System (APIS)[7] 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."

2.6.2 A critical level is defined as:

[7] UK Air Pollution Information System, www.apis.ac.uk.

> "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."

2.6.3 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).

2.6.4 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 exceedence. A larger exceedence is often considered to represent a greater risk of damage.

2.6.5 Maps of critical loads and levels and their exceedences 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 exceedence may infer that less damage will occur.

2.6.6 Table 5 presents the critical levels for the protection of vegetation for pollutants considered within this assessment.

Table 5 Critical Levels for the Protection of Vegetation

Pollutant	Critical Level	
	Concentration (μg/m^3)	Averaging Period
NO_x	30	Annual mean
	75	24-hour mean
SO_2	10	Annual mean

2.6.7 Critical loads have been designated within the UK based on the sensitivity of the receiving habitat and have been identified for the relevant designations considered within the assessment in Section 3.5.

3.0 BASELINE

3.1 Introduction

3.1.1 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.

3.2 Local Air Quality Management

3.2.1 As required by the Environment Act (1995), as amended by the Environment Act (2021), Buckinghamshire Council (BC) has undertaken Review and Assessment of air quality. This process has indicated that annual mean concentrations of NO_2 are above the AQOs within their area of jurisdiction. As such, nine AQMAs have been declared. The closest to the site is South Bucks District Council AQMA No2 (Buckinghamshire) which has been designated due to exceedences of annual mean AQO for NO_2. This is described as follows:

"Iver Parish"

3.2.2 The facility is located within the AQMA. As such, there is the potential for air quality impacts within this sensitive area. This has been considered throughout the assessment.

3.2.3 BC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

3.3 Air Quality Monitoring

3.3.1 Monitoring of NO_2 concentrations is undertaken by BC throughout their area of jurisdiction. Recent NO_2 concentrations recorded in the vicinity of the site are shown in Table 6.

Table 6 Monitoring Results NO_2

Pollutant		Annual Mean NO_2 Concentration (μg/m^3)		
		2022	2023	2024
SB2	Victoria Cescent, Iver	18.6	15.9	14.4
SB21	47 Richings Way, Iver	26.5	23.5	22.9
SB22	29 Thorney Lane South, Iver	24.4	23.3	20.6
SB24	Langley Park Road, Iver	20.1	18.2	15.8
SB25	Bangors Road South, Iver	21.9	18.3	17.9
SB28, SB29	Swan Pub, High Street, Iver	28.0	25.5	22.5
SB30, SB31	Colne Cottage, 6 Thorney Lane North, Iver	31.2	27.4	23.6
SB32, SB33	Tower Arms, Thorney Lane South, Iver	26.9	25.9	24.3
SB38	Grand Union House, Iver	20.4	16.7	16.1
SB41	Iver Village Junior School, Iver	20.6	16.8	14.3
SB49	Costa Coffee, High Street, Iver[a]	27.8	23.7	23.3

Note: (a) Monitor commissioned in 2022.

3.3.2 As shown in Table 6, annual mean NO_2 concentrations were below the annual mean AQO of 40μg/m^3 at all locations in recent years. Reference should be made to Figure 3 for a map of the survey positions.

3.3.3 BC do not undertake monitoring of PM_{10} and $PM_{2.5}$ concentrations in the vicinity of the site.

3.4 Background Pollutant Concentrations

3.4.1 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 Local Authorities in their Review and Assessment of air quality. The site is located in grid square NGR: 503500, 180500. Data for this location was downloaded from the DEFRA website[8] for the purpose of the assessment and is summarised in Table 7.

8 http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.

Table 7 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (μg/m^3)
NO_2	16.10
NO	-[a]
SO_2	4.85
C_6H_6[b]	0.554
PM_{10}	12.89
$PM_{2.5}$	7.72
CO	438

NOTE: (a) Predictions not available from DEFRA.
(b) Used to represent background CH_2O concentrations in lieu of alternative data.

3.4.2 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ are predicted for 2024, C_6H_6 for 2010 and SO_2 and CO for 2001. These were the most recent predictions available at the time of assessment and are therefore considered to provide a reasonable representation of background concentrations in the vicinity of the site.

3.5 Sensitive Receptors

3.5.1 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.

Sensitive Human Receptors

3.5.2 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. These are summarised in Table 8. Receptor heights were included to represent sensitive locations at varying heights within existing developments.

Table 8 Sensitive Human Receptor Locations

Receptor		NGR (m)		Height (m)
		X	Y	
R1	Residential - Grange Way	503358.6	180685.0	1.5
R2	Residential - Barnes Way	503798.5	180790.7	1.5
R3 (1.5m)	Residential - Olympia House	503605.4	180656.3	1.5
R3 (8.5m)	Residential - Olympia House	503605.4	180656.3	8.5
R4 (1.5m)	Residential - Olympia House	503608.9	180608.1	1.5
R4 (8.5m)	Residential - Olympia House	503608.9	180608.1	8.5
R5 (1.5m)	Residential - D X House	503599.8	180596.6	1.5
R5 (8.5m)	Residential - D X House	503599.8	180596.6	8.5
R6 (1.5m)	Residential - D X House	503602.4	180553.6	1.5
R6 (8.5m)	Residential - D X House	503602.4	180553.6	8.5
R7 (1.5m)	Residential - D X House	503602.9	180548.4	1.5
R7 (8.5m)	Residential - D X House	503602.9	180548.4	8.5
R8 (1.5m)	Residential - D X House	503639.1	180550.2	1.5
R8 (8.5m)	Residential - D X House	503639.1	180550.2	8.5
R9	Business - 5k-9 working dogs	503946.1	180435.1	1.5
R10	Residential - Bathurst Walk	503646.8	179854.4	1.5
R11	Residential - Bathurst Walk	503342.9	179824.5	1.5
R12	Business - Thorney Business Park	503200.6	180132.4	1.5

3.5.3 Reference should be made to Figure 4 for a map of the sensitive human receptor locations.

Ecological Receptors

3.5.4 Atmospheric emissions from the facility have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. A desk-top study was therefore undertaken to identify the presence of Special Areas of Conservation (SAC)s, Special

Protection Areas (SPAs) and Ramsar sites, collectively 'habitat sites', within 10km of the facility, and Sites of Special Scientific Interest, LWSs, including BNSs, and national and local nature reserves within 2km of the facility. This indicated the following for inclusion in the assessment:

- Grand Union Canal, Slough Branch, BNS;
- Opposite Iver Station BNS;
- Grand Union Canal, near Iver North BNS;
- Beeches LWS;
- Lower Colne LWS;
- Little Britain LWS;
- South West London Waterbodies SPA;
- South West London Waterbodies Ramsar;
- Windsor Forest & Great Park SAC; and,
- Burnham Beeches SAC.

3.5.5 For the purpose of the modelling assessment discrete receptors were placed at the closest points of each designation to the facility to ensure the maximum potential impact was predicted. These are summarised in Table 9.

Table 9 Ecological Receptor Locations

Receptor		NGR (m)	
		X	Y
E1	Burnham Beeches SAC	495846.7	184743.2
E2	Windsor Forest and Great Park SAC	496884.4	174851.6
E3	South West London Waterbodies SPA and Ramsar	500249.3	175463.3
E4	South West London Waterbodies SPA and Ramsar	500860.6	174791.5
E5	South West London Waterbodies SPA and Ramsar	502701.0	175718.1
E6	South West London Waterbodies SPA and Ramsar	503805.9	174243.8
E7	South West London Waterbodies SPA and Ramsar	504754.8	174231.1
E8	Grand Union Canal, Slough Branch BNS	503243.4	180274.1
E9	Grand Union Canal, Slough Branch BNS	503402.0	180321.0

Receptor		NGR (m)	
		X	Y
E10	Grand Union Canal, Slough Branch BNS	503532.3	180361.1
E11	Grand Union Canal, Slough Branch BNS	503670.8	180399.9
E12	Opposite Iver Station BNS	503422.9	180291.9
E13	Opposite Iver Station BNS	503540.2	180328.0
E14	Opposite Iver Station BNS	503639.4	180257.7
E15	Opposite Iver Station BNS	503725.8	180204.3
E16	Opposite Iver Station BNS	503790.2	180250.0
E17	Grand Union Canal, near Iver North BNS	504442.1	180607.5
E18	Lower Colne LWS	504994.3	178999.3
E19	Lower Colne LWS	505227.5	179409.3
E20	Lower Colne LWS	505340.6	179720.3
E21	Little Britain LWS	504881.7	180320.1
E22	Little Britain LWS	504708.0	180951.0
E23	Little Britain LWS	504786.0	181865.5
E24	Beeches LWS	505296.1	180868.3
E25	Beeches LWS	505470.1	180560.2
E26	Beeches LWS	505299.8	179838.0

3.5.6 Reference should be made to Figures 4 and 5 for maps of the ecological receptors.

3.5.7 Critical loads have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the APIS[9] and MAGIC[10] websites, as well as the relevant site designations and publicly available information, was undertaken in order to identify the most suitable habitat description and associated critical load for the area of each designation considered within the assessment.

9 http://www.apis.ac.uk/.

10 Multi-Agency Geographic Information for the Countryside, www.magic.gov.uk.

3.5.8 The relevant nitrogen deposition critical loads are presented in Table 10.

Table 10 Critical Loads for Nitrogen Deposition

Receptor		Feature	APIS Habitat	Nitrogen Critical Load (kgN/ha/yr)	
				Low	High
E1	Burnham Beeches SAC	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	Fagus forest on non-acid and acid soils	10	15
E2	Windsor Forest and Great Park SAC	Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (Quercion robori-petraeae or Ilici-Fagenion)	Fagus forest on non-acid and acid soils	10	15
E3	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-
E4	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-
E5	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-
E6	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-
E7	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-
E8	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-
E9	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-
E10	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-
E11	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-

Receptor		Feature	APIS Habitat	Nitrogen Critical Load (kgN/ha/yr)	
				Low	High
E12	Opposite Iver Station BNS	Neutral grassland	Low and medium altitude hay meadows	10	20
E13	Opposite Iver Station BNS	Neutral grassland	Low and medium altitude hay meadows	10	20
E14	Opposite Iver Station BNS	Neutral grassland	Low and medium altitude hay meadows	10	20
E15	Opposite Iver Station BNS	Neutral grassland	Low and medium altitude hay meadows	10	20
E16	Opposite Iver Station BNS	Neutral grassland	Low and medium altitude hay meadows	10	20
E17	Grand Union Canal, near Iver North BNS	Standing open water and canals	-	-	-
E18	Lower Colne LWS	Rivers and Streams	-	-	-
E19	Lower Colne LWS	Rivers and Streams	-	-	-
E20	Lower Colne LWS	Rivers and Streams	-	-	-
E21	Little Britain LWS	Standing open water and canals	-	-	-
E22	Little Britain LWS	Standing open water and canals	-	-	-
E23	Little Britain LWS	Standing open water and canals	-	-	-
E24	Beeches LWS	Standing open water and canals	-	-	-
E25	Beeches LWS	Standing open water and canals	-	-	-
E26	Beeches LWS	Standing open water and canals	-	-	-

3.5.9 The site features were also reviewed to identify the habitat types most sensitive to acid deposition. These are summarised in Table 11.

Table 11 Critical Loads for Acid Deposition

Receptor		Feature	APIS Habitat	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E1	Burnham Beeches SAC	Rhinolophus hipposideros - Lesser horseshoe bat	Broadleaved, mixed and yew woodland	0.142	1.699	1.841
E2	Windsor Forest and Great Park SAC	Rhinolophus hipposideros - Lesser horseshoe bat	Broadleaved, mixed and yew woodland	0.142	0.759	0.901
E3	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-	-
E4	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-	-
E5	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-	-
E6	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-	-
E7	South West London Waterbodies SPA and Ramsar	Anas clypeata (North-western/Central Europe)	-	-	-	-
E8	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-	-
E9	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-	-
E10	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-	-
E11	Grand Union Canal, Slough Branch BNS	Standing open water and canals	-	-	-	-

Receptor		Feature	APIS Habitat	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E12	Opposite Iver Station BNS	Neutral Grassland	Calcareous grassland	1.071	4	5.071
E13	Opposite Iver Station BNS	Neutral Grassland	Calcareous grassland	1.071	4	5.071
E14	Opposite Iver Station BNS	Neutral Grassland	Calcareous grassland	1.071	4	5.071
E15	Opposite Iver Station BNS	Neutral Grassland	Calcareous grassland	1.071	4	5.071
E16	Opposite Iver Station BNS	Neutral Grassland	Calcareous grassland	1.071	4	5.071
E17	Grand Union Canal, near Iver North BNS	Standing open water and canals	-	-	-	-
E18	Lower Colne LWS	Rivers and Streams	-	-	-	-
E19	Lower Colne LWS	Rivers and Streams	-	-	-	-
E20	Lower Colne LWS	Rivers and Streams	-	-	-	-
E21	Little Britain LWS	Standing open water and canals	-	-	-	-
E22	Little Britain LWS	Standing open water and canals	-	-	-	-
E23	Little Britain LWS	Standing open water and canals	-	-	-	-
E24	Beeches LWS	Standing open water and canals	-	-	-	-
E25	Beeches LWS	Standing open water and canals	-	-	-	-
E26	Beeches LWS	Standing open water and canals	-	-	-	-

3.5.10 Baseline pollutant concentrations and deposition rates at each ecological receptor were obtained from the APIS[11] website and are summarised in Table 12.

Table 12 Baseline Pollution Levels at Ecological Receptors

Receptor		Annual Mean Conc. (µg/m³)		Baseline Deposition Rate	
		NO_x	SO_2	Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)
E1	Burnham Beeches SAC	16.85	1.52	23.81	1.83
E2	Windsor Forest and Great Park SAC	16.85	1.32	22.25	1.7
E3	South West London Waterbodies SPA and Ramsar	16.85	1.53	23.06	1.78
E4	South West London Waterbodies SPA and Ramsar	16.85	1.57	22.86	1.76
E5	South West London Waterbodies SPA and Ramsar	16.85	1.75	23.59	1.83
E6	South West London Waterbodies SPA and Ramsar	16.85	1.68	23.42	1.82
E7	South West London Waterbodies SPA and Ramsar	16.85	2.04	23.59	1.84
E8	Grand Union Canal, Slough Branch BNS	16.85	1.73	13.34	1.04
E9	Grand Union Canal, Slough Branch BNS	16.85	1.73	13.34	1.04
E10	Grand Union Canal, Slough Branch BNS	16.85	1.73	13.34	1.04
E11	Grand Union Canal, Slough Branch BNS	16.85	1.73	13.34	1.04
E12	Opposite Iver Station BNS	16.85	1.73	13.34	1.04
E13	Opposite Iver Station BNS	16.85	1.73	13.34	1.04
E14	Opposite Iver Station BNS	16.85	1.73	13.34	1.04
E15	Opposite Iver Station BNS	16.85	1.73	13.34	1.04
E16	Opposite Iver Station BNS	16.85	1.73	13.34	1.04
E17	Grand Union Canal, near Iver North BNS	16.85	1.61	13.39	1.05
E18	Lower Colne LWS	16.85	1.81	12.12	0.95

11 http://www.apis.ac.uk/.

Receptor		Annual Mean Conc. (µg/m³)		Baseline Deposition Rate	
		NO_x	SO_2	Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)
E19	Lower Colne LWS	16.85	1.81	12.12	0.95
E20	Lower Colne LWS	16.85	1.81	12.12	0.95
E21	Little Britain LWS	16.85	2.10	12.22	0.96
E22	Little Britain LWS	16.85	2.10	12.22	0.96
E23	Little Britain LWS	16.85	2.10	12.22	0.96
E24	Beeches LWS	16.85	2.10	12.22	0.96
E25	Beeches LWS	16.85	2.10	12.22	0.96
E26	Beeches LWS	16.85	2.10	12.22	0.96

4.0 METHODOLOGY

4.1 Introduction

4.1.1 Emissions from the site have the potential to contribute to elevated pollutant concentrations at sensitive locations. These have been quantified through dispersion modelling in accordance with the methodology outlined in the following Sections.

4.2 Dispersion Model

4.2.1 Dispersion modelling was undertaken using ADMS-6.0 (v6.0.2.5), 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.

4.2.2 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 input meteorology and calculates user-selected long-term and short-term averages.

4.3 Modelling Scenarios

4.3.1 The proposed generators will operate in accordance with a regular testing schedule. This will include the following Events:

- Event 1: Biweekly - Each of the 27 generators will be tested, one at a time (daytime only) for a maximum of 15-minutes every fortnight. Generators will be tested at 10% load;
- Event 2: Biannual - Each of the 27 generators to be tested, one at a time (daytime only) for four hours twice annually. Generators will be tested at 100% load; and,
- Event 3: Maintenance - Each of the 27 generators to be tested, one at a time (daytime only) for ten cumulative hours over a year. Generators will be tested at 100% load.

4.3.2 There is also the potential for all 27 generators to operate during an Emergency Blackout Event. These are configured so all generators would operate at 100% load.

4.3.3 The Events described above were reviewed to develop suitable scenarios for consideration in the modelling assessment. These are summarised in Table 13.

Table 13 Modelling Scenarios

Scenario	Operating Profile	Description	Representative Event
Scenario 1	Continuous	Each of the 27 generators operated at 100% load, 24-hours a day, 365-days a year. This predicted maximum potential short-term impacts associated with the various testing Events	Event 1, 2 and 3
Scenario 2	A single worst-case event of 72-hours of generator operation	A single event where all generators operate at 100% load. This predicted potential impacts during an Emergency Blackout Event	Emergency Blackout Event

4.3.4 The scenarios have been represented within the model as summarised in the following Sections. Predicted pollutant concentrations were summarised in the following formats:

- PC - Predicted pollutant level as a result of emissions from the facility only; and,
- Predicted environmental concentration (PEC) - Total predicted pollutant level as a result of emissions from the facility and existing baseline conditions.

4.3.5 Predicted ground level pollutant concentrations and deposition rates were compared with the relevant AQOs, AEGLs, critical levels and critical loads. These criteria are collectively referred to as Environmental Quality Standards (EQSs).

Scenario 1

4.3.6 For Scenario 1, emissions from each generator were modelled constantly with 100% load. The maximum predicted concentration for each averaging period was then identified and compared to the relevant EQS. This significantly overestimates impacts as constant operation has been assumed to ensure a full range of meteorological conditions were included in the results. Additional analysis of any EQS exceedence was provided as necessary.

Human Receptors

4.3.7 During Events 1, 2 and 3 the generators are run for a maximum of 15-minutes and 4-hours. The model outputs are therefore summarised in Table 14.

Table 14 Scenario 1 Model Outputs

Pollutant	Modelled As	EQS ($\mu g/m^3$)[(a)]
NO_2	Maximum 10-minute mean	941
	Maximum 30-minute mean	941
	Maximum 1-hour mean	941[(b)]
CH_2O	Maximum 10-minute mean	1,105
	Maximum 30-minute mean	941
	Maximum 1-hour mean	100
CO	Maximum 10-minute mean	481,156
	Maximum 30-minute mean	171,841
	Maximum 1-hour mean	95,086
SO_2	Maximum 10-minute mean	524[(c)]
	Maximum 30-minute mean	524
	Maximum 1-hour mean	524[(d)]
NO	Maximum 1-hour mean	4,400

NOTE: (a) Converted from ppm.
(b) Results also considered in the context of the AQO of 200µg/m^3.
(c) Results also considered in the context of the 15-minute AQO of 266µg/m^3.
(d) Results also considered in the context of the AQO of 350µg/m^3.

Ecological Receptors

4.3.8 During Events 1, 2 and 3 the generators are run for a maximum of 4-hours. As such, predicted concentrations at ecological receptors were assessed in accordance with the EA guidance[12] for events where daily operation is less than 10-hours. The methodology

[12] Guidance on Air Dispersion Modelling for Back-up Engine Arrays at Data Centres (IED Chapter II), EA, 2026.

outlines the use of 1-hour 100th %ile NO_x concentrations, factored by the number of hours of operation, as a proxy for 24-hour 100th %ile PCs.

Scenario 2

4.3.9 For Scenario 2, emissions from each generator were modelled constantly with 100% load to ensure a full range of meteorological conditions were included in the outputs.

4.3.10 The approach to analysis of the results is summarised in the following Sections.

<u>Human Receptors</u>

4.3.11 The EA has issued guidance[13] on dispersion modelling of emissions from back-up generating plant. This includes a method for statistical analysis using the hypergeometric probability distribution in order to identify the potential for an exceedence of the 1-hour AQO for NO_2 for facilities that operate periodically on an undefined schedule.

4.3.12 For Scenario 2, an operating period of 72-hours per annum was assumed. Using the hypergeometric probability distribution method, it was determined that should the results indicate 1,430 or more instances of NO_2 concentrations over 200µg/m^3 within a year, then the probability of producing 19 instances of NO_2 concentrations over 200µg/m^3, and therefore an exceedence of the AQO, within 72 operational hours would be 2.0%. As the plant can operate for periods in excess of 4-hours, this value was multiplied by 2.5 in accordance with the guidance[14]. This provided a probability of 4.9%. The EA indicate that:

> "A probability of less than 5% indicates exceedances are unlikely, provided the generator plant operational lifetime is no more than 20 years."

4.3.13 Although the generator plant operational lifetime may exceed 20-years, grid outages of 72-hour duration are extremely unlikely. As such, this level of probability is considered to be acceptable and therefore an appropriate criterion for use in the assessment.

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13 Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

14 Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

4.3.14 Based on the number of instances determined previously, the 83.68th percentile (%ile) was calculated for use in the modelling assessment. As such, should predicted 83.68th %ile 1-hour mean NO_2 concentrations be under 200µg/m^3 then there is less than 5% probability of an AQO exceedence and impacts are not considered significant in accordance with the utilised guidance[15].

4.3.15 The maximum predicted concentrations of CH_2O, CO and SO_2 for each averaging period were identified and compared to the relevant EQS. This significantly overestimates impacts of these pollutants as constant operation has been assumed to ensure a full range of meteorological conditions were included in the results. If exceedences of the EQSs were identified, then the input parameters would have been amended to more accurately represent actual emissions.

4.3.16 The duration of Scenario 2 was assumed as 72-hours. As such, emissions are unlikely to significantly affect concentrations for averaging periods greater than 24-hours, or the 24-hour mean AQO for PM_{10} as 35 exceedences are permitted per annum. The model outputs for human receptors are therefore summarised in Table 15.

Table 15 Scenario 2 Model Outputs: Human Receptors

Pollutant	Modelled As	EQS (µg/m^3)(a)
NO_2	83.68th %ile 1-hour mean	200
	Maximum 1-hour mean	941
CH_2O	Maximum 1-hour mean	100
CO	Maximum 8-hour rolling mean	10,000
SO_2	Maximum 1-hour mean	350
	Maximum 1-hour mean	524
NO	Maximum 1-hour mean	4,400

NOTE: (a) Converted from ppm where relevant.

15 Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

Ecological Receptors

4.3.17 Scenario 2 has the potential to affect 24-hour mean NO_x concentrations at sensitive ecological receptors. The potential risk of EQS exceedence was therefore considered using a staged approach.

4.3.18 The first step in the analysis involved utilising the 'exceedence thresholds' function of ADMS-6. This allows the user to define a threshold value and the model provides an output defined as the 'number of exceedences per annum of each concentration threshold value'.

4.3.19 The threshold value was calculated by deducting the short-term baseline concentration of 33.70µg/m^3, defined as twice the annual mean baseline NO_x concentration, from the 24-hour mean NO_x EQS. This resulted in a threshold concentration of 41.30µg/m^3.

4.3.20 The number of exceedences of the defined threshold concentration was then calculated using ADMS-6. The number of threshold exceedences represent the number of days within a year where the 24-hour NO_x EQS would be exceeded based on 24-hour operation, 365-days per year.

4.3.21 The next step involved determining the 'probability of exceedence' occurring by dividing the maximum number of exceedence days by the numbers of days in a year.

4.3.22 The 'probability of exceedence' assumes that the plant is operational 24-hours a day, 365-days a year. However, the duration of Scenario 2 is 72-hours. As such, the 'probability of operation' was calculated as 0.8% i.e 3-days in every 365.

4.3.23 The final step in the analysis involved combining the 'probability of operation' with the 'probability of exceedence' to give the 'probability of operational exceedence'. This value represented the probability that an EQS exceedence occurs within a given year should a 72-hour grid outage arise.

Long Term Averaging Periods

4.3.24 The EA outlines a requirement to consider long term pollutant averaging periods. As such, modelling was also undertaken for the parameters outlined in Table 16.

Table 16 Long Term Pollutant Averaging Periods

Pollutant	Receptor Type	Modelled As	EQS (µg/m³)(a)
NO_2	Human	Annual mean	40
NO	Human	Annual mean	310
PM_{10}	Human	Annual mean	40
		90.4th %ile 24-hour mean	50
$PM_{2.5}$	Human	Annual mean	12
NO_x	Ecological	Annual mean	30
SO_2	Ecological	Annual mean	10
Nitrogen deposition	Ecological	Annual	As outlined in Table 10
Acid deposition	Ecological	Annual	As outlined in Table 11

4.3.25 To predict annual mean concentrations, constant operation of all generators using the input parameters for Scenario 2 was undertaken as a worst-case, prior to factoring the results to represent a total operational period of 96.5-hours per annum. This consisted of:

- Event 1: 6.5-hours;
- Event 2: 8-hours;
- Event 3: 10-hours; and,
- Emergency Blackout Event: 72-hours.

4.3.26 Daily PM_{10} concentrations were predicted based on constant operation of all generators using the input parameters for Scenario 2 as a worst-case.

4.4 Source Parameters

4.4.1 A summary of the source parameters used in the assessment for both Scenario 1 and Scenario 2 are provided in Table 17. These were calculated from the relevant technical data sheets for the generators which stated pollutant emission rates in g/kW, rather than as a concentration. It is noted that a review of three different generator sets was undertaken to determine the worst-case value for each input. This approach produced a hypothetical generator specification that represents the most conservative emissions performance from all options the Applicant could eventually produce.

Table 17 Source Parameters - Scenario 1 and Scenario 2

Generator	Rating (kW)	Stack Height (m)	Stack Diameter (m)	Efflux Velocity (m/s)	Exhaust Gas Temp. (°C)	Stack Location (NGR) (m)		Pollutant Emission Rate (g/s)				
						X	Y	NO_x	PM	CO	CH_2O	SO_2
BU 1	3,088	25.0	0.6	39.60	434	503348.3	180454.0	5.5448	0.0258	0.6094	0.0601	0.0034
BU 2	3,088	25.0	0.6	39.60	434	503354.3	180455.8	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 1	3,088	25.0	0.6	39.60	434	503360.3	180457.6	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 2	3,088	25.0	0.6	39.60	434	503366.4	180459.4	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 3	3,088	25.0	0.6	39.60	434	503372.4	180461.2	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 4	3,088	25.0	0.6	39.60	434	503378.4	180463.0	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 5	3,088	25.0	0.6	39.60	434	503384.4	180464.9	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 6	3,088	25.0	0.6	39.60	434	503390.4	180466.7	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 7	3,088	25.0	0.6	39.60	434	503396.5	180468.5	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 8	3,088	25.0	0.6	39.60	434	503402.5	180470.3	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 9	3,088	25.0	0.6	39.60	434	503408.5	180472.1	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 10	3,088	25.0	0.6	39.60	434	503414.5	180474.0	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 11	3,088	25.0	0.6	39.60	434	503420.6	180475.8	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 12	3,088	25.0	0.6	39.60	434	503426.6	180477.6	5.5448	0.0258	0.6094	0.0601	0.0034

Generator	Rating (kW)	Stack Height (m)	Stack Diameter (m)	Efflux Velocity (m/s)	Exhaust Gas Temp. (°C)	Stack Location (NGR) (m)		Pollutant Emission Rate (g/s)				
						X	Y	NO_x	PM	CO	CH_2O	SO_2
SEG 13	3,088	25.0	0.6	39.60	434	503432.6	180479.4	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 14	3,088	25.0	0.6	39.60	434	503438.7	180481.3	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 15	3,088	25.0	0.6	39.60	434	503444.7	180483.1	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 16	3,088	25.0	0.6	39.60	434	503450.7	180484.9	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 17	3,088	25.0	0.6	39.60	434	503456.7	180486.7	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 18	3,088	25.0	0.6	39.60	434	503462.7	180488.5	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 19	3,088	25.0	0.6	39.60	434	503468.7	180490.3	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 20	3,088	25.0	0.6	39.60	434	503474.8	180492.2	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 21	3,088	25.0	0.6	39.60	434	503480.8	180494.0	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 22	3,088	25.0	0.6	39.60	434	503486.8	180495.8	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 23	3,088	25.0	0.6	39.60	434	503492.8	180497.6	5.5448	0.0258	0.6094	0.0601	0.0034
SEG 24	3,088	25.0	0.6	39.60	434	503498.9	180499.4	5.5448	0.0258	0.6094	0.0601	0.0034
HG	1,500	25.0	0.4	25.59	464.6	503500.9	180500.1	2.3020	0.0151	0.7230	0.0303	0.0363

4.4.2 The emission rate for PM is stated as total dust. However, for the purposes of dispersion modelling it was considered that the entire PM emission consisted of only PM_{10} or $PM_{2.5}$. This allowed the maximum ground level impacts, with respect to the relevant EQSs, to be assessed. Actual plant emissions of PM are unlikely to only consist of only these size fractions, resulting in a worst-case assessment.

4.4.3 Reference should be made to Figure 6 for a map of the source locations.

4.5 NO_x Conversion

4.5.1 Ambient NO_x concentrations were predicted through dispersion modelling. Concentrations of NO_2 shown in the results section assume 15% conversion from NO_x to NO_2 in accordance with previous EA consultation responses for similar sites. Concentrations of NO shown in the results section account for the remaining 85% of the conversion.

4.6 Building Effects

4.6.1 The dispersion of substances released from elevated sources can be influenced by the presence of buildings close to the emission point. Structures can interrupt the wind flows and cause significantly higher ground-level concentrations close to the source than would arise in the absence of the buildings.

4.6.2 Analysis of the site layout indicated that one building should be included within the model in order to take account of effects on pollutant dispersion. Input geometries are shown in Table 18.

Table 18 Building Geometries

Building	NGR (m)		Height (m)	Length / Diameter (m)	Width (m)	Angle (°)
	X	Y				
Amazon	503446.0	180439.3	19.78	183.1	66.5	253.1

4.6.3 It is noted that there are a number of residential buildings to the north-east of the site boundary. These were not included within the dispersion model as they are approximately 100m east of the closest generator. Pollutant dispersion effects are considered unlikely to occur over a distance of this magnitude.

4.7 Meteorological Data

4.7.1 Meteorological data used in the assessment was taken from Heathrow Airport meteorological station over the period 1st January 2020 to 31st December 2024 (inclusive). This observation station is located at NGR: 506947, 176515, which is approximately 5.2km south-east of the facility. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

4.7.2 All meteorological files used in the assessment were provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 7 for wind roses of the utilised meteorological records.

4.8 Roughness Length

4.8.1 A roughness length (z_0) of 0.5m was used to describe the modelling extents. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for 'parkland, open suburbia'.

4.8.2 A z_0 of 0.3m was used to describe the meteorological site. This value is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for 'agricultural areas (max)'.

4.9 Monin-Obukhov Length

4.9.1 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 100m was used to describe the modelling extents and meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-6 as being suitable for 'large conurbations >1 million'.

4.10 Terrain Data

4.10.1 Ordnance Survey OS Terrain 50 data was included in the model 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 method suggested by CERC[16].

4.11 Background Concentrations

4.11.1 Review of the data summarised in Section 3.0 was undertaken in order to identify suitable baseline values for use in the assessment. The NO_2 concentration recorded at the SB38 monitoring site in 2024 was utilised to represent existing levels at human receptors. The value is higher than the value predicted by DEFRA and therefore ensured a robust assessment. It should be noted that SB38 is classed as a roadside monitor and therefore actual background concentrations at human receptors are likely to be lower.

4.11.2 BC do not undertake monitoring of SO_2, C_6H_6, PM_{10} or $PM_{2.5}$ within the vicinity of the site. As such, background concentrations predicted by DEFRA, as shown in Table 7, were utilised to represent baseline levels throughout the assessment extents.

4.11.3 DEFRA does not provide predicted background concentrations for NO. As such, a review of the Automatic Urban and Rural Network (AURN) was undertaken in order to identify a suitable background monitor and associated NO concentration for use in the assessment. This indicated the London Hillingdon analyser is located approximately 3.1km south-east of the site. The annual mean NO concentration of 8.07μg/m^3 recorded during 2024 at the monitor was therefore used in the assessment.

4.11.4 Background levels at the ecological receptors were obtained from the APIS website, as summarised in Section 3.5.

4.11.5 It is not possible to add short-term peak baseline and process concentrations. This is because the conditions which give rise to peak ground-level concentrations of substances emitted from an elevated source at a particular location and time are likely to be different to the conditions which give rise to peak concentrations due to emissions

16 Note 105: Setting up Terrain Data for Input to CERC Models, CERC, 2016.

from other sources. This point is addressed in in EA guidance 'Air emissions risk assessment for your environmental permit'[17], which advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum predicted short-term concentration due to emissions from the source to twice the annual mean baseline concentration. This approach was adopted throughout the assessment.

4.12 Assessment Criteria

Human Receptors

4.12.1 EA guidance 'Air emissions risk assessment for your environmental permit'[18] states that PCs can be screened as insignificant if they meet the following criteria:

- 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.

4.12.2 If these criteria are exceeded the following guidance is provided on whether PECs can be screened as insignificant:

- The short-term PEC 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.

Ecological Receptors

4.12.3 EA guidance 'Air emissions risk assessment for your environmental permit'[19] states that PCs at SPAs and SACs can be screened as insignificant if they meet the following criteria:

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

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

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

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

- The long-term PC is greater than 1% and the long term PEC is less than 70% of the long-term environmental standard.

4.12.4 The guidance states that PCs at LWS and BNS can be screened as insignificant if they meet the following criteria:

- 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 standards.

4.12.5 Predicted PCs have been compared to the relevant EQSs and the criteria stated above. Where the impact is within these parameters, the EA concludes that impacts associated with an installation are acceptable.

4.13 Nitrogen Deposition

4.13.1 Nitrogen deposition rates were calculated using the conversion factors provided within the IAQM 'A guide to the assessment of air quality impacts on designated nature conservation sites'[20]. Predicted pollutant concentrations were multiplied by the relevant deposition velocity and conversion factor to calculate the speciated dry deposition flux. The conversion factors used for the determination of nitrogen deposition are presented within Table 19.

Table 19 Conversion Factors to Determine Dry Deposition Flux for Nitrogen Deposition

Pollutant	Deposition Velocity (m/s)		Conversion Factor ($\mu g/m^2/s$ to kg/ha/yr of pollutant species)
	Grassland	Forest	
NO_2	0.0015	0.003	95.9

4.13.2 The relevant deposition velocity for each ecological receptor was selected from Table 19 based on the vegetation type present within the designation.

20 A guide to the assessment of air quality impacts on designated nature conservation sites, IAQM, 2020.

4.14 Acid Deposition

4.14.1 Acid deposition occurs as a result of NO_2 and SO_2. Predicted ground level pollutant concentrations of both species were converted to kilo-equivalent ion depositions (ked/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 using the standard conversion factors shown in Table 20.

Table 20 Conversion Factors to Determine Dry Deposition Flux for Acid Deposition

Pollutant	Deposition Velocity (m/s)		Conversion Factor (μg/m²/s to keq/ha/yr of pollutant species)
	Grassland	Forest	
NO_2	0.0015	0.003	95.9
SO_2	0.012	0.024	9.84

4.14.2 The following formula was used to calculate predicted PCs as a proportion of the critical load function:

$$\text{PC as \%CL function} = ((\text{PC of N deposition/CLmaxN}) \times 100$$

4.14.3 The above formula was obtained from the APIS website[21]

4.15 Modelling Uncertainty

4.15.1 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.

21 http://www.apis.ac.uk/.

4.15.2 Potential uncertainties in the 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 annual meteorological data sets from an observation station local to the site to account for inter-year variability. The assessment was based on the worst-case year for each pollutant and each averaging period to ensure maximum concentrations were considered;
- Surface characteristics - The z_0 and Monin-Obukhov length were determined for both the dispersion and meteorological sites based on the surrounding land uses and guidance provided by CERC;
- Plant operating conditions - Operational parameters were provided by the Applicant or were obtained from the relevant technical data sheets for the engines. A review of three different generator sets was undertaken to determine the worst-case value for each input. This approach produced a hypothetical generator specification that represents the most conservative emissions performance from all options the Applicant could eventually procure;
- Background concentrations - Background pollutant levels were obtained from BC monitoring data, the DEFRA mapping study and APIS website;
- Receptor locations - Sensitive human and ecological locations were obtained from the Due Diligence[22] report produced by Arup in support of the development. These were verified through review of mapping resources; and,
- Variability - All model inputs were as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

4.15.3 Results were considered in the context of the relevant EQSs. 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.

22 Amazon Web Services, LHR114 - Ridgeway Trading Estate, Due Diligence Report, Arup, 2022.

5.0 RESULTS

5.1 Introduction

5.1.1 Dispersion modelling was undertaken with the inputs described in Section 4.0. For ease of reference, Scenario 1 and 2 represent the following events:

- Scenario 1: Events 1, 2 and 3; and,
- Scenario 2: Emergency Blackout Event.

5.1.2 The results are outlined in the following Sections.

5.2 Scenario 1

Human Receptors

5.2.1 The maximum PC for any meteorological data set at each receptor during Scenario 1 is summarised in Table 21.

Table 21 Scenario 1: Predicted Pollutant Concentrations - PC

Receptor	Maximum Predicted Short Term PC (µg/m³)												
	NO_2			CH_2O			CO			SO_2			NO 1-hr
	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	
R1	17.33	16.35	15.30	1.25	1.18	1.11	21.30	17.77	17.77	1.07	0.98	0.89	86.71
R2	11.51	10.34	9.10	0.88	0.80	0.71	16.44	13.14	13.14	0.83	0.75	0.66	51.58
R3 (1.5m)	19.01	17.96	16.76	1.56	1.47	1.37	28.58	24.33	24.33	1.44	1.32	1.22	95.00
R3 (8.5m)	19.54	18.19	16.98	1.59	1.49	1.39	29.22	24.51	24.51	1.47	1.33	1.23	96.24
R4 (1.5m)	20.21	19.29	18.18	1.75	1.66	1.58	32.56	28.57	28.57	1.63	1.53	1.43	103.00
R4 (8.5m)	20.86	19.70	18.56	1.80	1.71	1.61	34.13	28.98	28.98	1.71	1.57	1.46	105.18
R5 (1.5m)	20.44	19.54	18.55	1.81	1.72	1.64	34.13	30.37	30.37	1.71	1.63	1.52	105.10
R5 (8.5m)	21.37	20.40	19.21	1.91	1.81	1.70	36.00	31.11	31.11	1.81	1.67	1.56	108.87
R6 (1.5m)	18.12	17.68	17.07	1.48	1.44	1.39	31.65	30.46	30.46	1.59	1.56	1.53	96.76
R6 (8.5m)	19.28	18.81	18.17	1.68	1.64	1.58	33.23	30.64	30.64	1.67	1.59	1.54	102.95
R7 (1.5m)	16.77	16.44	15.97	1.39	1.35	1.31	31.56	30.43	30.43	1.58	1.56	1.53	90.52
R7 (8.5m)	18.38	17.85	17.16	1.67	1.61	1.53	33.00	30.63	30.63	1.66	1.58	1.54	97.26
R8 (1.5m)	16.82	16.08	15.30	1.55	1.50	1.43	30.36	26.96	26.96	1.52	1.44	1.35	86.72
R8 (8.5m)	17.81	17.02	16.04	1.64	1.57	1.49	31.48	27.64	27.64	1.58	1.49	1.39	90.87

Receptor	Maximum Predicted Short Term PC (µg/m³)												
	NO_2			CH_2O			CO			SO_2			NO 1-hr
	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	
R9	9.44	8.87	8.16	0.76	0.71	0.64	14.66	11.99	11.99	0.74	0.67	0.60	46.24
R10	9.79	8.80	7.75	0.71	0.64	0.56	11.99	9.43	9.43	0.60	0.54	0.47	43.90
R11	10.22	9.06	7.88	0.74	0.65	0.57	11.14	8.39	8.39	0.56	0.49	0.42	44.66
R12	11.66	10.58	9.44	0.84	0.76	0.68	15.44	12.11	12.11	0.78	0.69	0.61	53.47

5.2.2 The PC proportion of the relevant EQS for each pollutant outlined in Table 21 is provided in Table 22.

Table 22 Scenario 1: Predicted Pollutant Concentrations - PC Proportion of EQS

Receptor	PC Proportion of EQS (µg/m³)												
	NO_2			CH_2O			CO			SO_2			NO 1-hr
	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	
R1	1.84	1.74	7.65	0.11	0.13	1.11	0.00	0.01	0.02	0.40	0.19	0.25	1.97
R2	1.22	1.10	4.55	0.08	0.08	0.71	0.00	0.01	0.01	0.31	0.14	0.19	1.17
R3 (1.5m)	2.02	1.91	8.38	0.14	0.16	1.37	0.01	0.01	0.03	0.54	0.25	0.35	2.16
R3 (8.5m)	2.08	1.93	8.49	0.14	0.16	1.39	0.01	0.01	0.03	0.55	0.25	0.35	2.19

Receptor	PC Proportion of EQS (µg/m³)												
	NO_2			CH_2O			CO			SO_2			NO 1-hr
	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	
R4 (1.5m)	2.15	2.05	9.09	0.16	0.18	1.58	0.01	0.02	0.03	0.61	0.29	0.41	2.34
R4 (8.5m)	2.22	2.09	9.28	0.16	0.18	1.61	0.01	0.02	0.03	0.64	0.30	0.42	2.39
R5 (1.5m)	2.17	2.08	9.27	0.16	0.18	1.64	0.01	0.02	0.03	0.64	0.31	0.44	2.39
R5 (8.5m)	2.27	2.17	9.61	0.17	0.19	1.70	0.01	0.02	0.03	0.68	0.32	0.45	2.47
R6 (1.5m)	1.93	1.88	8.54	0.13	0.15	1.39	0.01	0.02	0.03	0.60	0.30	0.44	2.20
R6 (8.5m)	2.05	2.00	9.08	0.15	0.17	1.58	0.01	0.02	0.03	0.63	0.30	0.44	2.34
R7 (1.5m)	1.78	1.75	7.99	0.13	0.14	1.31	0.01	0.02	0.03	0.60	0.30	0.44	2.06
R7 (8.5m)	1.95	1.90	8.58	0.15	0.17	1.53	0.01	0.02	0.03	0.62	0.30	0.44	2.21
R8 (1.5m)	1.79	1.71	7.65	0.14	0.16	1.43	0.01	0.02	0.03	0.57	0.27	0.39	1.97
R8 (8.5m)	1.89	1.81	8.02	0.15	0.17	1.49	0.01	0.02	0.03	0.59	0.28	0.40	2.07
R9	1.00	0.94	4.08	0.07	0.08	0.64	0.00	0.01	0.01	0.28	0.13	0.17	1.05
R10	1.04	0.93	3.87	0.06	0.07	0.56	0.00	0.01	0.01	0.23	0.10	0.14	1.00
R11	1.09	0.96	3.94	0.07	0.07	0.57	0.00	0.00	0.01	0.21	0.09	0.12	1.01
R12	1.24	1.12	4.72	0.08	0.08	0.68	0.00	0.01	0.01	0.29	0.13	0.17	1.22

5.2.3 As shown in Table 22, PCs were below 10% of the relevant criteria at all receptors.

5.2.4 The maximum PEC for any meteorological data set at each receptor during Scenario 1 is summarised in Table 23.

Table 23 Scenario 1: Predicted Pollutant Concentrations - PEC

Receptor	Maximum Predicted Short Term PEC (µg/m³)												
	NO_2			CH_2O			CO			SO_2			NO 1-hr
	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	
R1	49.53	48.55	47.50	2.36	2.29	2.21	897	894	894	10.77	10.68	10.59	118.91
R2	43.71	42.54	41.30	1.99	1.90	1.82	892	889	889	10.53	10.45	10.36	83.78
R3 (1.5m)	51.21	50.16	48.96	2.67	2.58	2.47	905	900	900	11.14	11.02	10.92	127.20
R3 (8.5m)	51.74	50.39	49.18	2.70	2.60	2.49	905	901	901	11.17	11.03	10.93	128.44
R4 (1.5m)	52.41	51.49	50.38	2.86	2.77	2.69	909	905	905	11.33	11.23	11.13	135.20
R4 (8.5m)	53.06	51.90	50.76	2.91	2.82	2.72	910	905	905	11.41	11.27	11.16	137.38
R5 (1.5m)	52.64	51.74	50.75	2.92	2.83	2.75	910	906	906	11.41	11.33	11.22	137.30
R5 (8.5m)	53.57	52.60	51.41	3.01	2.91	2.81	912	907	907	11.51	11.37	11.26	141.07
R6 (1.5m)	50.32	49.88	49.27	2.59	2.55	2.50	908	906	906	11.29	11.26	11.23	128.96
R6 (8.5m)	51.48	51.01	50.37	2.79	2.74	2.68	909	907	907	11.37	11.29	11.24	135.15

Receptor	Maximum Predicted Short Term PEC (µg/m³)												
	NO_2			CH_2O			CO			SO_2			NO 1-hr
	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	10-Min	30-Min	1-hr	
R7 (1.5m)	48.97	48.64	48.17	2.50	2.46	2.42	908	906	906	11.28	11.26	11.23	122.72
R7 (8.5m)	50.58	50.05	49.36	2.78	2.71	2.64	909	907	907	11.36	11.28	11.24	129.46
R8 (1.5m)	49.02	48.28	47.50	2.66	2.61	2.54	906	903	903	11.22	11.14	11.05	118.92
R8 (8.5m)	50.01	49.22	48.24	2.75	2.68	2.60	907	904	904	11.28	11.19	11.09	123.07
R9	41.64	41.07	40.36	1.87	1.82	1.75	891	888	888	10.44	10.37	10.30	78.44
R10	41.99	41.00	39.95	1.82	1.74	1.67	888	885	885	10.30	10.24	10.17	76.10
R11	42.42	41.26	40.08	1.85	1.76	1.68	887	884	884	10.26	10.19	10.12	76.86
R12	43.86	42.78	41.64	1.95	1.87	1.79	891	888	888	10.48	10.39	10.31	85.67

5.2.5 As shown in Table 23, there were no predicted exceedences of any EQS at any receptor location for any pollutant or averaging period of interest.

5.2.6 As outlined previously, the results shown in Table 21 and Table 23 assume constant operation of each generator throughout the year. This has therefore presented an extreme worst-case scenario of the standby test coinciding with the worst-case meteorological conditions. Given the tests are only undertaken over a cumulative period of 24.5-hours per year, this is very unlikely to occur. As such, impacts during Scenario 1 are not considered to be significant.

Ecological Receptors

5.2.7 Predicted 24-hour mean NO_x PCs at the identified ecological receptors are summarised in Table 24.

Table 24 Predicted 24-hour Mean NO_x Concentrations

Receptor		Predicted 24-hour Mean NO_x PC ($\mu g/m^3$)				
		2020	2021	2022	2023	2024
E1	Burnham Beeches SAC	0.08	0.10	0.10	0.09	0.11
E2	Windsor Forest and Great Park SAC	0.12	0.14	0.12	0.13	0.10
E3	South West London Waterbodies SPA and Ramsar	0.13	0.14	0.19	0.18	0.16
E4	South West London Waterbodies SPA and Ramsar	0.16	0.16	0.17	0.19	0.17
E5	South West London Waterbodies SPA and Ramsar	0.17	0.18	0.20	0.18	0.19
E6	South West London Waterbodies SPA and Ramsar	0.13	0.15	0.15	0.16	0.19
E7	South West London Waterbodies SPA and Ramsar	0.17	0.17	0.13	0.15	0.17
E8	Grand Union Canal, Slough Branch BNS	2.64	2.59	2.52	2.51	2.66
E9	Grand Union Canal, Slough Branch BNS	3.89	4.87	5.09	4.63	4.52
E10	Grand Union Canal, Slough Branch BNS	4.23	4.93	4.24	4.35	4.55
E11	Grand Union Canal, Slough Branch BNS	2.44	2.44	2.59	2.53	2.47

Receptor		Predicted 24-hour Mean NO_x PC (µg/m^3)				
		2020	2021	2022	2023	2024
E12	Opposite Iver Station BNS	2.98	3.29	3.20	3.12	3.31
E13	Opposite Iver Station BNS	2.92	2.99	2.97	2.95	3.01
E14	Opposite Iver Station BNS	1.90	1.88	1.87	1.95	1.90
E15	Opposite Iver Station BNS	1.47	1.59	1.46	1.52	1.43
E16	Opposite Iver Station BNS	1.38	1.66	1.40	1.62	1.40
E17	Grand Union Canal, near Iver North BNS	0.64	0.85	0.89	0.55	0.81
E18	Lower Colne LWS	0.29	0.46	0.43	0.48	0.42
E19	Lower Colne LWS	0.41	0.47	0.37	0.48	0.47
E20	Lower Colne LWS	0.44	0.50	0.46	0.47	0.46
E21	Little Britain LWS	0.62	0.53	0.65	0.50	0.46
E22	Little Britain LWS	0.60	0.60	0.53	0.48	0.62
E23	Little Britain LWS	0.46	0.48	0.32	0.46	0.32
E24	Beeches LWS	0.40	0.48	0.46	0.30	0.45
E25	Beeches LWS	0.34	0.44	0.46	0.30	0.35
E26	Beeches LWS	0.49	0.54	0.48	0.46	0.49

5.2.8 Maximum predicted 24-hour mean NO_x concentrations at the identified ecological receptors are summarised in Table 25.

Table 25 Maximum Predicted 24-hour Mean NO_x Concentrations

Receptor		Maximum Predicted 24-hour Mean NO_x Concentration (µg/m^3)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	Burnham Beeches SAC	0.11	33.81	0.14	45.07
E2	Windsor Forest and Great Park SAC	0.14	33.84	0.18	45.12
E3	South West London Waterbodies SPA and Ramsar	0.19	33.89	0.26	45.19

Receptor		Maximum Predicted 24-hour Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E4	South West London Waterbodies SPA and Ramsar	0.19	33.89	0.25	45.18
E5	South West London Waterbodies SPA and Ramsar	0.20	33.90	0.27	45.20
E6	South West London Waterbodies SPA and Ramsar	0.19	33.89	0.25	45.19
E7	South West London Waterbodies SPA and Ramsar	0.17	33.87	0.23	45.16
E8	Grand Union Canal, Slough Branch BNS	2.66	36.36	3.54	48.48
E9	Grand Union Canal, Slough Branch BNS	5.09	38.79	6.79	51.72
E10	Grand Union Canal, Slough Branch BNS	4.93	38.63	6.58	51.51
E11	Grand Union Canal, Slough Branch BNS	2.59	36.29	3.45	48.38
E12	Opposite Iver Station BNS	3.31	37.01	4.42	49.35
E13	Opposite Iver Station BNS	3.01	36.71	4.02	48.95
E14	Opposite Iver Station BNS	1.95	35.65	2.61	47.54
E15	Opposite Iver Station BNS	1.59	35.29	2.12	47.06
E16	Opposite Iver Station BNS	1.66	35.36	2.22	47.15
E17	Grand Union Canal, near Iver North BNS	0.89	34.59	1.19	46.13
E18	Lower Colne LWS	0.48	34.18	0.63	45.57
E19	Lower Colne LWS	0.48	34.18	0.64	45.57
E20	Lower Colne LWS	0.50	34.20	0.67	45.60
E21	Little Britain LWS	0.65	34.35	0.86	45.80
E22	Little Britain LWS	0.62	34.32	0.83	45.76
E23	Little Britain LWS	0.48	34.18	0.64	45.57
E24	Beeches LWS	0.48	34.18	0.64	45.58
E25	Beeches LWS	0.46	34.16	0.61	45.54
E26	Beeches LWS	0.54	34.24	0.72	45.65

5.2.9 As indicated in Table 25, PCs are below 10% of the relevant critical level at all receptors. The PECs are also well below the relevant critical level. As such, predicted effects on 24-hour mean NO_x concentrations are not predicted to be significant.

5.3 Scenario 2

Human Receptors

5.3.1 The maximum PC for any meteorological data set at each human receptor during Scenario 2 is summarised in Table 26.

Table 26 Scenario 2: Predicted Pollutant Concentrations at Human Receptors - PC

Receptor	PC (µg/m³)					
	NO_2		Maximum 1-hour Mean NO	Maximum 1-hour Mean CH_2O	Maximum 8-hour Rolling Mean CO	Maximum 1-hour Mean SO_2
	83.68th %ile 1-hour Mean	Maximum 1-hour Mean				
R1	16.46	311.24	1763.67	22.55	206.16	1.84
R2	54.44	226.16	1281.55	16.44	111.88	1.54
R3 (1.5m)	156.26	350.12	1984.00	25.43	243.64	2.31
R3 (8.5m)	159.44	351.88	1993.96	25.56	245.43	2.32
R4 (1.5m)	152.53	371.90	2107.42	27.03	255.34	2.62
R4 (8.5m)	156.94	380.81	2157.93	27.68	262.63	2.66
R5 (1.5m)	152.33	384.84	2180.76	27.97	259.95	2.73
R5 (8.5m)	161.16	393.03	2227.20	28.56	272.26	2.79
R6 (1.5m)	104.76	359.55	2037.46	26.15	224.24	2.83
R6 (8.5m)	123.77	379.67	2151.44	27.62	242.46	2.86
R7 (1.5m)	101.19	343.47	1946.36	25.04	214.26	2.86
R7 (8.5m)	121.11	361.03	2045.85	26.27	229.95	2.89
R8 (1.5m)	110.23	316.90	1795.79	23.07	189.23	2.39
R8 (8.5m)	124.59	331.58	1878.96	24.13	201.21	2.47

Receptor	PC (µg/m³)					
	NO_2		Maximum 1-hour Mean NO	Maximum 1-hour Mean CH_2O	Maximum 8-hour Rolling Mean CO	Maximum 1-hour Mean SO_2
	83.68th %ile 1-hour Mean	Maximum 1-hour Mean				
R9	6.27	195.73	1109.14	14.23	101.17	1.38
R10	0.03	198.43	1124.41	14.40	67.29	1.20
R11	0.89	185.08	1048.78	13.42	77.73	1.08
R12	4.59	213.67	1210.81	15.49	137.29	1.27

5.3.2 The proportion of the relevant EQS for each pollutant outlined in Table 26 is summarised in Table 27.

Table 27 Scenario 2: Predicted Pollutant Concentrations - PC Proportion of EQS

Receptor	PC Proportion of EQS (%)					
	NO_2		Maximum 1-hour mean NO	Maximum 1-hour Mean CH_2O	Maximum 8-hour Rolling Mean CO	Maximum 1-hour Mean SO_2
	83.68th %ile 1-hour Mean	Maximum 1-hour Mean				
R1	8.23	33.07	40.08	22.55	2.06	0.72
R2	27.22	24.03	29.13	16.44	1.12	0.60
R3 (1.5m)	78.13	37.21	45.09	25.43	2.44	0.91
R3 (8.5m)	79.72	37.39	45.32	25.56	2.45	0.91
R4 (1.5m)	76.26	39.52	47.90	27.03	2.55	1.03
R4 (8.5m)	78.47	40.47	49.04	27.68	2.63	1.05
R5 (1.5m)	76.17	40.90	49.56	27.97	2.60	1.07
R5 (8.5m)	80.58	41.77	50.62	28.56	2.72	1.10
R6 (1.5m)	52.38	38.21	46.31	26.15	2.24	1.12
R6 (8.5m)	61.89	40.35	48.90	27.62	2.42	1.13
R7 (1.5m)	50.59	36.50	44.24	25.04	2.14	1.13
R7 (8.5m)	60.55	38.37	46.50	26.27	2.30	1.14

Receptor	PC Proportion of EQS (%)					
	NO_2		Maximum 1-hour mean NO	Maximum 1-hour Mean CH_2O	Maximum 8-hour Rolling Mean CO	Maximum 1-hour Mean SO_2
	83.68th %ile 1-hour Mean	Maximum 1-hour Mean				
R8 (1.5m)	55.11	33.68	40.81	23.07	1.89	0.94
R8 (8.5m)	62.30	35.24	42.70	24.13	2.01	0.97
R9	3.13	20.80	25.21	14.23	1.01	0.54
R10	0.02	21.09	25.55	14.40	0.67	0.47
R11	0.44	19.67	23.84	13.42	0.78	0.43
R12	2.30	22.71	27.52	15.49	1.37	0.50

5.3.3 The results shown in Table 27 can be summarised as follows:

- PCs were above 10% of the relevant EQS for 83.68th %ile 1-hour NO_2, maximum 1-hour mean NO_2, maximum 1-hour mean NO and maximum 1-hour mean CH_2O concentrations. Reference should be made to Figures 8 to 11 for graphical representations of the results; and,
- PCs were below 10% of the relevant EQS for maximum 8-hour rolling mean CO and maximum 1-hour SO_2 concentrations.

5.3.4 The maximum PEC for any meteorological data set at each human receptor during Scenario 2 is summarised in Table 28.

Table 28 Scenario 2: Predicted Pollutant Concentrations at Human Receptors - PEC

Receptor	PEC ($\mu g/m^3$)					
	NO_2		Maximum 1-hour mean NO	Maximum 1-hour Mean CH_2O	Maximum 8-hour Rolling Mean CO	Maximum 1-hour Mean SO_2
	83.68th %ile 1-hour Mean	Maximum 1-hour Mean				
R1	48.66	343.44	1,779.81	23.66	1,082.16	11.54
R2	86.64	258.36	1,297.69	17.54	987.88	11.24
R3 (1.5m)	188.46	382.32	2,000.14	26.54	1,119.64	12.01

Receptor	PEC (µg/m³)					
	NO_2		Maximum 1-hour mean NO	Maximum 1-hour Mean CH_2O	Maximum 8-hour Rolling Mean CO	Maximum 1-hour Mean SO_2
	83.68th %ile 1-hour Mean	Maximum 1-hour Mean				
R3 (8.5m)	191.64	384.08	2,010.10	26.67	1,121.43	12.02
R4 (1.5m)	184.73	404.10	2,123.56	28.14	1,131.34	12.32
R4 (8.5m)	189.14	413.01	2,174.07	28.79	1,138.63	12.36
R5 (1.5m)	184.53	417.04	2,196.90	29.08	1,135.95	12.43
R5 (8.5m)	193.36	425.23	2,243.34	29.67	1,148.26	12.49
R6 (1.5m)	136.96	391.75	2,053.60	27.26	1,100.24	12.53
R6 (8.5m)	155.97	411.87	2,167.58	28.73	1,118.46	12.56
R7 (1.5m)	133.39	375.67	1,962.50	26.15	1,090.26	12.56
R7 (8.5m)	153.31	393.23	2,061.99	27.38	1,105.95	12.59
R8 (1.5m)	142.43	349.10	1,811.93	24.18	1,065.23	12.09
R8 (8.5m)	156.79	363.78	1,895.10	25.24	1,077.21	12.17
R9	38.47	227.93	1,125.28	15.34	977.17	11.08
R10	32.23	230.63	1,140.55	15.51	943.29	10.90
R11	33.09	217.28	1,064.92	14.53	953.73	10.78
R12	36.79	245.87	1,226.95	16.60	1,013.29	10.97

5.3.5 The results shown in Table 28 can be summarised as follows:

- The 83.68th %ile 1-hour mean NO_2 concentration is not predicted to exceed the AQO at any receptor;
- The maximum 1-hour mean NO_2 concentration is not predicted to exceed the AEGL at any receptor;
- The maximum 1-hour mean CH_2O concentration is not predicted to exceed the EAL at any receptor;
- The maximum 8-hour rolling mean CO concentration is not predicted to exceed the AQO at any receptor; and,

- The maximum 1-hour mean SO_2 concentration is not predicted to exceed the AQO or AEGL at any receptor.

5.3.6 As exceedences were not predicted, impacts associated with emissions during Scenario 2 are not considered to be significant.

Ecological Receptors

5.3.7 The potential for exceedences of the 24-hour mean EQS at ecological receptors during Scenario 2 was assessed using the methodology outlined in Section 4.3. The number of threshold exceedences, representing the number of days within a year where the 24-hour NO_x EQS would be exceeded based on 24-hour operation, 365 days per year, was initially modelled. These are summarised in Table 29.

Table 29 24-hour Mean NO_x Threshold Exceedences

Receptor		Number of Threshold Exceedences (Days)				
		2020	2021	2022	2023	2024
E1	Burnham Beeches SAC	0	0	0	0	0
E2	Windsor Forest and Great Park SAC	0	0	0	0	0
E3	South West London Waterbodies SPA and Ramsar	0	0	0	0	0
E4	South West London Waterbodies SPA and Ramsar	0	0	0	0	0
E5	South West London Waterbodies SPA and Ramsar	0	1	2	0	1
E6	South West London Waterbodies SPA and Ramsar	0	0	0	0	0
E7	South West London Waterbodies SPA and Ramsar	0	0	0	0	0
E8	Grand Union Canal, Slough Branch BNS	85	101	78	88	71
E9	Grand Union Canal, Slough Branch BNS	69	99	86	88	84
E10	Grand Union Canal, Slough Branch BNS	70	91	89	77	93
E11	Grand Union Canal, Slough Branch BNS	115	102	107	112	118
E12	Opposite Iver Station BNS	59	96	79	85	80

Receptor		Number of Threshold Exceedences (Days)				
		2020	2021	2022	2023	2024
E13	Opposite Iver Station BNS	61	87	76	64	79
E14	Opposite Iver Station BNS	68	83	81	70	82
E15	Opposite Iver Station BNS	66	78	80	69	83
E16	Opposite Iver Station BNS	72	86	87	77	91
E17	Grand Union Canal, near Iver North BNS	107	108	107	115	123
E18	Lower Colne LWS	9	12	12	12	15
E19	Lower Colne LWS	15	18	21	16	17
E20	Lower Colne LWS	19	23	28	15	23
E21	Little Britain LWS	47	62	61	45	55
E22	Little Britain LWS	93	76	79	106	100
E23	Little Britain LWS	40	56	36	54	42
E24	Beeches LWS	60	59	53	64	64
E25	Beeches LWS	40	49	47	41	42
E26	Beeches LWS	18	24	28	17	28

5.3.8 As shown in Table 29, the 24-hour NOx EQS is exceeded on a maximum of 123 days at any receptor location. This result was predicted at receptor E17.

5.3.9 The next step in the analysis involved determining the 'probability of exceedence' occurring by dividing the maximum number of exceedence days by the numbers of days in a year.

Table 30 Probability of 24-hour EQS Exceedence

Receptor		Maximum Number of Exceedence Days	Probability of Exceedence (%)
E1	Burnham Beeches SAC	0	0.0
E2	Windsor Forest and Great Park SAC	0	0.0

Receptor		Maximum Number of Exceedence Days	Probability of Exceedence (%)
E3	South West London Waterbodies SPA and Ramsar	0	0.0
E4	South West London Waterbodies SPA and Ramsar	0	0.0
E5	South West London Waterbodies SPA and Ramsar	2	0.5
E6	South West London Waterbodies SPA and Ramsar	0	0.0
E7	South West London Waterbodies SPA and Ramsar	0	0.0
E8	Grand Union Canal, Slough Branch BNS	101	27.7
E9	Grand Union Canal, Slough Branch BNS	99	27.1
E10	Grand Union Canal, Slough Branch BNS	93	25.5
E11	Grand Union Canal, Slough Branch BNS	118	32.3
E12	Opposite Iver Station BNS	96	26.3
E13	Opposite Iver Station BNS	87	23.8
E14	Opposite Iver Station BNS	83	22.7
E15	Opposite Iver Station BNS	83	22.7
E16	Opposite Iver Station BNS	91	24.9
E17	Grand Union Canal, near Iver North BNS	123	33.7
E18	Lower Colne LWS	15	4.1
E19	Lower Colne LWS	21	5.8
E20	Lower Colne LWS	28	7.7
E21	Little Britain LWS	62	17.0
E22	Little Britain LWS	106	29.0
E23	Little Britain LWS	56	15.3
E24	Beeches LWS	64	17.5
E25	Beeches LWS	49	13.4
E26	Beeches LWS	28	7.7

5.3.10 As shown in Table 30, the highest probability of an exceedence of the EQS was 33.7% at receptor E17.

5.3.11 The 'probability of exceedence' shown in Table 30 assumes that the plant is operational 24-hours a day, 365-days a year. However, the duration of Scenario 2 is 72-hours. As such, the 'probability of operation' was calculated as 0.8% i.e 3-days in every 365.

5.3.12 The final step in the analysis involved combining the 'probability of operation' with the 'probability of exceedence' to give the 'probability of operational exceedence'. This value represented the probability that an EQS exceedence occurs within a given year should a 72-hour grid outage arise. The results are shown in Table 31.

Table 31 Probability of Operational Exceedence

Receptor		Probability of Exceedence (%)	Probability of Operation (%)	Probability of Operational Exceedence (%)
E1	Burnham Beeches SAC	0.0	0.8	0.00
E2	Windsor Forest and Great Park SAC	0.0	0.8	0.00
E3	South West London Waterbodies SPA and Ramsar	0.0	0.8	0.00
E4	South West London Waterbodies SPA and Ramsar	0.0	0.8	0.00
E5	South West London Waterbodies SPA and Ramsar	0.5	0.8	0.00
E6	South West London Waterbodies SPA and Ramsar	0.0	0.8	0.00
E7	South West London Waterbodies SPA and Ramsar	0.0	0.8	0.00
E8	Grand Union Canal, Slough Branch BNS	27.7	0.8	0.23
E9	Grand Union Canal, Slough Branch BNS	27.1	0.8	0.22
E10	Grand Union Canal, Slough Branch BNS	25.5	0.8	0.21
E11	Grand Union Canal, Slough Branch BNS	32.3	0.8	0.27
E12	Opposite Iver Station BNS	26.3	0.8	0.22

Receptor		Probability of Exceedence (%)	Probability of Operation (%)	Probability of Operational Exceedence (%)
E13	Opposite Iver Station BNS	23.8	0.8	0.20
E14	Opposite Iver Station BNS	22.7	0.8	0.19
E15	Opposite Iver Station BNS	22.7	0.8	0.19
E16	Opposite Iver Station BNS	24.9	0.8	0.20
E17	Grand Union Canal, near Iver North BNS	33.7	0.8	0.28
E18	Lower Colne LWS	4.1	0.8	0.03
E19	Lower Colne LWS	5.8	0.8	0.05
E20	Lower Colne LWS	7.7	0.8	0.06
E21	Little Britain LWS	17.0	0.8	0.14
E22	Little Britain LWS	29.0	0.8	0.24
E23	Little Britain LWS	15.3	0.8	0.13
E24	Beeches LWS	17.5	0.8	0.14
E25	Beeches LWS	13.4	0.8	0.11
E26	Beeches LWS	7.7	0.8	0.06

5.3.13 As shown in Table 31, the maximum probability that the EQS will be exceeded should a 72-hour grid outage arise is 0.28% at receptor E17. The EA guidance 'dispersion modelling for oxides of nitrogen assessment for specified generators'[23] states that probabilities of less than 1% indicate exceedences are highly unlikely. As such, impacts at ecological receptors are not considered to be significant based on the maximum Scenario 2 duration.

23 Guidance on dispersion modelling for oxides of nitrogen assessment from specified generators, EA, 2018.

5.4 Long Term Averaging Periods

Human Receptors

5.4.1 Maximum predicted annual mean NO_2, NO, PM_{10} and $PM_{2.5}$ PCs based on a total operational period of 96.5-hours per annum are summarised in Table 32.

Table 32 Predicted Long Term Pollutant Concentrations - Human Receptors - PC

Receptor	PC (μg/m³)				Proportion of EQS (%)			
	NO_2	NO	PM_{10}	$PM_{2.5}$	NO_2	NO	PM_{10}	$PM_{2.5}$
R1	0.28	1.58	0.01	0.01	0.70	0.51	0.02	0.07
R2	0.23	1.29	0.01	0.01	0.57	0.42	0.02	0.06
R3 (1.5m)	0.55	3.14	0.02	0.02	1.39	1.01	0.04	0.15
R3 (8.5m)	0.56	3.19	0.02	0.02	1.41	1.03	0.04	0.15
R4 (1.5m)	0.58	3.29	0.02	0.02	1.45	1.06	0.05	0.15
R4 (8.5m)	0.60	3.42	0.02	0.02	1.51	1.10	0.05	0.16
R5 (1.5m)	0.59	3.37	0.02	0.02	1.49	1.09	0.05	0.16
R5 (8.5m)	0.63	3.54	0.02	0.02	1.56	1.14	0.05	0.16
R6 (1.5m)	0.45	2.55	0.01	0.01	1.13	0.82	0.04	0.12
R6 (8.5m)	0.52	2.92	0.02	0.02	1.29	0.94	0.04	0.14
R7 (1.5m)	0.42	2.39	0.01	0.01	1.06	0.77	0.03	0.11
R7 (8.5m)	0.49	2.79	0.02	0.02	1.23	0.90	0.04	0.13
R8 (1.5m)	0.41	2.32	0.01	0.01	1.02	0.75	0.03	0.11
R8 (8.5m)	0.45	2.54	0.01	0.01	1.12	0.82	0.04	0.12
R9	0.10	0.59	0.00	0.00	0.26	0.19	0.01	0.03
R10	0.04	0.21	0.00	0.00	0.09	0.07	0.00	0.01
R11	0.06	0.35	0.00	0.00	0.16	0.11	0.00	0.02
R12	0.14	0.78	0.00	0.00	0.35	0.25	0.01	0.04

5.4.2 As shown in Table 32, PCs were above 1% of the relevant EQS for annual mean NO_2 and annual mean NO. Reference should be made to Figures 12 and 13 for graphical representations of the results.

5.4.3 PCs were below 1% of the relevant EQS for annual mean PM_{10} and $PM_{2.5}$.

5.4.4 Maximum predicted annual mean NO_2, NO, PM_{10} and $PM_{2.5}$ PECs based on a total operational period of 96.5-hours per annum are summarised in Table 33.

Table 33 Predicted Long Term Pollutant Concentrations - Human Receptors - PEC

Receptor	PEC (μg/m³)			
	NO_2	NO	PM_{10}	$PM_{2.5}$
R1	16.38	9.65	12.90	7.73
R2	16.33	9.36	12.90	7.73
R3 (1.5m)	16.65	11.21	12.91	7.74
R3 (8.5m)	16.66	11.26	12.91	7.74
R4 (1.5m)	16.68	11.36	12.91	7.74
R4 (8.5m)	16.70	11.49	12.91	7.74
R5 (1.5m)	16.69	11.44	12.91	7.74
R5 (8.5m)	16.73	11.61	12.91	7.74
R6 (1.5m)	16.55	10.62	12.90	7.73
R6 (8.5m)	16.62	10.99	12.91	7.74
R7 (1.5m)	16.52	10.46	12.90	7.73
R7 (8.5m)	16.59	10.86	12.91	7.74
R8 (1.5m)	16.51	10.39	12.90	7.73
R8 (8.5m)	16.55	10.61	12.90	7.73
R9	16.20	8.66	12.89	7.72
R10	16.14	8.28	12.89	7.72
R11	16.16	8.42	12.89	7.72
R12	16.24	8.85	12.89	7.72

5.4.5 As shown in Table 33, there were no predicted exceedences of any EQS at any receptor location for any pollutant or averaging period of interest.

5.4.6 As the predicted concentrations shown in Table 33 are based on the total theoretical operational period, impacts associated with Scenario 1 in isolation would therefore be lower. As such, impacts on long term pollutant concentrations at human receptors are not considered to be significant.

5.4.7 Maximum predicted 90.4th %ile 24-hour mean PM_{10} PCs based on continuous operation are summarised in Table 34.

Table 34 Predicted 24-hour PM_{10} Concentrations - Human Receptors - PC

Receptor	90.4th %ile 24-hour Mean PM_{10} PC ($\mu g/m^3$)	Proportion of EQS (%)
R1	3.15	6.29
R2	1.89	3.77
R3 (1.5m)	5.01	10.02
R3 (8.5m)	5.04	10.07
R4 (1.5m)	4.97	9.94
R4 (8.5m)	5.20	10.39
R5 (1.5m)	5.10	10.20
R5 (8.5m)	5.36	10.72
R6 (1.5m)	3.89	7.79
R6 (8.5m)	4.45	8.91
R7 (1.5m)	3.71	7.42
R7 (8.5m)	4.36	8.73
R8 (1.5m)	3.81	7.61
R8 (8.5m)	4.18	8.37
R9	1.05	2.10
R10	0.42	0.84
R11	0.66	1.33

Receptor	90.4th %ile 24-hour Mean PM_{10} PC (µg/m³)	Proportion of EQS (%)
R12	1.40	2.80

5.4.8 As shown in Table 34, PCs were above 10% of the relevant AQO for 24-hour PM_{10} concentrations. Reference should be made to Figure 14 for a graphical representation of the results.

5.4.9 Maximum predicted 90.4th %ile 24-hour mean PM_{10} PECs based on continuous operation are summarised in Table 35.

Table 35 Predicted 24-hour PM_{10} Concentrations - Human Receptors - PEC

Receptor	90.4th %ile 24-hour Mean PM_{10} PEC (µg/m³)
R1	28.93
R2	27.67
R3 (1.5m)	30.79
R3 (8.5m)	30.82
R4 (1.5m)	30.75
R4 (8.5m)	30.98
R5 (1.5m)	30.88
R5 (8.5m)	31.14
R6 (1.5m)	29.67
R6 (8.5m)	30.23
R7 (1.5m)	29.49
R7 (8.5m)	30.14
R8 (1.5m)	29.59
R8 (8.5m)	29.96
R9	26.83
R10	26.20
R11	26.44

Receptor	90.4th %ile 24-hour Mean PM_{10} PEC (µg/m³)
R12	27.18

5.4.10 As shown in Table 35, there were no predicted exceedences of the 24-hour mean EQS for PM_{10} at any receptor location.

5.4.11 As the predicted concentrations shown in Table 35 are based on constant operation of the entire facility, impacts associated with Scenario 1 in isolation would therefore be lower. As such, impacts on 24-hour mean PM_{10} concentrations at human receptors are not considered to be significant.

Ecological Receptors

<u>Oxides of Nitrogen</u>

5.4.12 Maximum predicted annual mean NO_x concentrations at the ecological receptor locations based on a total operational period of 96.5-hours per annum are summarised in Table 36.

Table 36 Predicted Annual Mean NO_x Concentrations - Ecological Receptors

Receptor		Maximum Predicted Annual Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	Burnham Beeches SAC	0.01	16.86	0.0	56.2
E2	Windsor Forest and Great Park SAC	0.02	16.87	0.1	56.2
E3	South West London Waterbodies SPA and Ramsar	0.04	16.89	0.1	56.3
E4	South West London Waterbodies SPA and Ramsar	0.04	16.89	0.1	56.3
E5	South West London Waterbodies SPA and Ramsar	0.04	16.89	0.1	56.3
E6	South West London Waterbodies SPA and Ramsar	0.02	16.87	0.1	56.2

Receptor		Maximum Predicted Annual Mean NO_x Concentration (μg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E7	South West London Waterbodies SPA and Ramsar	0.02	16.87	0.1	56.2
E8	Grand Union Canal, Slough Branch BNS	1.17	18.02	3.9	60.1
E9	Grand Union Canal, Slough Branch BNS	0.93	17.78	3.1	59.3
E10	Grand Union Canal, Slough Branch BNS	0.82	17.67	2.7	58.9
E11	Grand Union Canal, Slough Branch BNS	1.06	17.91	3.5	59.7
E12	Opposite Iver Station BNS	0.81	17.66	2.7	58.9
E13	Opposite Iver Station BNS	0.68	17.53	2.3	58.4
E14	Opposite Iver Station BNS	0.65	17.50	2.2	58.3
E15	Opposite Iver Station BNS	0.51	17.36	1.7	57.9
E16	Opposite Iver Station BNS	0.55	17.40	1.8	58.0
E17	Grand Union Canal, near Iver North BNS	0.42	17.27	1.4	57.6
E18	Lower Colne LWS	0.08	16.93	0.3	56.4
E19	Lower Colne LWS	0.10	16.95	0.3	56.5
E20	Lower Colne LWS	0.11	16.96	0.4	56.5
E21	Little Britain LWS	0.20	17.05	0.7	56.8
E22	Little Britain LWS	0.33	17.18	1.1	57.3
E23	Little Britain LWS	0.19	17.04	0.6	56.8
E24	Beeches LWS	0.21	17.06	0.7	56.9
E25	Beeches LWS	0.17	17.02	0.6	56.7
E26	Beeches LWS	0.12	16.97	0.4	56.6

5.4.13 As shown in Table 36, PCs were below the relevant criteria at all ecological designations. As such, predicted effects on annual mean NO_x concentrations are not considered to be significant.

Sulphur Dioxide

5.4.14 Maximum predicted annual mean SO_2 concentrations at the ecological receptor locations based on a total operational period of 96.5-hours per annum are summarised in Table 37.

Table 37 Predicted Annual Mean SO_2 Concentrations - Ecological Receptors

Receptor		Maximum Predicted Annual Mean SO_2 Concentration (μg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	Burnham Beeches SAC	0.000	1.520	0.0	15.2
E2	Windsor Forest and Great Park SAC	0.000	1.320	0.0	13.2
E3	South West London Waterbodies SPA and Ramsar	0.000	1.530	0.0	15.3
E4	South West London Waterbodies SPA and Ramsar	0.000	1.570	0.0	15.7
E5	South West London Waterbodies SPA and Ramsar	0.000	1.750	0.0	17.5
E6	South West London Waterbodies SPA and Ramsar	0.000	1.680	0.0	16.8
E7	South West London Waterbodies SPA and Ramsar	0.000	2.040	0.0	20.4
E8	Grand Union Canal, Slough Branch BNS	0.001	1.731	0.0	17.3
E9	Grand Union Canal, Slough Branch BNS	0.001	1.731	0.0	17.3
E10	Grand Union Canal, Slough Branch BNS	0.001	1.731	0.0	17.3
E11	Grand Union Canal, Slough Branch BNS	0.001	1.731	0.0	17.3
E12	Opposite Iver Station BNS	0.001	1.731	0.0	17.3
E13	Opposite Iver Station BNS	0.001	1.731	0.0	17.3
E14	Opposite Iver Station BNS	0.001	1.731	0.0	17.3
E15	Opposite Iver Station BNS	0.001	1.731	0.0	17.3
E16	Opposite Iver Station BNS	0.001	1.731	0.0	17.3
E17	Grand Union Canal, near Iver North BNS	0.000	1.610	0.0	16.1

Receptor		Maximum Predicted Annual Mean SO_2 Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E18	Lower Colne LWS	0.000	1.810	0.0	18.1
E19	Lower Colne LWS	0.000	1.810	0.0	18.1
E20	Lower Colne LWS	0.000	1.810	0.0	18.1
E21	Little Britain LWS	0.000	2.100	0.0	21.0
E22	Little Britain LWS	0.000	2.100	0.0	21.0
E23	Little Britain LWS	0.000	2.100	0.0	21.0
E24	Beeches LWS	0.000	2.100	0.0	21.0
E25	Beeches LWS	0.000	2.100	0.0	21.0
E26	Beeches LWS	0.000	2.100	0.0	21.0

5.4.15 As shown in Table 37, PCs were below the relevant criteria at all ecological designations. As such, predicted effects on annual mean SO_2 concentrations are not considered to be significant.

Nitrogen Deposition

5.4.16 Maximum predicted annual nitrogen deposition rates at the ecological receptor locations based on a total operational period of 96.5-hours per annum are summarised in Table 38.

Table 38 Predicted Annual Nitrogen Deposition Rates - Ecological Receptors

Receptor		Predicted Annual Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
		PC	PEC	Low EQS		High EQS	
				PC	PEC	PC	PEC
E1	Burnham Beeches SAC	0.000	23.810	0.0	238.1	0.0	158.7

Receptor		Predicted Annual Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
		PC	PEC	Low EQS		High EQS	
				PC	PEC	PC	PEC
E2	Windsor Forest and Great Park SAC	0.001	22.251	0.0	222.5	0.0	148.3
E3	South West London Waterbodies SPA and Ramsar	0.001	23.061	-	-	-	-
E4	South West London Waterbodies SPA and Ramsar	0.001	22.861	-	-	-	-
E5	South West London Waterbodies SPA and Ramsar	0.001	23.591	-	-	-	-
E6	South West London Waterbodies SPA and Ramsar	0.001	23.421	-	-	-	-
E7	South West London Waterbodies SPA and Ramsar	0.000	23.590	-	-	-	-
E8	Grand Union Canal, Slough Branch BNS	0.025	13.365	-	-	-	-
E9	Grand Union Canal, Slough Branch BNS	0.020	13.360	-	-	-	-
E10	Grand Union Canal, Slough Branch BNS	0.018	13.358	-	-	-	-
E11	Grand Union Canal, Slough Branch BNS	0.023	13.363	-	-	-	-
E12	Opposite Iver Station BNS	0.017	13.357	0.2	133.6	0.1	66.8
E13	Opposite Iver Station BNS	0.015	13.355	0.1	133.5	0.1	66.8
E14	Opposite Iver Station BNS	0.014	13.354	0.1	133.5	0.1	66.8
E15	Opposite Iver Station BNS	0.011	13.351	0.1	133.5	0.1	66.8
E16	Opposite Iver Station BNS	0.012	13.352	0.1	133.5	0.1	66.8

Receptor		Predicted Annual Nitrogen Deposition Rate (kgN/ha/yr)		Proportion of EQS (%)			
		PC	PEC	Low EQS		High EQS	
				PC	PEC	PC	PEC
E17	Grand Union Canal, near Iver North BNS	0.009	13.399	-	-	-	-
E18	Lower Colne LWS	0.002	12.122	-	-	-	-
E19	Lower Colne LWS	0.002	12.122	-	-	-	-
E20	Lower Colne LWS	0.002	12.122	-	-	-	-
E21	Little Britain LWS	0.004	12.224	-	-	-	-
E22	Little Britain LWS	0.007	12.227	-	-	-	-
E23	Little Britain LWS	0.004	12.224	-	-	-	-
E24	Beeches LWS	0.005	12.225	-	-	-	-
E25	Beeches LWS	0.004	12.224	-	-	-	-
E26	Beeches LWS	0.003	12.223	-	-	-	-

5.4.17 As shown in Table 38, PCs were below the relevant criteria at all ecological designations. As such, predicted effects on nitrogen deposition are not considered to be significant.

Acid Deposition

5.4.18 Maximum predicted annual acid deposition rates at the ecological receptor locations based on a total operational period of 96.5-hours per annum are summarised in Table 39.

Table 39 Predicted Annual Acid Deposition Rates - Ecological Receptors

Receptor		Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)		Proportion of EQS (%)
		N	S	
E1	Burnham Beeches SAC	0.00002	0.00000	0.0
E2	Windsor Forest and Great Park SAC	0.00006	0.00000	0.0

Receptor		Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)		Proportion of EQS (%)
		N	S	
E3	South West London Waterbodies SPA and Ramsar	0.00006	0.00000	-
E4	South West London Waterbodies SPA and Ramsar	0.00006	0.00000	-
E5	South West London Waterbodies SPA and Ramsar	0.00006	0.00000	-
E6	South West London Waterbodies SPA and Ramsar	0.00004	0.00000	-
E7	South West London Waterbodies SPA and Ramsar	0.00003	0.00000	-
E8	Grand Union Canal, Slough Branch BNS	0.00181	0.00014	-
E9	Grand Union Canal, Slough Branch BNS	0.00144	0.00016	-
E10	Grand Union Canal, Slough Branch BNS	0.00126	0.00011	-
E11	Grand Union Canal, Slough Branch BNS	0.00163	0.00013	-
E12	Opposite Iver Station BNS	0.00125	0.00014	0.0
E13	Opposite Iver Station BNS	0.00104	0.00009	0.0
E14	Opposite Iver Station BNS	0.00100	0.00008	0.0
E15	Opposite Iver Station BNS	0.00079	0.00006	0.0
E16	Opposite Iver Station BNS	0.00084	0.00006	0.0
E17	Grand Union Canal, near Iver North BNS	0.00065	0.00005	-
E18	Lower Colne LWS	0.00012	0.00001	-
E19	Lower Colne LWS	0.00015	0.00001	-
E20	Lower Colne LWS	0.00017	0.00001	-
E21	Little Britain LWS	0.00031	0.00002	-
E22	Little Britain LWS	0.00051	0.00004	-
E23	Little Britain LWS	0.00029	0.00002	-
E24	Beeches LWS	0.00033	0.00002	-
E25	Beeches LWS	0.00026	0.00002	-
E26	Beeches LWS	0.00018	0.00001	-

5.4.19 As shown in Table 39, PCs were below the relevant criteria at all ecological designations. As such, predicted effects on acid deposition are not considered to be significant.

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Amazon Data Services UK Limited to undertake an Air Quality Assessment in relation to a proposed emergency back-up power generation facility at Ridgeway Data Centre, Iver.

6.1.2 Atmospheric emissions from standby generators at the site have the potential to cause air quality impacts at sensitive locations. As such, an Air Quality Assessment was undertaken in order to quantify potential effects during the following four operating scenarios:

- Event 1 - Biweekly service test;
- Event 2 - Biannual service test;
- Event 3 - Maintenance test; and,
- Event 4 - Emergency Blackout Event.

6.1.3 Dispersion modelling of NO_x, NO, CH_2O, CO, PM_{10}, $PM_{2.5}$ and SO_2 emissions was undertaken using ADMS-6. Impacts at sensitive receptors were quantified for two separate Scenarios and the results compared with the relevant EQSs.

6.1.4 Predicted pollutant concentrations for Scenario 1, representing regular standby generator testing, were below the relevant EQSs at all receptor locations. As such, impacts are not considered to be significant.

6.1.5 Predicted pollutant concentrations for Scenario 2, representing a 72-hour grid outage, were below the relevant EQSs at all human receptor locations. As such, impacts are not considered to be significant.

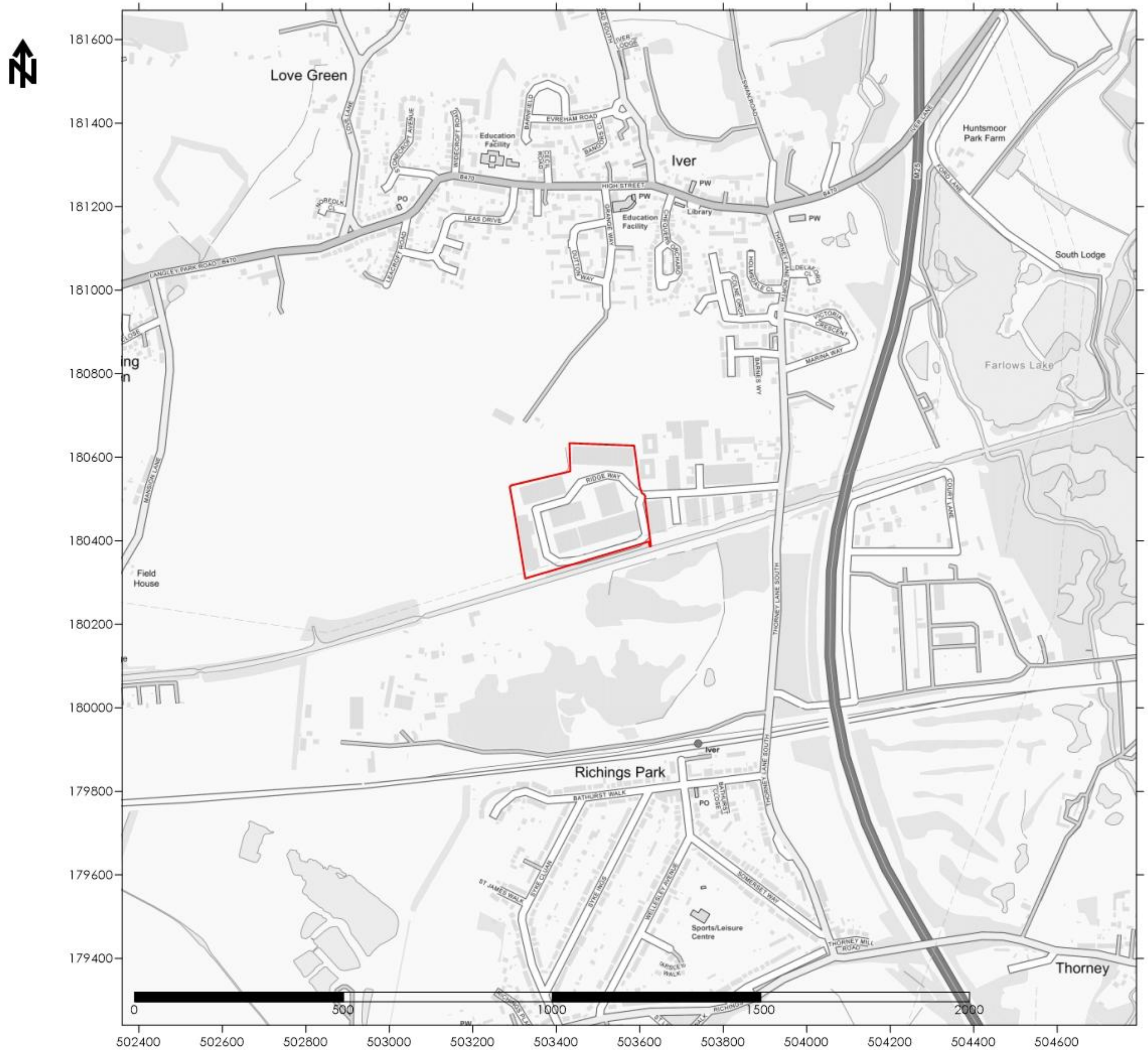
6.1.6 The risk of EQS exceedence at sensitive ecological receptors during Scenario 2 was predicted to be below 1%. As such, impacts are not considered to be significant.

6.1.7 Impacts on long-term pollutant concentrations were not predicted to be significant at any human or ecological receptor.

7.0 ABBREVIATIONS

AEGL	Acute Exposure Guideline Level
APIS	Air Pollution Information System
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
AURN	Automatic Urban and Rural Network
AW	Ancient Woodland
BC	Buckinghamshire Council
BNS	Biological Notification Site
CERC	Cambridge Environmental Research Consultants
C_6H_6	Benzene
CH_2O	Formaldehyde
CO	Carbon monoxide
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
EQS	Environmental Quality Standard
LAQM	Local Air Quality Management
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
NGR	National Grid Reference
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
PC	Process Contribution
PEC	Predicted Environmental Concentration
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 10µm
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
SAC	Special Area of Conservation
SO_2	Sulphur dioxide
US EPA	United States Environmental Protection Agency
z_0	Roughness length
%ile	Percentile

Figures



Legend

Site Boundary

Title

Figure 1 - Site Location

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Air Quality Assessment
Ridgeway Distribution Centre, Iver

Project Reference

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Site Boundary

Existing Site Fence

Title

Figure 2 - Site Layout

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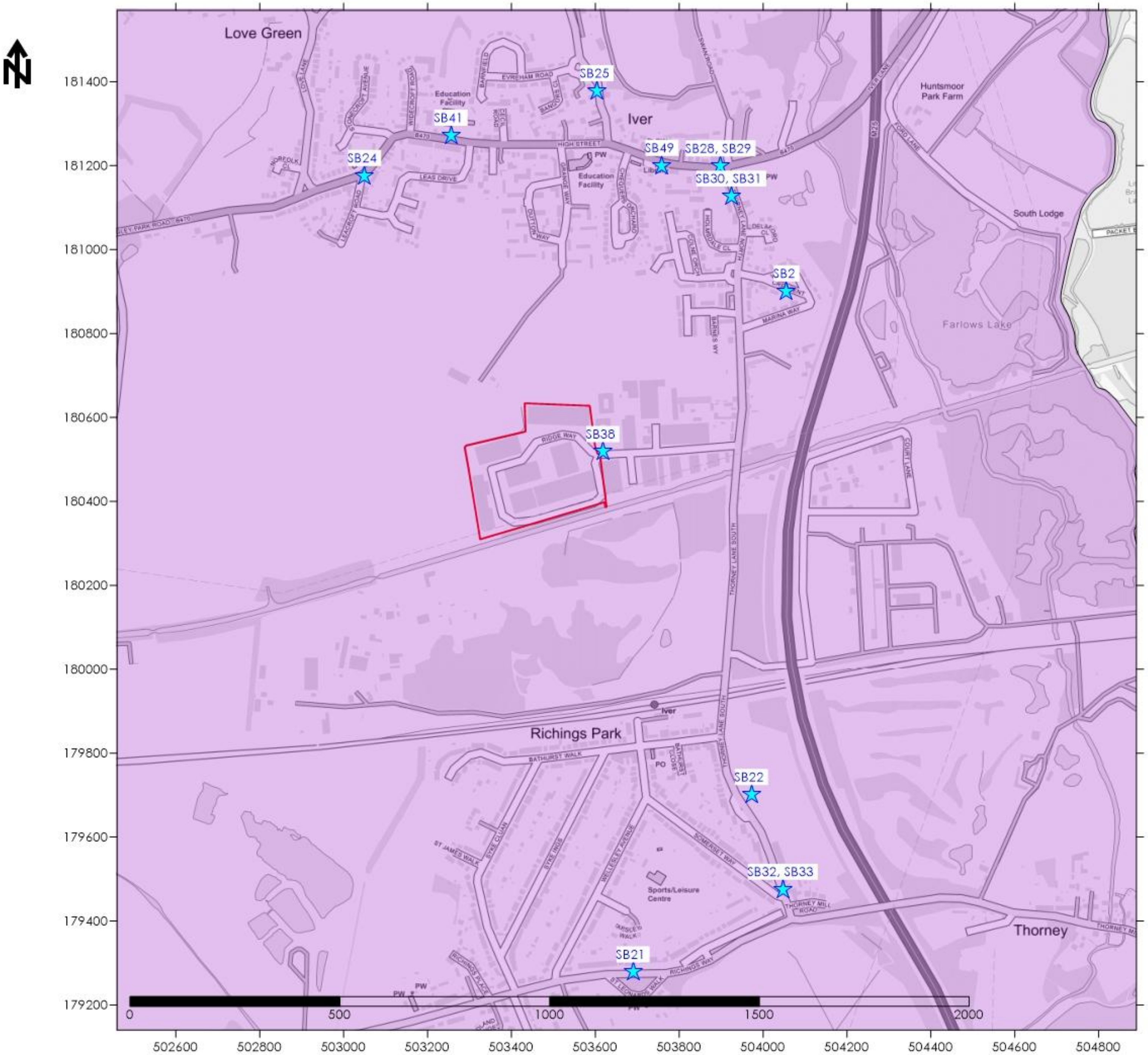

Legend

Site Boundary

Monitor

South Bucks District Council AQMA No. 2

Title

Figure 3 - Monitoring Locations and AQMA Designation

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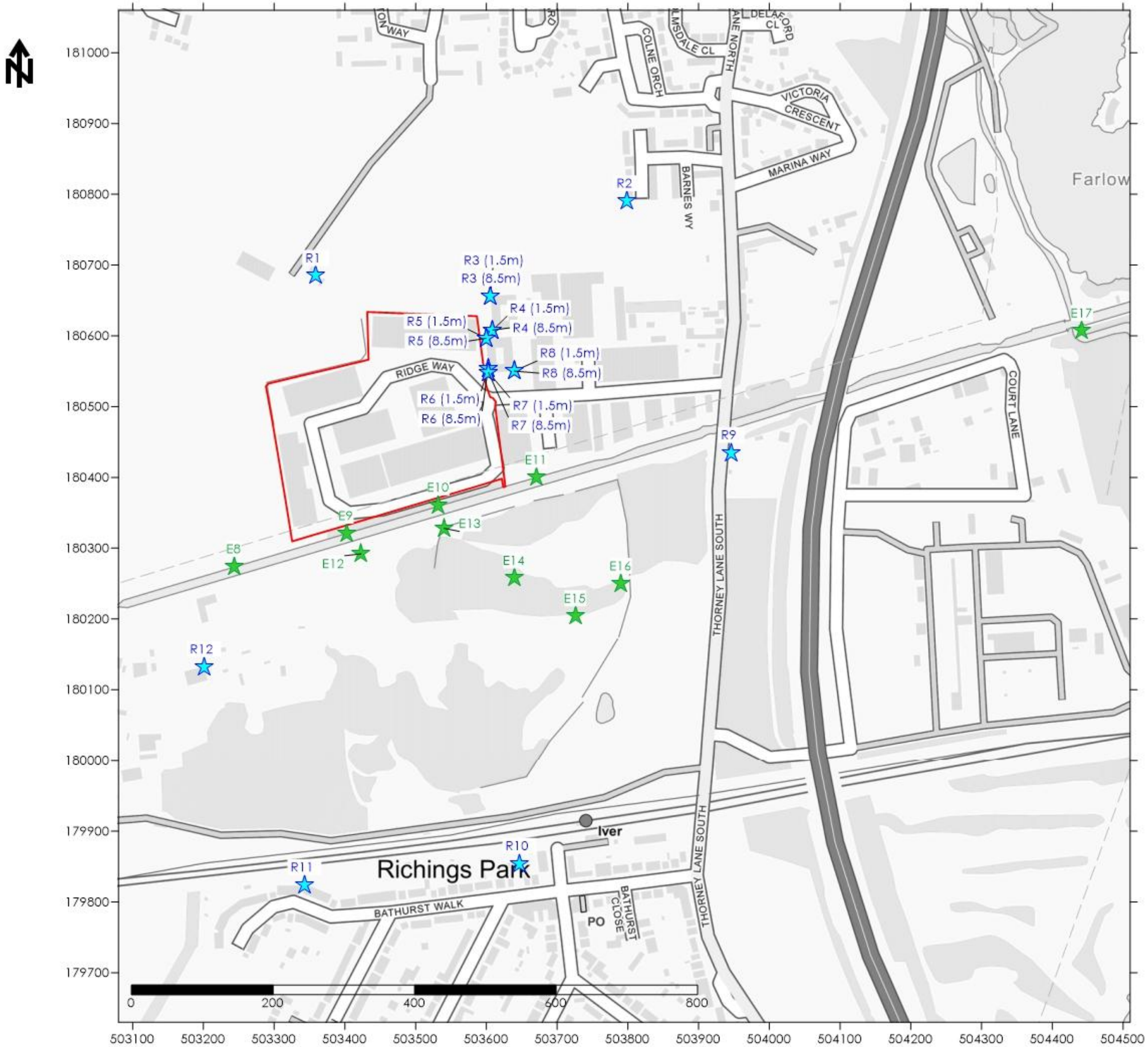

Legend

Site Boundary

Human Receptor

Ecological Receptor

Title

Figure 4 - Human and Ecological Sensitive Receptor Locations

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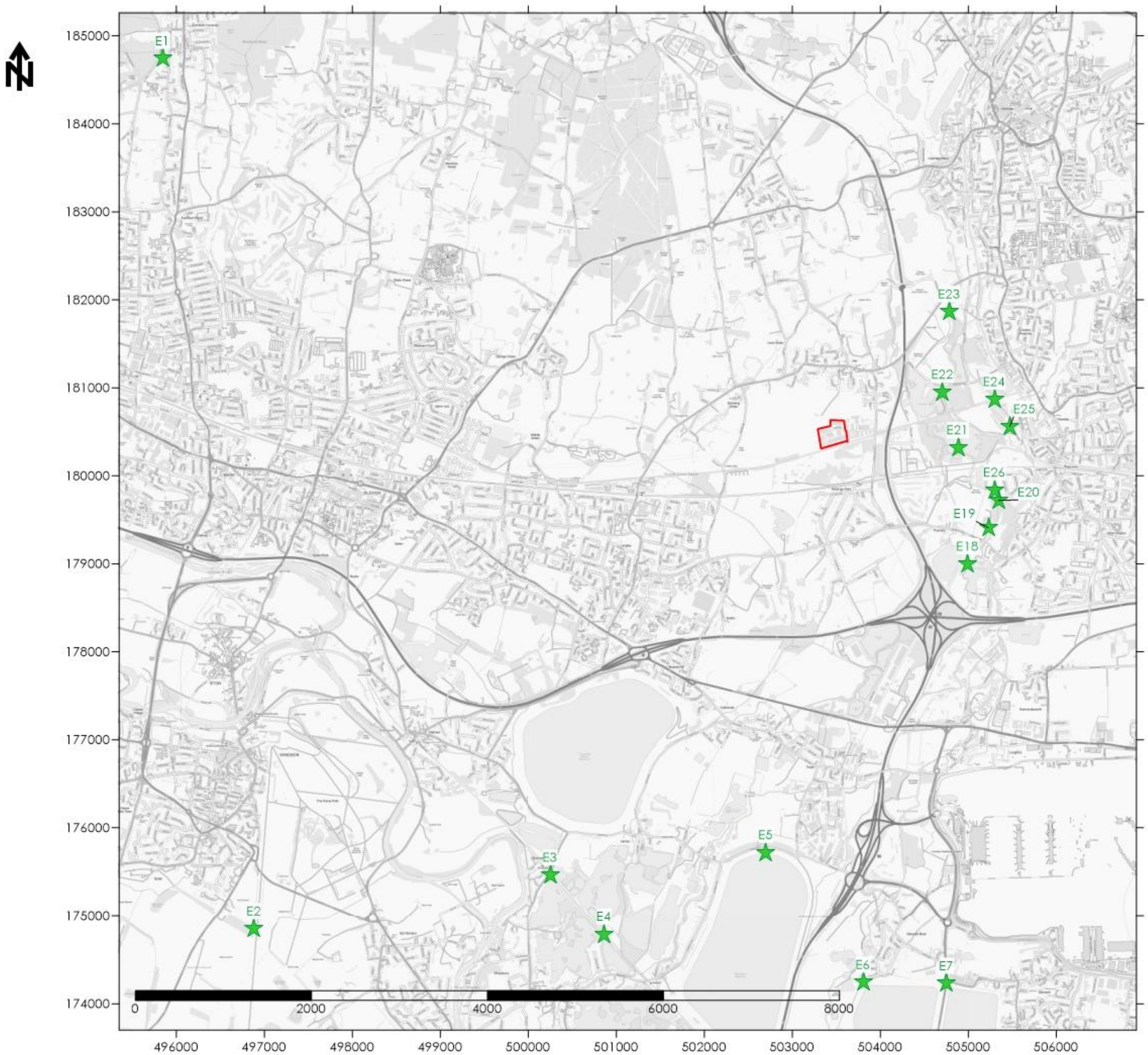

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Site Boundary

Receptor

Title

Figure 5 - Ecological Sensitive Receptor Locations

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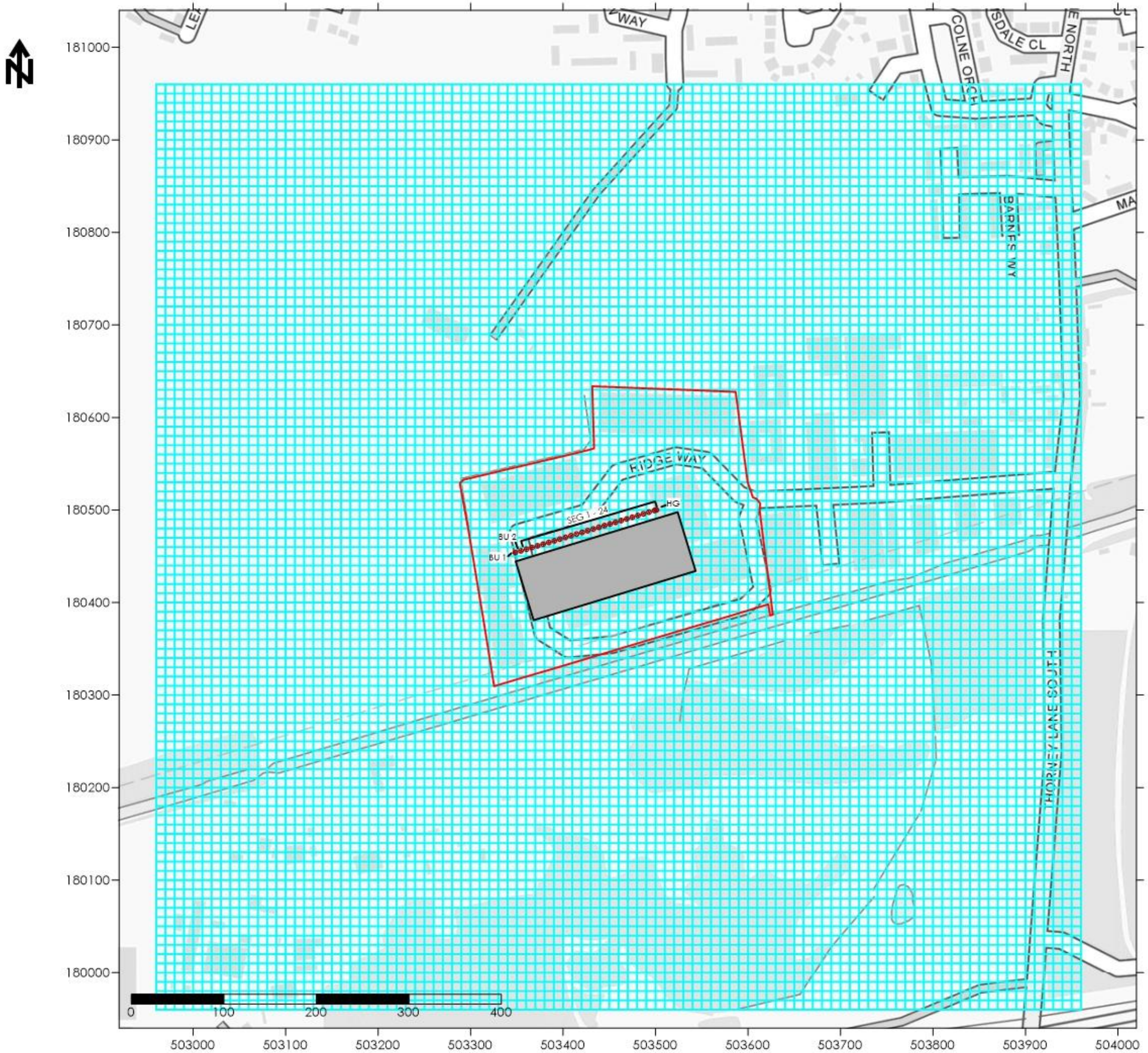

Legend

Site Boundary

Emission Point

Building

Output Grid

Title

Figure 6 - ADMS-6 Inputs

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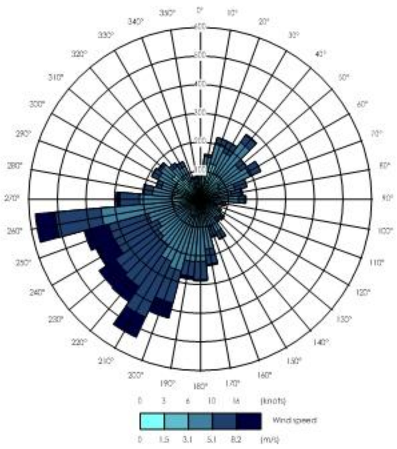
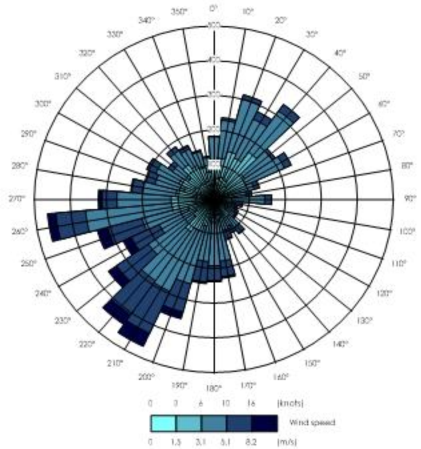
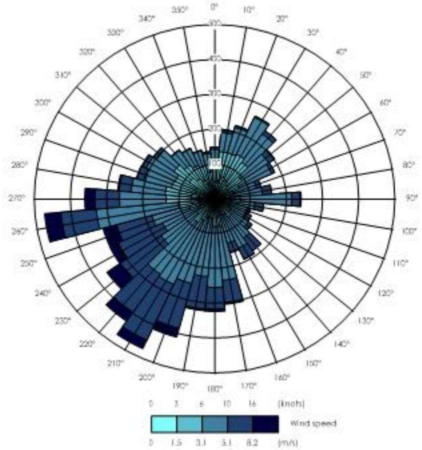


2020



2021



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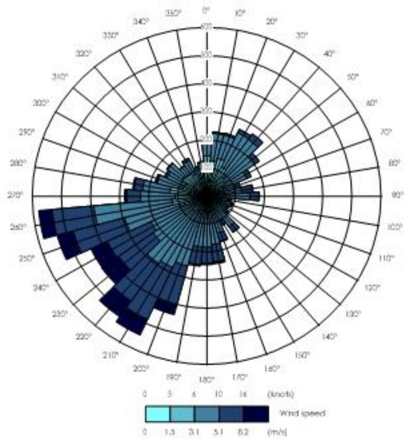
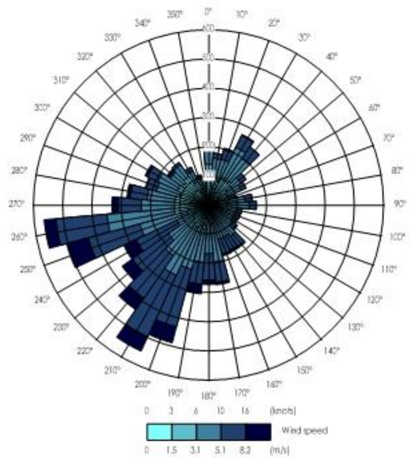


2023



2024

Legend

Title

Figure 7 - Wind Roses of 2020 to 2024 Heathrow Airport Meteorological Data

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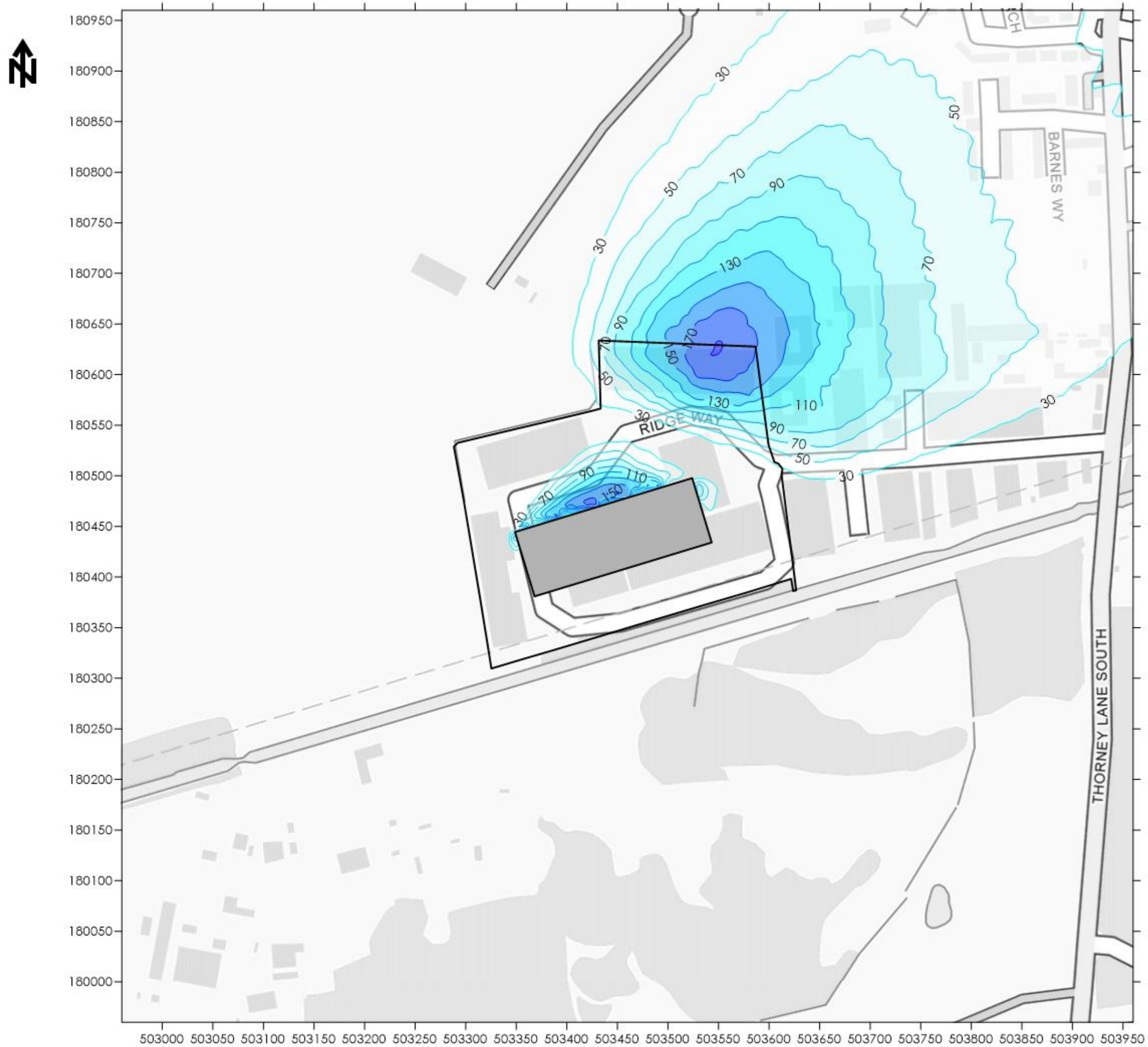

Legend

Site Boundary

190
170
150
130
110
90
70
50
30

83.68th %ile 1-hour Mean NO_2 Concentrations ($\mu g/m^3$)

Title

Figure 8 - Predicted 83.68th %ile 1-hour NO_2 Concentrations ($\mu g/m^3$)
2023 Meteorological Data

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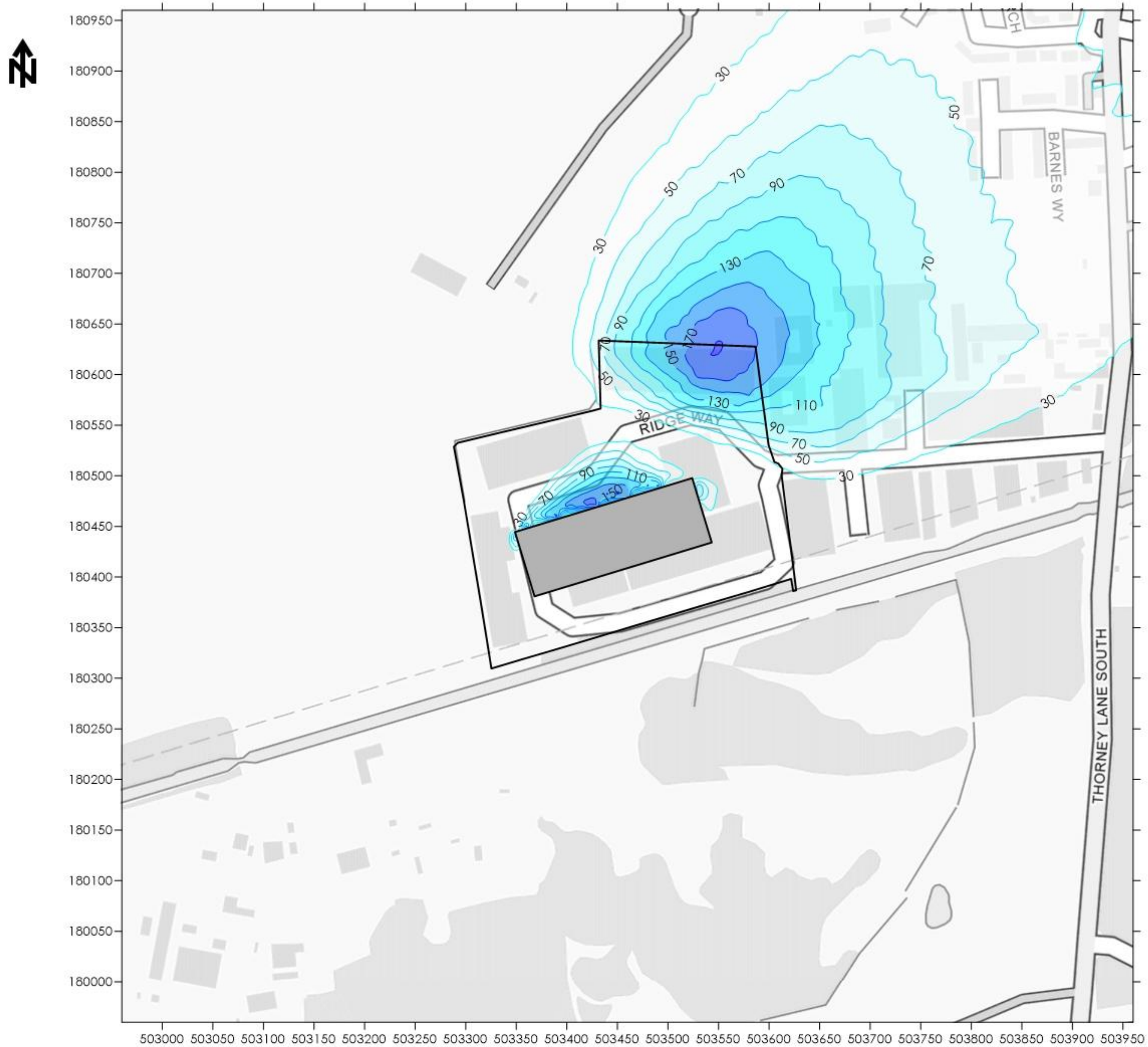

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Site Boundary

190
170
150
130
110
90
70
50
30

83.68th %ile 1-hour Mean NO_2 Concentrations ($\mu g/m^3$)

Title

Figure 8 - Predicted 83.68th %ile 1-hour NO_2 PC Concentrations ($\mu g/m^3$)
2023 Meteorological Data

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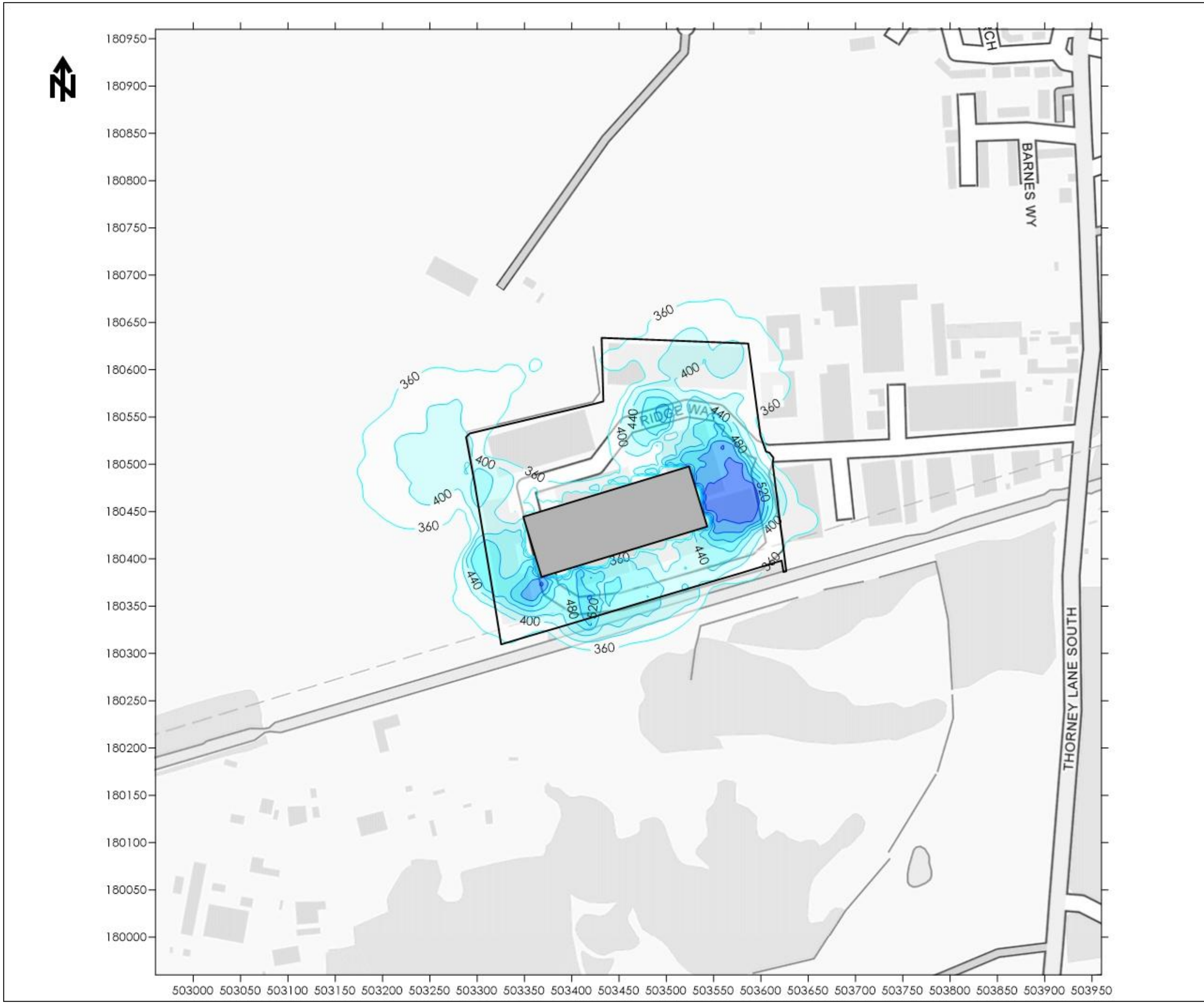

Title
Figure 9 - Predicted 100th %ile 1-hour Mean NO_2 PC Concentrations (µg/m³)
2021 Meteorological Data

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Ridgeway Distribution Centre, Iver

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Legend

Site Boundary

3600
3400
3200
3000
2800
2600
2400
2200

100th %ile 1-hour Mean NO Concentrations (μg/m³)

Title

Figure 10 - Predicted 100th %ile 1-hour Mean NO PC Concentrations (μg/m³) 2021 Meteorological Data

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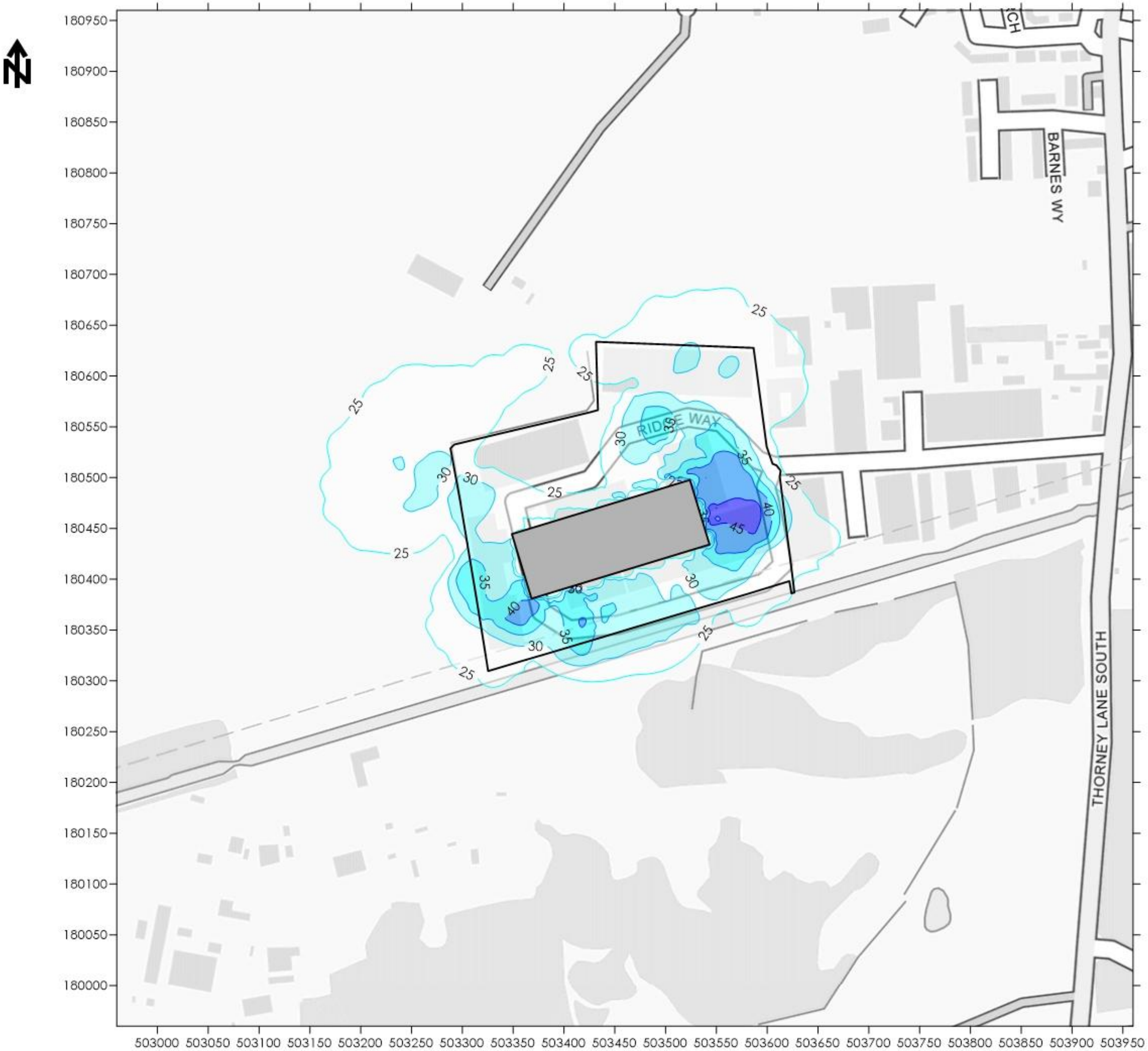

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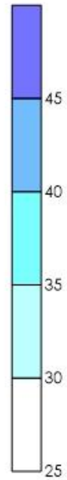
Site Boundary



100th %ile 1-hour Mean CH_2O Concentrations (μg/m³)

Title

Figure 11 - Predicted 100th %ile 1-hour Mean CH_2O PC Concentrations (μg/m³) 2021 Meteorological Data

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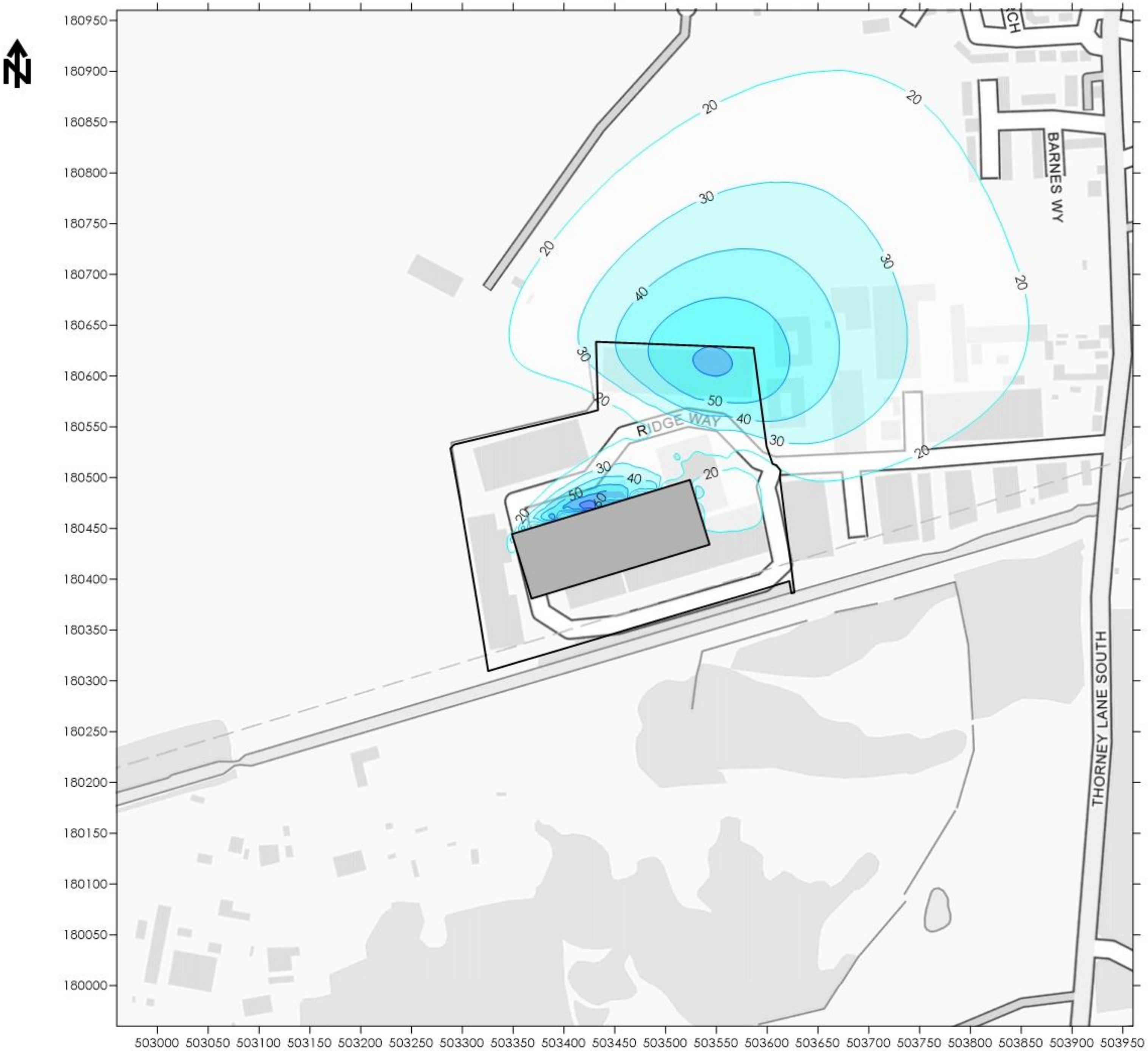

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Site Boundary

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

80
70
60
50
40
30
20

Title

Figure 12 - Predicted Annual Mean NO_2 PC Concentrations ($\mu g/m^3$) 2023 Meteorological Data

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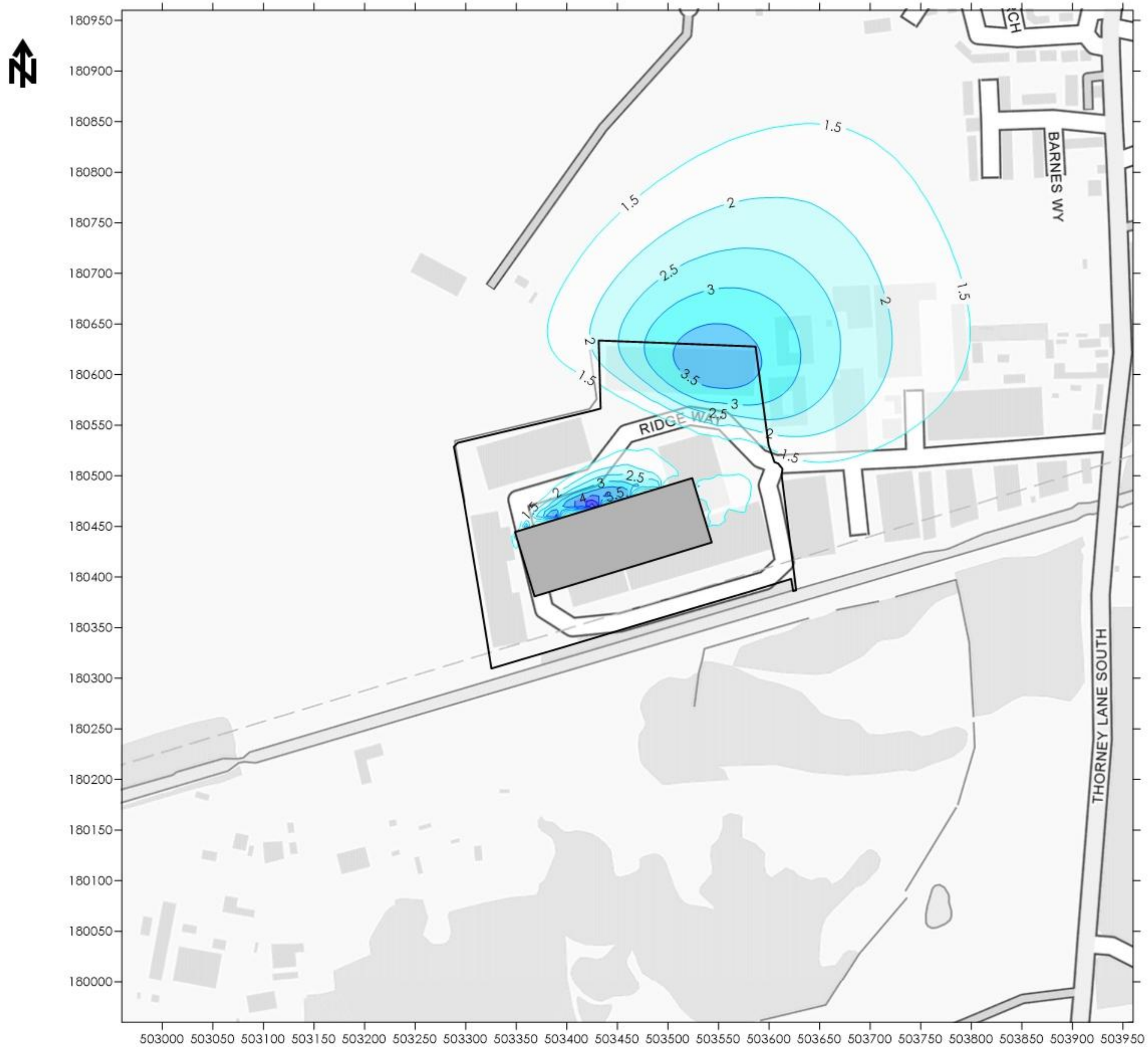

Title

Figure 13 - Predicted Annual Mean NO PC Concentrations (µg/m³) 2023 Meteorological Data

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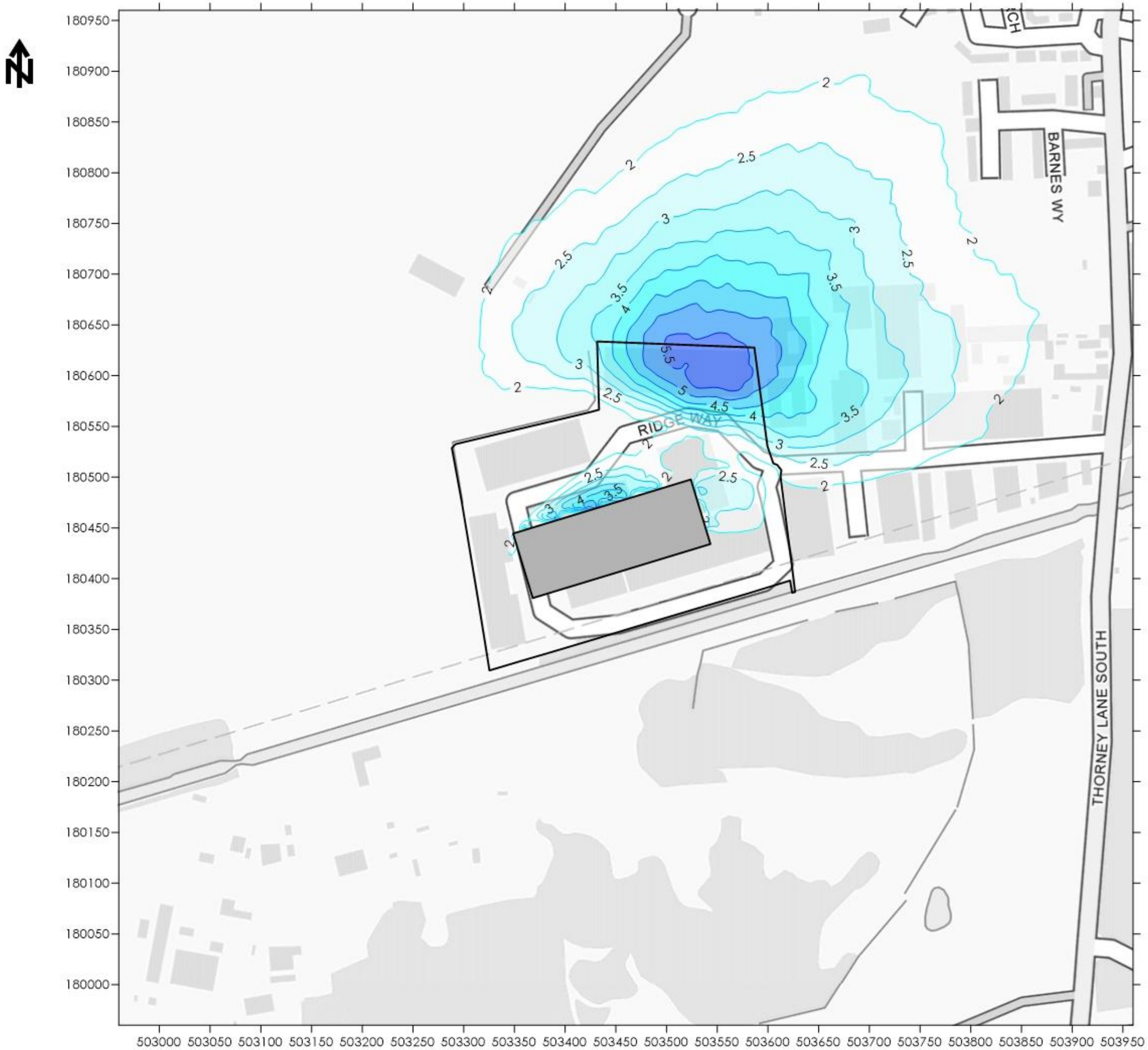

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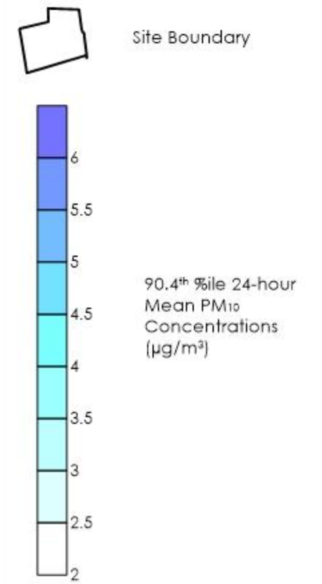

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Figure 14 - Predicted 90.4th %ile 24-hour Mean PM_{10} PC Concentrations (µg/m³)
2023 Meteorological Data

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