Dispersion Modelling Assessment

Glasgow Data Centre

Presented to: HFD Construction Group

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Table of Contents

Figures

Appendices

1.0 Introduction

1.1 Appointment

1.1.1 Lucion Delta-Simons Ltd ("Lucion") was instructed by Wallace Whittle on behalf of HFD Construction (the 'Client') to undertake a Dispersion Modelling Assessment in support of an Environmental Authorisation Permit Application under the Environmental Authorisations (Scotland) Regulations (2018) (EASR) for a Data Centre (DV1) in Glasgow (the 'Site').

1.2 Site Location and Context

1.2.1 The Site is located on land off Lancaster Avenue, Glasgow, at approximate National Grid Reference (NGR): 277810, 661860. Reference should be made to Figure 1 for a map of the Site and surrounding area.

1.2.2 It is proposed to install ten Hydrotreated Vegetable Oil (HVO) fired back-up generators to complement two existing generators. The facility will subsequently include the following back-up combustion plant:

- Two existing P2500 - LV Generators 2000kVA / 1600kW;
- Two QSK78 - G24 Generators;
- Two QSK78 - G16 Generators; and,
- Six QSK78 - G16 Generators fitted with Selective Catalytic Reduction (SCR) systems.

1.2.3 The back-up generators will ensure the availability of uninterrupted power supply to the Data Centre at all times. Beyond maintenance and testing, the plant will be utilised in emergency situations. Reference should be made to Figure 2 for a site layout plan.

1.2.4 Atmospheric emissions associated with the operation of the standby generators have the potential to cause air quality impacts at sensitive receptor locations in the vicinity of the Site. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions, quantify pollutant levels at sensitive locations and consider potential effects. This is detailed in the following report.

1.2.5 The standard limitations associated with this assessment are presented in **Appendix A.**

1.2.6 A glossary of terms used in this report is provided in **Appendix B**.

2.0 Legislation and Policy

2.1 Legislation

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

- Nitrogen dioxide (NO_2);
- Sulphur dioxide (SO_2);
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$);
- Benzene (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 Air Quality (Scotland) Regulations (2010) were amended in 2016[1] to introduce an Air Quality Objective (AQO) for $PM_{2.5}$.

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA), in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland and published in July 2007[2]. The document contains standards, objectives and measures for improving ambient air quality, including a number of AQOs. These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 **Table 1** presents the AQOs for pollutants considered within this assessment.

Table 1 - Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (µg/m³)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded more than 18 times per annum
CO	10,000	8-hour running mean
PM_{10}	18	Annual mean
	50	24-hour mean, not to be exceeded more than 7 times per annum
$PM_{2.5}$	10	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
C_6H_6	3.25	Running annual mean

1 The Air Quality (Scotland) Amendment Regulations 2016, Environmental Protection, Scottish Statutory Instruments, 2016.
2 The AQS for England, Scotland, Wales and Northern Ireland, DEFRA, Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, 2007.

2.1.5 **Table 2** summarises the advice provided in DEFRA and devolved administrations, including the Scottish Government, guidance[3] on where the AQOs for pollutants considered within this report apply.

Table 2 - Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access
15-minute mean	All locations where members of public might reasonably be exposed for a period of 15 minutes or longer	-

2.2 Industrial Pollution Control Legislation

2.2.1 Atmospheric emissions from industry are controlled in Scotland through the EASR. The operation of back-up generators is included within the Regulations and as such the facility is required to operate in accordance with an Environmental Authorisation issued by the Scottish Environment Protection Agency (SEPA). Compliance with any conditions of the authorisation must be demonstrated through periodic monitoring requirements, which will be set in order to mitigate the risk of environmental harm.

[3] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

2.2.2 The Cleaner Air for Scotland 2[4] was produced by the Scottish Government in 2021. It contains the air quality policy framework for the next five years and a series of actions to deliver further air quality improvements. A core concept of industrial regulation in SEPA is continual improvement as well as mandatory environmental performance standards that will drive any dynamic improvement on a cyclical basis. The implications of the framework have been considered throughout the undertaking of this assessment.

2.3 Local Air Quality Management

2.3.1 Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management. 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, as summarised in **Table 2**, are likely to be exceeded, the LA 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.

2.4 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 comparator value. This enables 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 The EAL used in this assessment was obtained from Environment Agency (EA) guidance[5] and is summarised in **Table 3**. This was used in lieu of specific SEPA standards for 24-hour C_6H_6 concentrations.

4 Cleaner Air For Scotland 2 Towards a Better Place for Everyone, Scottish Government, 2021.
5 https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit.

Table 3 - Environmental Assessment Levels

Pollutant	Environmental Assessment Level	
	Concentration (μg/m³)	Averaging Period
C_6H_6	30	24-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 (mg/m³)					
	Level	Averaging Period				
		10-minutes	30-minutes	60-minutes	4-hours	8-hours
NO_2	1	0.94	0.94	0.94	0.94	0.94
	2	38	28	23	15	13
	3	64	47	38	26	21
CO	1	N/A	N/A	N/A	N/A	N/A
	2	480	170	95	38	31
	3	1,900	690	380	170	150
C_6H_6	1	420	240	170	58	29
	2	6,500	3,600	2,600	1,300	650
	3	31,000	18,000	13,000	6,500	3,300
SO_2	1	0.52	0.52	0.52	0.52	0.52
	2	1.95	1.95	1.95	1.95	1.95
	3	78	78	78	49	25

2.6 Critical Loads and Levels

2.6.1 A critical load is defined by the UK Air Pollution Information System (APIS)[6] 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:

[6] 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 exceedance. A larger exceedance is often considered to represent a greater risk of damage.

2.6.5 Maps of critical loads and levels and their exceedances have been used to show the potential extent of pollution damage and aid in developing strategies for reducing pollution. Decreasing deposition below the critical load is seen as means for preventing the risk of damage. However, even a decrease in the exceedance may infer that less damage will occur.

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/m³)	Averaging Period
Oxides of nitrogen (NO_x)	30	Annual mean
	75	24-hour mean
SO_2	20	Annual mean for higher plants
	10	Annual mean for sensitive lichen communities and bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity

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), North Lanarkshire Council (NLC) has undertaken Review and Assessment of air quality within its area of jurisdiction. This process has indicated that annual mean concentrations of PM_{10} are above the AQO within the county. As such, one AQMA has been declared. This is described as follows:

"An area encompassing part of the centre of Motherwell to the north of the civic centre in the vicinity of Merry Street, Menteith Road and Airbles Road."

3.2.2 The Site is located approximately 5.2km north-east of the AQMA. It is considered unlikely that the proposals would cause air quality impacts over a distance of this magnitude. As such, the AQMA has not been considered further in the context of the assessment.

3.2.3 NLC 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 pollutant concentrations is undertaken by NLC throughout its area of jurisdiction. A review of the survey locations indicated that the closest position is situated approximately 1.2km north of the Site. It is considered unlikely that pollution levels would be comparable over a distance of this magnitude. As such, this source of data was not considered further in the context of the assessment.

3.4 Background Concentrations

3.4.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by the Scottish Government for NO_2, PM_{10} and $PM_{2.5}$ to assist LAs in their Review and Assessment of air quality. DEFRA has also produced predictions of background CO, SO_2 and C_6H_6 concentrations on the same basis. The Site is located in grid square NGR: 277500, 661500. Data for this location was downloaded from the Scottish Air Quality website[7] and DEFRA[8] for the purpose of the assessment and is summarised in **Table 6**.

Table 6 - Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration ($\mu g/m^3$)	Data Source
NO_2	12.36	Scottish Air Quality
PM_{10}	12.11	Scottish Air Quality
$PM_{2.5}$	5.83	Scottish Air Quality
CO	291	DEFRA
SO_2	8.11	DEFRA
C_6H_6	0.371	DEFRA

3.4.2 As shown in **Table 6**, predicted background concentrations are below the relevant AQOs at the Site.

3.4.3 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ are predicted for 2026, C_6H_6 for 2010 and CO and SO_2 for 2001. These were the most recent predictions available at the time of reporting and are therefore considered to provide a reasonable representation of background concentrations in the vicinity of the Site.

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

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.

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 7**.

Table 7 - Human Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Girvan Crescent	277821.2	661994.1
R2	Residential - Girvan Crescent	277858.3	661962.9
R3	Residential - Girvan Crescent	277885.8	661947.1
R4	Residential - Tarbolton Crescent	277907.4	661942.0
R5	Residential - Tarbolton Crescent	277956.5	661951.8
R6	Residential - Dalry Place	277995.1	661964.1
R7	Residential - Dalry Place	278017.9	661957.3
R8	Residential - Bowhill Road	278116.8	661989.6
R9	Residential - Lindean Drive	278158.0	661974.4
R10	Residential - Goldstream Grove	278217.4	661923.5
R11	Residential - Callander Road	277754.7	662052.2
R12	Residential - Michael Terrace	277625.1	662326.2

3.5.3 Reference should be made to Figure 3 for a map of the human receptor locations.

Ecological Receptors

3.5.4 Atmospheric emissions from the facility also have the potential to impact receptors of ecological sensitivity. A desk-top study was undertaken utilising the Proximity Screening tool[9] to identify ecological receptors within the relevant screening distance from the Site, as outlined in SEPA guidance[10]. Use of the tool for HVO fuel and 50-100MW total thermal input capacity indicated a 7km screening distance. The following ecological designations were therefore identified for inclusion in the assessment:

- Lady Bell's Moss Site of Special Scientific Interest (SSSI); and,
- Hamilton Low Parks SSSI.

3.5.5 For the purpose of the modelling assessment, discrete receptors have been placed at the closest point of the designations to the facility to ensure the maximum potential impacts are predicted. These are summarised in **Table 8**.

Table 8 - Ecological Receptor Locations

Receptor		NGR (m)	
		X	Y
E1	Lady Bell's Moss SSSI	280612.0	664772.9
E2	Hamilton Low Parks SSSI	273585.1	656475.6

3.5.6 Reference should be made to Figure 4 for a map of the ecological receptor locations.

9 https://www.apis.ac.uk/MCP_Screening.
10 https://beta.sepa.scot/topics/air/air-emissions-risk-assessments/.

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[11] website was undertaken in order to identify the most sensitive habitat description and associated critical load for the area of each designation considered within the assessment.

3.5.8 The relevant nitrogen deposition critical loads are presented in **Table 9**.

Table 9 - Critical Loads for Nitrogen Deposition

Receptor		Feature	Relevant Nitrogen Critical Load Class	Critical Load (kgN/ha/yr)	
				Low	High
E1	Lady Bell's Moss SSSI	Raised bog	Raised and blanket bogs	5	10
E2	Hamilton Low Parks SSSI	Ardea cinerea - breeding	-[(a)]	-	-

Note: (a) Critical load not assigned for feature on APIS.

3.5.9 The relevant acid deposition critical loads are summarised in **Table 10**.

Table 10 - Critical Loads for Acid Deposition

Receptor		Feature	Relevant Acid Critical Load Class	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E1	Lady Bell's Moss Site of SSSI	Raised bog	Bogs	0.321	0.248	0.569
E2	Hamilton Low Parks SSSI	Ardea cinerea - breeding	-[(a)]	-	-	-

Note: (a) Critical load not assigned for feature on APIS.

3.5.10 Baseline NO_x concentrations, as well as nitrogen and acid deposition rates, at the ecological receptors were obtained from the APIS[12] website and are summarised in **Table 11**.

Table 11 - Baseline Pollutant Levels

Receptor		Background Annual Mean Pollutant Conc. (μg/m^3)		Background Deposition Rate	
		NO_x	SO_2	Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)
E1	Lady Bell's Moss Site of SSSI	7.46	0.99	9.60	0.77
E2	Hamilton Low Parks SSSI	12.30	1.18	10.30	0.82

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

4.0 Methodology

4.1 Introduction

4.1.1 Atmospheric emissions from the back-up generators have the potential to contribute to pollutant concentrations at sensitive human and ecological locations in the vicinity of the Site. Dispersion modelling has therefore been undertaken in order to quantify pollutant levels at sensitive locations. The associated methodology is summarised in the following Sections.

4.2 SEPA Consultation

4.2.1 Prior to undertaking the dispersion modelling, a Method Statement was produced and submitted to SEPA for comment. This summarised the proposed approach to assessment and relevant dispersion modelling inputs. Following a meeting on 15th May 2026 agreement to the general approach was provided. Any additional requirements identified by SEPA during this process were also considered throughout the assessment as necessary.

4.3 Dispersion Model

4.3.1 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 (MO) length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

4.3.2 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.

4.4 Modelling Scenarios

4.4.1 The proposed generators will operate in accordance with a regular testing schedule and have the potential to be utilised in emergency situations. These Events are described as follows:

- Event 1: Testing and maintenance - The generators will operate for 17.7-hours each year, in accordance with a regular schedule that will include the following:
  - Weekly: Each generator will operate individually for 10-minutes off-load every week;
  - Monthly: Each P2500 generator as well as two identical banks of five generators will operate separately for 30-minutes every month at approximately 30% load. No more than five generators will be operational at any one time; and,
  - Annually: Each generator will operate individually for 3-hours every year at 100% load.
- Event 2: Emergency Blackout Event - There is the potential for all generators to operate at 100% load in the event of a power outage. The Client has confirmed that emergency operation would occur for a maximum of 24-hours each year.

4.4.2 The Events described above were reviewed in the context of operational duration and emission potential when developing suitable scenarios for the modelling assessment. These were previously agreed with SEPA during the pre-application process and are summarised in **Table 12**.

Table 12 - Modelling Scenarios

Scenario	Operating Profile	Description	Representative Event
Scenario 1	Continuous	One bank of five generators was modelled at 100% load, 24-hours a day, 365-days a year as the maximum potential generators to be operating at a single time. The results represent maximum potential short-term impacts associated with the regular testing and maintenance schedule	Event 1
Scenario 2	A single event of 24-hours of generator operation	A single event where all generators operate at 100% load. The results represent potential impacts associated with an Emergency Blackout Event	Event 2

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

- Process Contribution (PC) - Predicted pollutant level as a result of emissions from the facility; and,
- Predicted Environmental Concentration (PEC) - Predicted pollutant level as a result of emissions from the facility and existing baseline conditions.

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

Scenario 1

4.4.5 For Scenario 1, emissions from the bank of five generators 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. If exceedances of the EQSs were identified, then the input parameters would have been amended to more accurately represent actual emissions.

4.4.6 During Scenario 1, the generators will be run between 10-minutes and 3-hours. As such, emissions are unlikely to significantly affect concentrations for averaging periods greater than 3-hours. These were therefore not included in the model.

4.4.7 The assessment EQS for Scenario 1 are summarised in **Table 13**.

Table 13 - Scenario 1 Modelled EQS

Pollutant	Modelled As	EQS ($\mu g/m^3$)
NO_2	Maximum 10-minute mean	940
	Maximum 30-minute mean	940
	Maximum 1-hour mean	940[(a)]
CO	Maximum 10-minute mean	480,000
	Maximum 30-minute mean	170,000
	Maximum 1-hour mean	95,000[(b)]
C_6H_6	Maximum 10-minute mean	420,000

Pollutant	Modelled As	EQS (µg/m³)
	Maximum 30-minute mean	240,000
	Maximum 1-hour mean	170,000
SO_2	Maximum 10-minute mean	520
	Maximum 30-minute mean	520
	Maximum 1-hour mean	520[(c)]
	99.9th percentile (%ile) 15-minute mean	266

Note: (a) The total duration of Scenario 1 is assumed as 17.7-hours. As such, emissions are unlikely to significantly affect concentrations in the context of the 1-hour mean AQO of 200µg/m^3 as 18 exceedances are permitted per annum. Results were therefore not considered in the context of the AQO.

(b) Results also considered in the context of the EAL of 30,000µg/m^3.

(c) The total duration of Scenario 1 is assumed as 17.7-hours. As such, emissions are unlikely to significantly affect concentrations in the context of the 1-hour mean EQS of 350µg/m^3 as 24 exceedances are permitted per annum. Results were therefore not considered in the context of the EQS.

Scenario 2

4.4.8 For Scenario 2, emissions from all generators were modelled constantly to ensure a full range of meteorological conditions were included in the outputs. The approach to analysis of the results is summarised in the following Sections.

Human Receptors

4.4.9 Statistical analysis using the hypergeometric probability distribution to identify the potential for an exceedance of the 1-hour EQS for NO_2 was utilised. This method is outlined in 'Specified generators: dispersion modelling assessment' guidance produced by the EA[13] for facilities that operate periodically on an undefined schedule.

4.4.10 An operating period of 24-hours per annum was assumed. Using the hypergeometric probability distribution method, it was determined that should the results indicate 4,980 or less 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 exceedance of the EQS, within 24-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 guidance[15] indicates that:

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

4.4.11 Although the generator plant operational lifetime may exceed 20-years, operation over a 24-hour duration is considered unlikely. As such, this level of probability is considered to be acceptable and therefore an appropriate criterion for use in the assessment.

4.4.12 Based on the number of instances determined previously, the 43.15th %ile was calculated for use in the modelling assessment. As such, should predicted 43.15th %ile 1-hour mean NO_2 concentrations be under 200µg/m^3 then there is less than 5% probability of an EQS exceedance and impacts are not considered significant.

[13] https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.
[14] https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.
[15] https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.

4.4.13 The maximum predicted concentrations of C_6H_6, CO and SO_2 for each short-term 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 exceedances of the EQSs were identified, then additional analysis would have been provided as necessary.

4.4.14 The duration of Scenario 2 was assumed as 24-hours. As such, emissions are unlikely to significantly affect the 24-hour mean EQSs for PM_{10} and SO_2 as seven and three exceedances are permitted per annum, respectively. These were therefore not included in the model.

4.4.15 The relevant EQS for Scenario 2 are summarised in **Table 14**.

Table 14 - Scenario 2 Relevant EQS: Human Receptors

Pollutant	Modelled As	EQS (µg/m³)
NO_2	43.15th %ile 1-hour mean[(a)]	200
C_6H_6	100th %ile 24-hour mean	30
CO	100th %ile 8-hour rolling mean	10,000
SO_2	99.9th %ile 15-minute mean	266
	99.7th %ile 1-hour mean	350

Note: (a) %ile associated with 24-hours of operation per year. Calculated using the approach for hypergeometric mean calculation as outlined in EA guidance[16].

Ecological Receptors

4.4.16 Scenario 2 has the potential to affect 24-hour mean NO_x concentrations at sensitive ecological receptors. An assessment was therefore be undertaken assuming constant operation of the generators.

Long-Term Averaging Periods

4.4.17 Modelling was also undertaken for the long-term pollutant averaging periods summarised in **Table 15**.

Table 15 - Long Term Pollutant Averaging Periods

Pollutant	Receptor Type	Modelled As	EQS (µg/m³)
NO_2	Human	Annual mean	40
PM_{10}	Human	Annual mean	18
$PM_{2.5}$	Human	Annual mean	10
C_6H_6	Human	Annual mean	3.25
NO_x	Ecological	Annual mean	30
SO_2	Ecological	Annual mean	10
Nitrogen deposition	Ecological	Annual	As outlined in **Table 9**
Acid deposition	Ecological	Annual	As outlined in **Table 10**

4.4.18 To predict annual mean concentrations, the generators were modelled as operating simultaneously at 100% load, 365-days a year and the results subsequently factored to represent 41.7-hours operation of all generators. This consisted of:

- Scenario 1: 17.7-hours all generators operating; and,

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

- Scenario 2: 24-hours all generators operating.

4.4.19 The maximum predicted concentration for each averaging period was identified and compared to the relevant EQS.

4.5 Assessment Area

4.5.1 The assessment area was defined based on the Site location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 277060, 661110 to 278560, 662610. One Cartesian grid with a 10m resolution was used within the model to produce data suitable for contour plotting.

4.5.2 Reference should be made to Figure 5 for a graphical representation of the assessment grid extents.

4.6 Process Conditions

4.6.1 A summary of the process conditions for each generator is provided in **Table 16**. These were provided by the Applicant or calculated from the relevant technical data sheets for the generators.

Table 16 - Process Conditions

Parameter	Unit	P2500	QSK78 - G24	QSK78 - G16	QSK78 - G16 SCR
Quantity	-	2	2	2	6
Stack height	m	7.5	9.4	9.4	9.4
Source diameter	m	0.6	0.6	0.6	0.6
Exhaust gas temperature	°C	475	448	463	463
Exhaust gas flow rate	m^3/hr	31,500	27,060	27,960	27,960
Oxygen content of exhaust gas	%	10.5	9.8	10.0	10.0
Exhaust gas flow rate[(a)]	Nm^3/hr	7,545	7,172	7,393	7,393
Exhaust gas efflux velocity	m/s	30.95	26.58	27.47	27.47

Note: (a) 273K, 5% oxygen (O_2).

4.6.2 Reference should be made to Figure 5 for a map of the source locations.

4.7 Emissions

4.7.1 Pollutant emission concentrations for the generators were obtained from the relevant technical data sheets and information provided by DTGen, the technology supplier. A summary of the emissions from each source is summarised in **Table 17**.

Table 17 - Emissions

Parameter	Unit	P2500	QSK78 - G24	QSK78 - G16	QSK78 - G16 SCR
NO_x emission concentration	mg/Nm^3[(a)]	3,250	3,025	1,755	507
NO_x emission rate	g/s	6.811	6.027	3.605	1.041
Particulate Matter (PM) emission concentration	mg/Nm^3[(a)]	40	28	14.3	14.3
PM emission rate	g/s	0.084	0.056	0.029	0.029
CO emission concentration	mg/Nm^3[(a)]	210	424	243.4	243.4
CO emission rate	g/s	0.440	0.845	0.500	0.500

Parameter	Unit	P2500	QSK78 - G24	QSK78 - G16	QSK78 - G16 SCR
Volatile Organic Compound (VOC) emission concentration	$mg/Nm^{3(a)}$	400	73	30.7	30.7
VOC emission rate	g/s	0.838	0.145	0.063	0.063
SO_2 emission concentration	$mg/Nm^{3(a)}$	1.8	1.8	1.8	1.8
SO_2 emission rate	g/s	0.004	0.004	0.004	0.004

Note: (a) 273K, 5% O_2.

4.7.2 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 PM_{10} or $PM_{2.5}$. This allowed the maximum ground level impacts, with respect to the relevant EQS, to be assessed. Actual plant emissions of PM are unlikely to only consist of only these size fractions, resulting in a worst-case assessment.

4.7.3 The emission rate for VOC is stated as total hydrocarbons. Emissions from the combustion of HVO fuel will comprise numerous VOC components, of which C_6H_6 is anticipated to be a very small proportion. Information provided by DTGen indicated a C_6H_6 fraction of around 1% of total hydrocarbon emissions. In addition, data published by US EPA[17] indicated a C_6H_6 emission concentration from diesel fuel engines of 0.213ppm, while total hydrocarbon emissions were 34.5ppm. This indicates a 0.62% C_6H_6 proportion of exhaust emissions. Within the assessment, emissions were modelled as VOC and the results factored to C_6H_6 using the relative atomic mass to carbon ratio and the total hydrocarbon to C_6H_6 proportion provided by DTGen to allow comparison with the relevant EQS.

4.8 NO_x to NO_2 Conversion

4.8.1 Emissions of total NO_x from combustion processes are predominantly in the form of nitric oxide (NO). Excess oxygen in the combustion gases and further atmospheric reactions cause the oxidation of nitrogen oxide NO to nitrogen dioxide (NO_2). Comparisons of ambient NO and NO_2 concentrations in the vicinity of point sources in recent years has indicated that it is unlikely that more than 30% of the NO_x is present at ground level as NO_2.

4.8.2 Ambient NO_x concentrations were predicted through dispersion modelling. Concentrations of NO_2 shown in the results section assume 70% conversion from NO_x to NO_2 for annual means and 35% conversion for 1-hour concentrations, based upon SEPA guidance[18].

4.9 Deposition Calculation

4.9.1 Nitrogen deposition rates were calculated using the conversion factors provided within 'Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06'[19]. 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 18**.

[17] AP-42 Large Stationary Diesel and All Stationary Dual-fuel Engines, U.S. Environmental Protection Agency, 1996.
[18] https://beta.sepa.scot/topics/air/air-emissions-risk-assessments/#anchor-detaileddispersionmodelling.
[19] Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06, Air Quality Advisory Group, 2014.

Table 18 - Conversion Factors to Determine Dry Deposition Flux for Nitrogen Deposition

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

4.9.2 Predicted pollutant concentrations were converted to kilo-equivalent ion depositions (keq/ha/yr) for comparison with the relevant critical load for acid deposition. 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 19**.

Table 19 - 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	6.84
SO_2	0.012	0.024	9.84

4.9.3 The relevant deposition velocity was selected based on the vegetation type present within each designation.

4.9.4 The plume depletion model was switched off in accordance with SEPA requirements.

4.10 Building Effects

4.10.1 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.

4.10.2 Analysis of the site layout indicated that a number of buildings should be included within the model in order to take account of effects on pollutant dispersion. Building input geometries are shown in **Table 20.**

Table 20 - Building Geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
	X	Y				
Main	277807.3	661857.5	15.0	79.6	61.1	195.3
South Building	277808.1	661754.8	10.0	31.4	62.9	178.9
West Building	277736.3	661910.2	9.0	59.8	47.8	201.1
Transformers	277839.4	661837.3	7.4	57.5	11.4	195.3

4.10.3 Reference should be made to Figure 5 for a map of the building locations.

4.11 Meteorological Data

4.11.1 Meteorological data for use in the assessment was taken from Glasgow meteorological station over the period of 1st January 2020 to 31st December 2024 (inclusive). This observation station is located at NGR: 248050, 666760, which is approximately 30.1km west of the Site. It is considered that conditions would be reasonably similar over a distance of this magnitude. The data is therefore considered suitable for an assessment of this nature.

4.11.2 All meteorological files used in the assessment were provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of data within the UK. Wind roses of the meteorological records that have been utilised for the dispersion modelling assessment are provided in **Appendix C**.

4.12 Roughness Length

4.12.1 Roughness length (z_0) is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 0.5m was used to describe the modelling extents. This is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for 'parkland, open suburbia'.

4.12.2 A z_0 of 0.2m 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 (min)'.

4.13 Monin-Obukhov Length

4.13.1 The MO length provides a measure of the stability of the atmosphere. A minimum MO length of 30m 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 'mixed urban/industrial'.

4.14 Terrain Data

4.14.1 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 method suggested by CERC[20].

4.15 Background Concentrations

4.15.1 Review of existing data was undertaken in Section 3.0 in order to identify suitable background values for use in the assessment. This indicated the closest monitor is approximately 1.2km north of the Site. Due to the distance between the two positions, results are considered unlikely to be representative of the facility location. The background concentrations predicted by Scottish Air were therefore used to represent baseline levels in the assessment.

4.15.2 NLC do not undertake monitoring of CO, SO_2 or C_6H_6 concentrations in the vicinity of the Site. As such, background concentrations of the pollutants were obtained from the DEFRA mapping study for the grid square containing the Site, as shown in **Table 6**.

4.15.3 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 from other sources. This point is addressed in SEPA guidance[21], 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.

4.16 Assessment Criteria

4.16.1 SEPA guidance[22] 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.

4.16.2 If these criteria are exceeded the following guidance is provided on when whether impacts can be screened as insignificant:

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

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20 Note 105: Setting up Terrain Data for Input to CERC Models, CERC, 2016.
21 https://beta.sepa.scot/topics/air/air-emissions-risk-assessments/.
22 https://beta.sepa.scot/topics/air/air-emissions-risk-assessments/.

4.16.3 Should predicted PCs or PECs at any sensitive location be below the relevant thresholds then impacts are not considered significant and no further assessment is required. Should the relevant thresholds be exceeded, then additional consideration to potential impacts should be provided.

4.17 Modelling Uncertainty

4.17.1 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.

4.17.2 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. The assessment was based on the worst-case year for each averaging period to ensure maximum concentrations were considered;
- Surface characteristics - The z_0 and MO length were determined for both the dispersion and meteorological sites based on the surrounding land uses and guidance provided by CERC. Terrain data was included and processed using the method outlined by CERC;
- Plant operating conditions - Operational parameters for the facility were provided by the Applicant and obtained from relevant technical data sheets provided by the suppliers. As such, these are considered to be representative of anticipated operating conditions;
- Emission rates - Emission rates were derived from information provided by the Applicant and obtained from technical data sheets provided by the suppliers. These are considered to be representative of emissions during operation;
- Background concentrations - Background pollutant levels were obtained from Scottish Air Quality, DEFRA and APIS websites. These are considered representative of baseline air quality conditions at sensitive locations within the vicinity of the Site;
- Receptor locations - A Cartesian Grid was included in the model in order to provide suitable data for contour plotting. Receptor points were also included at sensitive locations to provide additional consideration of these areas; 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.

4.17.3 Results were considered in the context of the relevant EQSs and significance criteria. 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.

5.0 Results

5.1 Introduction

5.1.1 Dispersion modelling was undertaken with the inputs described in Section 4.0. The results are outlined in the following Sections.

5.2 Scenario 1

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

Table 21 - Scenario 1: Predicted Pollutant Concentrations

Receptor	PEC (µg/m³)												
	NO_2			C_6H_6			CO			SO_2			
	10-Min	30-Min	1-Hour	10-Min	30-Min	1-Hour	10-Min	30-Min	1-Hour	10-Min	15-min(a)	30-Min	1-Hour
R1	121	120	118	0.8	0.8	0.8	643	643	642	17	17	17	17
R2	148	147	146	0.9	0.9	0.9	661	660	659	17	17	17	17
R3	171	170	168	0.9	0.9	0.9	675	674	673	17	17	17	17
R4	171	169	168	0.9	0.9	0.9	675	674	673	17	17	17	17
R5	170	168	164	0.9	0.9	0.9	675	673	671	17	17	17	17
R6	145	143	140	0.9	0.9	0.9	659	657	655	17	17	17	17
R7	141	139	135	0.9	0.9	0.8	656	655	652	17	17	17	17
R8	91	89	86	0.8	0.8	0.8	625	623	621	17	17	17	16
R9	82	81	78	0.8	0.8	0.8	619	618	616	16	17	16	16
R10	74	71	68	0.8	0.8	0.8	613	612	609	16	17	16	16
R11	91	90	88	0.8	0.8	0.8	624	624	623	17	17	17	17
R12	54	52	50	0.8	0.8	0.8	601	599	598	16	16	16	16

Note: (a) 99.9th %ile for comparison against the 15-minute mean AQO.

5.2.2 As shown in **Table 21**, there were no predicted exceedances of any EQS at any receptor location for any pollutant or averaging period of interest. As such, impacts during Scenario 1 are not considered to be significant.

5.3 Scenario 2

Human Receptors

Maximum Pollutant Concentrations

5.3.1 Maximum predicted short-term pollutant concentrations at any point within the modelling extents for any meteorological data set for Scenario 2 are summarised in **Table 22**.

Table 22 - Scenario 2: Maximum Predicted Short-Term Pollutant Concentrations across modelled grid

Scenario	Averaging Period	EQS (µg/m³)	PC (µg/m³)	PC proportion of EQS (%)	PEC (µg/m³)	PEC Proportion of EQS (%)
NO_2	43.15th %ile 1-hour	200	33.00	16.5	57.72	28.9
C_6H_6	24-hour	30	3.64	12.1	4.38	14.6
CO	8-hour rolling	10,000	635.88	6.4	1,217.88	12.2
SO_2	99.9th %ile 15-minute	266	5.13	1.9	21.35	8.0

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Scenario	Averaging Period	EQS (μg/m³)	PC (μg/m³)	PC proportion of EQS (%)	PEC (μg/m³)	PEC Proportion of EQS (%)
	99.7th %ile 1-hour	350	4.79	1.4	21.01	6.0

5.3.2 As shown in **Table 22**, there were no predicted exceedances of any EQS at any location for any pollutant or averaging period of interest.

5.3.3 Reference should be made to Figure 6 to Figure 10 for graphical representations of predicted PECs, inclusive of background levels, throughout the assessment extents. It should be noted that the values shown in the Figures are predictions from the meteorological data set which resulted in the maximum pollutant concentration for that averaging period. For example, the maximum 1-hour mean NO_2 concentration was predicted using the 2020 meteorological data set. As such, the contours shown in Figure 6 were produced from the 2020 model outputs.

Nitrogen Dioxide

5.3.4 Predicted 43.15th %ile 1-hour mean NO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table 23**.

Table 23 - Scenario 2: Predicted 43.15th %ile 1-hour Mean NO_2 Concentrations

Receptor	Predicted 43.15th %ile 1-hour Mean NO_2 PEC (μg/m³)				
	2020	2021	2022	2023	2024
R1	24.72	24.72	24.72	24.72	24.72
R2	24.72	24.72	24.72	24.72	24.72
R3	24.72	24.72	24.72	24.72	24.72
R4	24.73	24.72	24.72	24.72	24.72
R5	24.74	24.72	24.72	24.72	24.72
R6	24.73	24.72	24.72	24.72	24.72
R7	24.73	24.72	24.72	24.72	24.72
R8	24.72	24.72	24.72	24.72	24.72
R9	24.72	24.72	24.72	24.72	24.72
R10	24.72	24.72	24.72	24.72	24.72
R11	24.72	24.72	24.72	24.72	24.72
R12	24.72	24.72	24.72	24.72	24.72

5.3.5 As indicated in **Table 23**, 43.15th %ile 1-hour mean NO_2 concentrations were below the EQS of 200μg/m³ at all receptor locations for all meteorological data sets.

5.3.6 Maximum predicted 43.15th %ile 1-hour mean NO_2 concentrations at the receptor locations are summarised in **Table 24**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 24 - Scenario 2: Maximum Predicted 43.15th %ile 1-hour Mean NO_2 Concentrations

Receptor	Maximum Predicted 43.15th %ile 1-hour Mean NO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
	PC	PEC		
R1	0.00	24.72	0.0	0.0
R2	0.00	24.72	0.0	0.0
R3	0.00	24.72	0.0	0.0
R4	0.01	24.73	0.0	0.0
R5	0.02	24.74	0.0	0.0
R6	0.01	24.73	0.0	0.0
R7	0.01	24.73	0.0	0.0
R8	0.00	24.72	0.0	0.0
R9	0.00	24.72	0.0	0.0
R10	0.00	24.72	0.0	0.0
R11	0.00	24.72	0.0	0.0
R12	0.00	24.72	0.0	0.0

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

5.3.7 As shown in in **Table 24**, PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 1-hour mean NO_2 concentrations are not considered to be significant, in accordance with the stated criteria.

Benzene

5.3.8 Predicted 100th %ile 24-hour mean C_6H_6 PECs at the receptor locations, inclusive of background levels, are summarised in **Table 25**.

Table 25 - Scenario 2: Predicted 100th %ile 24-hour Mean C_6H_6 Concentrations

Receptor	Predicted 100th %ile 24-hour Mean C_6H_6 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	1.11	1.15	1.13	1.13	1.11
R2	1.32	1.25	1.26	1.28	1.26
R3	1.39	1.36	1.33	1.32	1.38
R4	1.42	1.37	1.39	1.35	1.44
R5	1.32	1.27	1.32	1.27	1.31
R6	1.22	1.22	1.25	1.15	1.21
R7	1.18	1.19	1.22	1.14	1.16
R8	1.00	1.00	1.00	0.98	0.98
R9	0.96	0.98	0.95	0.94	0.98
R10	0.92	0.93	0.94	0.93	0.95
R11	1.01	0.98	1.08	0.94	1.05
R12	0.84	0.82	0.84	0.80	0.85

5.3.9 As indicated in **Table 25**, 24-hour mean C_6H_6 concentrations were below the EQS of 30µg/m³ at all receptor locations for all meteorological data sets.

5.3.10 Maximum predicted 100th %ile 24-hour mean C_6H_6 concentrations at the receptor locations are summarised in **Table 26**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 26 - Scenario 2: Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Concentrations

Receptor	Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R1	0.41	1.15	1.4	1.4
R2	0.58	1.32	1.9	2.0
R3	0.65	1.39	2.2	2.2
R4	0.70	1.44	2.3	2.4
R5	0.58	1.32	1.9	2.0
R6	0.51	1.25	1.7	1.7
R7	0.48	1.22	1.6	1.6
R8	0.26	1.00	0.9	0.9
R9	0.24	0.98	0.8	0.8
R10	0.21	0.95	0.7	0.7
R11	0.34	1.08	1.1	1.2
R12	0.11	0.85	0.4	0.4

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

5.3.11 As shown in in **Table 26**, PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 24-hour mean C_6H_6 concentrations are not considered to be significant, in accordance with the stated criteria.

<u>Carbon Monoxide</u>

5.3.12 Predicted 100th %ile 8-hour rolling mean CO PECs at the receptor locations, inclusive of background levels, are summarised in **Table 27**.

Table 27 - Scenario 2: Predicted 100th %ile 8-hour Rolling Mean CO Concentrations

Receptor	Predicted 100th %ile 8-hour Rolling Mean CO PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	742.75	744.85	744.51	739.03	736.46
R2	777.68	796.41	790.47	767.29	788.01
R3	823.56	832.78	834.88	835.60	841.54
R4	845.42	832.27	838.39	835.95	833.07
R5	811.79	807.60	808.26	808.61	803.37
R6	772.92	770.27	766.39	773.51	778.34
R7	762.70	761.78	755.88	752.78	761.15
R8	681.61	678.54	678.92	680.92	676.67
R9	667.65	667.88	666.17	665.88	667.03
R10	656.68	656.89	654.99	652.14	657.86
R11	695.60	678.20	691.03	693.30	680.80
R12	619.92	614.78	621.34	617.95	619.49

5.3.13 As indicated in **Table 27**, 8-hour rolling mean CO concentrations were below the EQS of 10,000µg/m³ at all receptor locations for all meteorological data sets.

5.3.14 Maximum predicted 100th %ile 8-hour rolling mean CO concentrations at the receptor locations are summarised in **Table 28**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 28 - Scenario 2: Maximum Predicted 100th %ile 8-hour Rolling Mean CO Concentrations

Receptor	Maximum Predicted 100th %ile 8-hour Rolling Mean CO Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R1	162.85	744.85	1.6	1.7
R2	214.41	796.41	2.1	2.3
R3	259.54	841.54	2.6	2.8
R4	263.42	845.42	2.6	2.8
R5	229.79	811.79	2.3	2.4
R6	196.34	778.34	2.0	2.1
R7	180.70	762.70	1.8	1.9
R8	99.61	681.61	1.0	1.1
R9	85.88	667.88	0.9	0.9
R10	75.86	657.86	0.8	0.8
R11	113.60	695.60	1.1	1.2
R12	39.34	621.34	0.4	0.4

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

5.3.15 As shown in in **Table 28** PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 8-hour rolling mean CO concentrations are not considered to be significant, in accordance with the stated criteria.

<u>Sulphur Dioxide</u>

5.3.16 Predicted 99.9th %ile 15-minute mean SO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table 29**.

Table 29 - Scenario 2: Predicted 99.9th %ile 15-minute Mean SO_2 Concentrations

Receptor	Predicted 99.9th %ile 15-minute Mean SO_2 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	17.55	17.52	17.56	17.55	17.54
R2	17.95	17.95	17.93	17.93	17.94
R3	18.24	18.24	18.24	18.24	18.24
R4	18.24	18.23	18.30	18.27	18.24
R5	18.11	18.12	18.12	18.11	18.15
R6	17.85	17.83	17.83	17.85	17.86
R7	17.76	17.79	17.76	17.78	17.78
R8	17.17	17.19	17.19	17.18	17.19
R9	17.11	17.09	17.10	17.13	17.09
R10	17.01	17.01	17.02	17.03	17.04
R11	17.22	17.18	17.22	17.20	17.18
R12	16.64	16.64	16.69	16.68	16.66

5.3.17 As indicated in **Table 29**, 99.9th %ile 15-minute mean SO_2 concentrations were below the EQS of 266µg/m³ at all receptor locations for all meteorological data sets.

5.3.18 Maximum predicted 99.9th %ile 15-minute mean SO_2 concentrations at the receptor locations are summarised in **Table 30**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 30 - Scenario 2: Maximum Predicted 99.9th %ile 15-minute Mean SO_2 Concentrations

Receptor	Maximum Predicted 99.9th %ile 15-minute Mean SO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R1	1.34	17.56	0.5	0.5
R2	1.73	17.95	0.6	0.7
R3	2.02	18.24	0.8	0.8
R4	2.08	18.30	0.8	0.8
R5	1.93	18.15	0.7	0.8
R6	1.64	17.86	0.6	0.7
R7	1.57	17.79	0.6	0.6
R8	0.97	17.19	0.4	0.4
R9	0.91	17.13	0.3	0.4
R10	0.82	17.04	0.3	0.3
R11	1.00	17.22	0.4	0.4
R12	0.47	16.69	0.2	0.2

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

5.3.19 As shown in in **Table 30** PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 15-minute mean SO_2 concentrations are not considered to be significant, in accordance with the stated criteria.

5.3.20 Predicted 99.7th %ile 1-hour mean SO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table 31**.

Table 31 - Scenario 2: Predicted 99.7th %ile 1-hour Mean SO_2 Concentrations

Receptor	Predicted 99.7th %ile 1-hour Mean SO_2 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	17.43	17.41	17.47	17.43	17.46
R2	17.82	17.81	17.81	17.81	17.82
R3	18.14	18.13	18.14	18.13	18.15
R4	18.17	18.15	18.17	18.16	18.17
R5	17.99	17.99	17.99	17.98	17.98
R6	17.73	17.72	17.72	17.73	17.73
R7	17.64	17.63	17.62	17.62	17.65
R8	17.06	17.05	17.06	17.06	17.06
R9	16.95	16.95	16.96	16.98	16.95
R10	16.86	16.86	16.86	16.88	16.87
R11	17.08	17.07	17.13	17.10	17.09
R12	16.57	16.54	16.59	16.58	16.57

5.3.21 As indicated in **Table 31**, 99.7th %ile 1-hour mean SO_2 concentrations were below the EQS of 350µg/m³ at all receptor locations for all meteorological data sets.

5.3.22 Maximum predicted 99.7th %ile 1-hour mean SO_2 concentrations at the receptor locations are summarised in **Table 32**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 32 - Scenario 2: Maximum Predicted 99.7th %ile 1-hour Mean SO_2 Concentrations

Receptor	Maximum Predicted 99.7th %ile 1-hour Mean SO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R1	1.25	17.47	0.4	0.4
R2	1.60	17.82	0.5	0.5
R3	1.93	18.15	0.6	0.6
R4	1.95	18.17	0.6	0.6
R5	1.77	17.99	0.5	0.5
R6	1.51	17.73	0.4	0.5
R7	1.43	17.65	0.4	0.4
R8	0.84	17.06	0.2	0.3
R9	0.76	16.98	0.2	0.2
R10	0.66	16.88	0.2	0.2
R11	0.91	17.13	0.3	0.3
R12	0.37	16.59	0.1	0.1

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

5.3.23 As shown in in **Table 32** PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 1-hour mean SO_2 concentrations are not considered to be significant, in accordance with the stated criteria.

Ecological Receptors

5.3.24 Predicted 24-hour mean NO_x PECs at the ecological receptor locations, inclusive of background levels, are summarised in **Table 33**.

Table 33 - Scenario 2: Predicted 24-hour Mean NO_x Concentrations

Receptor	Predicted 24-hour Mean NO_x PEC (µg/m³)				
	2020	2021	2022	2023	2024
E1	28.22	27.44	32.64	29.27	33.46
E2	41.21	33.81	33.00	36.12	34.51

5.3.25 As indicated in **Table 33**, 24-hour mean NO_x PECs were below the EQS of 75µg/m³ at all ecological receptors.

5.3.26 Maximum predicted 24-hour mean NO_x concentrations at the ecological receptors are summarised in **Table 34**.

Table 34 - Scenario 2: Maximum Predicted 24-hour Mean NO_x Concentrations

Receptor	Maximum Predicted 24-hour Mean NO_x Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
E1	18.54	33.46	24.7	44.6
E2	16.61	41.21	22.1	54.9

5.3.27 As indicated in **Table 34**, PCs were above 10% of the 24-hour mean EQS at all locations. However, PECs were below 100% of the EQS at all receptors. As such, predicted effects on 24-mean NO_x concentrations are not considered to be significant.

5.4 Long Term Averaging Periods

Human Receptors

Maximum Pollutant Concentrations

5.4.1 Maximum predicted long-term pollutant concentrations at any point within the modelling extents for any meteorological data set are summarised in **Table 35**. It should be noted that these include emissions associated with both testing and maintenance and emergency blackout events. The results in **Table 35** do not necessarily represent concentrations at receptors.

Table 35 - Maximum Predicted Long-Term Pollutant Concentrations across assessment grid

Scenario	Averaging Period	EQS (µg/m³)	PC (µg/m³)	PC proportion of EQS (%)	PEC (µg/m³)	PEC Proportion of EQS (%)
NO_2	Annual	40	2.00	5.0	14.36	35.9
PM_{10}	Annual	18	0.04	0.2	12.15	67.5
$PM_{2.5}$	Annual	10	0.04	0.4	5.87	58.7
C_6H_6	Annual	30	0.003	0.1	0.37	11.5

5.4.2 As shown in **Table 35**, there were no predicted exceedances of any EQS at any location for any pollutant or averaging period of interest.

5.4.3 Reference should be made to Figure 11 to Figure 14 for graphical representations of predicted PECs, inclusive of background levels, throughout the assessment extents.

Nitrogen Dioxide

5.4.4 Predicted annual mean NO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table 36**. These are based on a total operational period of 41.7-hours per annum.

Table 36 - Predicted Annual Mean NO_2 Concentrations

Receptor	Predicted Annual Mean NO_2 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	12.57	12.53	12.61	12.52	12.56
R2	12.78	12.69	12.79	12.68	12.74
R3	13.03	12.87	13.00	12.86	12.96
R4	13.22	13.02	13.16	13.02	13.13
R5	13.26	13.08	13.19	13.09	13.17
R6	13.10	12.97	13.06	12.97	13.03
R7	13.04	12.93	13.01	12.92	12.99
R8	12.74	12.69	12.73	12.68	12.71
R9	12.67	12.64	12.67	12.62	12.65
R10	12.58	12.57	12.59	12.56	12.57
R11	12.44	12.43	12.47	12.43	12.44
R12	12.38	12.38	12.39	12.38	12.38

5.4.5 As indicated in **Table 36**, annual mean NO_2 concentrations were below the EQS of 40µg/m³ at all receptor locations for all meteorological data sets.

5.4.6 Maximum predicted annual mean NO_2 concentrations at the receptor locations are summarised in **Table 37**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 37 - Maximum Predicted Annual Mean NO_2 Concentrations

Receptor	Maximum Predicted Annual Mean NO_2 Conc. ($\mu g/m^3$)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.25	12.61	0.6	31.5
R2	0.43	12.79	1.1	32.0
R3	0.67	13.03	1.7	32.6
R4	0.86	13.22	2.2	33.1
R5	0.90	13.26	2.2	33.1
R6	0.74	13.10	1.8	32.7
R7	0.68	13.04	1.7	32.6
R8	0.38	12.74	0.9	31.8
R9	0.31	12.67	0.8	31.7
R10	0.23	12.59	0.6	31.5
R11	0.11	12.47	0.3	31.2
R12	0.03	12.39	0.1	31.0

5.4.7 As indicated in **Table 37**, PCs were below 1% of the EQS at all receptor locations with the exception of R2 to R7. However, PECs were below 70% of the EQS at these locations. As such, predicted effects on annual mean NO_2 concentrations are not considered to be significant, in accordance with the stated criteria.

Particulate Matter

5.4.8 Predicted annual mean PM_{10} PECs at the receptor locations, inclusive of background levels, are summarised in **Table 38**. These are based on a total operational period of 41.7-hours per annum.

Table 38 - Predicted Annual Mean PM_{10} Concentrations

Receptor	Predicted Annual Mean PM_{10} PEC ($\mu g/m^3$)				
	2020	2021	2022	2023	2024
R1	12.11	12.11	12.11	12.11	12.11
R2	12.12	12.12	12.12	12.12	12.12
R3	12.12	12.12	12.12	12.12	12.12
R4	12.13	12.12	12.13	12.12	12.12
R5	12.13	12.12	12.13	12.12	12.13
R6	12.12	12.12	12.12	12.12	12.12
R7	12.12	12.12	12.12	12.12	12.12
R8	12.12	12.12	12.12	12.12	12.12
R9	12.12	12.12	12.12	12.11	12.12
R10	12.11	12.11	12.11	12.11	12.11
R11	12.11	12.11	12.11	12.11	12.11
R12	12.11	12.11	12.11	12.11	12.11

5.4.9 As indicated in **Table 38**, annual mean PM_{10} concentrations were below the EQS of $18\mu g/m^3$ at all receptor locations for all meteorological data sets.

5.4.10 Maximum predicted annual mean PM_{10} concentrations at the receptor locations are summarised in **Table 39**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 39 - Maximum Predicted Annual Mean PM_{10} Concentrations

Receptor	Maximum Predicted Annual Mean PM_{10} Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.00	12.11	0.0	67.3
R2	0.01	12.12	0.0	67.3
R3	0.01	12.12	0.1	67.3
R4	0.02	12.13	0.1	67.4
R5	0.02	12.13	0.1	67.4
R6	0.01	12.12	0.1	67.4
R7	0.01	12.12	0.1	67.3
R8	0.01	12.12	0.0	67.3
R9	0.01	12.12	0.0	67.3
R10	0.00	12.11	0.0	67.3
R11	0.00	12.11	0.0	67.3
R12	0.00	12.11	0.0	67.3

5.4.11 As indicated in **Table 39**, PCs were below 1% of the EQS at all receptor locations. As such, predicted effects on annual mean PM_{10} concentrations are not considered to be significant, in accordance with the stated criteria.

5.4.12 Predicted annual mean $PM_{2.5}$ PECs at the receptor locations, inclusive of background levels, are summarised in **Table 40**. These are based on a total operational period of 41.7-hours per annum.

Table 40 - Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor	Predicted Annual Mean $PM_{2.5}$ PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	5.83	5.83	5.83	5.83	5.83
R2	5.84	5.84	5.84	5.84	5.84
R3	5.84	5.84	5.84	5.84	5.84
R4	5.85	5.84	5.85	5.84	5.84
R5	5.85	5.84	5.85	5.84	5.85
R6	5.84	5.84	5.84	5.84	5.84
R7	5.84	5.84	5.84	5.84	5.84
R8	5.84	5.84	5.84	5.84	5.84
R9	5.84	5.84	5.84	5.83	5.84
R10	5.83	5.83	5.83	5.83	5.83
R11	5.83	5.83	5.83	5.83	5.83
R12	5.83	5.83	5.83	5.83	5.83

5.4.13 As indicated in **Table 40**, annual mean $PM_{2.5}$ concentrations were below the EQS of 10µg/m³ at all receptor locations for all meteorological data sets.

5.4.14 Maximum predicted annual mean $PM_{2.5}$ concentrations at the receptor locations are summarised in **Table 41**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 41 - Maximum Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor	Maximum Predicted Annual Mean $PM_{2.5}$ Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.00	5.83	0.0	58.3
R2	0.01	5.84	0.1	58.4
R3	0.01	5.84	0.1	58.4
R4	0.02	5.85	0.2	58.5
R5	0.02	5.85	0.2	58.5
R6	0.01	5.84	0.1	58.4
R7	0.01	5.84	0.1	58.4
R8	0.01	5.84	0.1	58.4
R9	0.01	5.84	0.1	58.4
R10	0.00	5.83	0.0	58.3
R11	0.00	5.83	0.0	58.3
R12	0.00	5.83	0.0	58.3

5.4.15 As indicated in **Table 41**, PCs were below 1% of the EQS at all receptor locations. As such, predicted effects on annual mean $PM_{2.5}$ concentrations are not considered to be significant, in accordance with the stated criteria.

<u>Benzene</u>

5.4.16 Predicted annual mean C_6H_6 PECs at the receptor locations, inclusive of background levels, are summarised in **Table 42**. These are based on a total operational period of 41.7-hours per annum.

Table 42 - Predicted Annual Mean C_6H_6 Concentrations

Receptor	Predicted Annual Mean C_6H_6 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	0.37	0.37	0.37	0.37	0.37
R2	0.37	0.37	0.37	0.37	0.37
R3	0.37	0.37	0.37	0.37	0.37
R4	0.37	0.37	0.37	0.37	0.37
R5	0.37	0.37	0.37	0.37	0.37
R6	0.37	0.37	0.37	0.37	0.37
R7	0.37	0.37	0.37	0.37	0.37
R8	0.37	0.37	0.37	0.37	0.37
R9	0.37	0.37	0.37	0.37	0.37
R10	0.37	0.37	0.37	0.37	0.37
R11	0.37	0.37	0.37	0.37	0.37
R12	0.37	0.37	0.37	0.37	0.37

5.4.17 As indicated in **Table 42**, annual mean C_6H_6 concentrations were below the EQS of 3.25µg/m³ at all receptor locations for all meteorological data sets.

5.4.18 Maximum predicted annual mean C_6H_6 concentrations at the receptor locations are summarised in **Table 43**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 43 - Maximum Predicted Annual Mean C_6H_6 Concentrations

Receptor	Maximum Predicted Annual Mean C_6H_6 Conc. (μg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.000	0.371	0.0	11.4
R2	0.001	0.372	0.0	11.4
R3	0.001	0.372	0.0	11.4
R4	0.001	0.372	0.0	11.4
R5	0.001	0.372	0.0	11.4
R6	0.001	0.372	0.0	11.4
R7	0.001	0.372	0.0	11.4
R8	0.000	0.371	0.0	11.4
R9	0.000	0.371	0.0	11.4
R10	0.000	0.371	0.0	11.4
R11	0.000	0.371	0.0	11.4
R12	0.000	0.371	0.0	11.4

5.4.19 As indicated in **Table 43**, PCs were below 1% of the EQS at all receptor locations. As such, predicted effects on annual mean C_6H_6 concentrations are not considered to be significant, in accordance with the stated criteria.

Ecological Receptors

Nitrogen Oxides

5.4.20 Predicted annual mean NO_x PECs at the ecological receptor locations, inclusive of background levels, are summarised in **Table 44**. These are based on a total operational period of 41.7-hours per annum.

Table 44 - Predicted Annual Mean NO_x Concentrations

Receptor	Predicted Annual Mean NO_x PEC (μg/m³)				
	2020	2021	2022	2023	2024
E1	7.47	7.47	7.47	7.47	7.47
E2	12.30	12.31	12.30	12.31	12.30

5.4.21 As indicated in **Table 44**, annual mean NO_x PECs were below the EQS of 30μg/m³ at all ecological receptors for all meteorological data sets.

5.4.22 Maximum predicted annual mean NO_x concentrations at the ecological receptors are summarised in **Table 45**.

Table 45 - Maximum Predicted Annual Mean NO_x Concentrations

Receptor	Maximum Predicted Annual Mean NO_x Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
E1	0.01	7.47	0.05	24.91
E2	0.01	12.31	0.02	41.02

5.4.23 As shown in **Table 45**, PCs were below 1% of the annual mean NO_x EQS at all locations. As such, predicted effects on annual mean NO_x concentrations are not considered to be significant in accordance with the stated criteria.

Sulphur Dioxide

5.4.24 Predicted annual mean SO_2 PECs at the ecological receptor locations, inclusive of background levels, are summarised in **Table 46**. These are based on a total operational period of 41.7-hours per annum.

Table 46 - Predicted Annual Mean SO_2 Concentrations

Receptor	Predicted Annual Mean SO_2 PEC (µg/m³)				
	2020	2021	2022	2023	2024
E1	0.99002	0.99002	0.99002	0.99002	0.99002
E2	1.18000	1.18001	1.18000	1.18001	1.18001

5.4.25 As indicated in **Table 46**, annual mean SO_2 were below the EQS of 10µg/m³ at all ecological receptors for all meteorological data sets.

5.4.26 Maximum predicted annual mean SO_2 concentrations at the ecological receptors are summarised in **Table 47**.

Table 47 - Maximum Predicted Annual Mean SO_2 Concentrations

Receptor	Maximum Predicted Annual Mean SO_2 Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
E1	0.00002	0.99002	0.0002	9.90
E2	0.00001	1.18001	0.0001	11.80

5.4.27 As shown in **Table 47**, PCs were below 1% of the annual mean SO_2 EQS at all locations. As such, predicted effects on annual mean SO_2 concentrations are not considered to be significant in accordance with the stated criteria.

Nitrogen Deposition

5.4.28 Predicted annual nitrogen PC deposition rates at the ecological receptor locations are summarised in **Table 48**.

Table 48 - Predicted Annual Nitrogen Deposition Rates

Receptor	Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
	2020	2021	2022	2023	2024
E1	0.0014	0.0014	0.0014	0.0013	0.0013
E2	0.0004	0.0006	0.0004	0.0005	0.0005

5.4.29 Maximum predicted annual nitrogen deposition rates at the ecological receptors are summarised in **Table 49**.

Table 49 - Maximum Predicted Annual Nitrogen Deposition Rates

Receptor	Maximum Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)	Proportion of EQS (%)	
		Low EQS	High EQS
E1	0.0014	0.03	0.01
E2	0.0006	-	-

5.4.30 As shown in **Table 49**, PCs were below 1% of the EQS at the relevant location. As such, predicted effects on nitrogen deposition are not considered to be significant in accordance with the stated criteria.

Acid Deposition

5.4.31 Predicted annual acid PC deposition rates at the ecological receptor locations are summarised in **Table 50**.

Table 50 - Predicted Annual Acid Deposition Rates

Receptor	Predicted Annual PC Acid Deposition Rate (keq/ha/yr)				
	2020	2021	2022	2023	2024
E1	0.00011	0.00011	0.00010	0.00010	0.00010
E2	0.00003	0.00004	0.00003	0.00004	0.00003

5.4.32 Maximum predicted annual acid deposition rates at the ecological receptors are summarised in **Table 51**.

Table 51 - Maximum Predicted Annual Acid Deposition Rates

Receptor	Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)	Proportion of EQS (%)
E1	0.00011	0.02
E2	0.00004	-

5.4.33 As shown in **Table 51**, PCs were below 1% of the EQS at all relevant location. As such, predicted effects on acid deposition are not considered to be significant in accordance with the stated criteria.

5.5 Sensitivity Analysis

5.5.1 A sensitivity analysis was undertaken to assess variation in model results associated with a number of individual inputs, as agreed during consultation with SEPA on 15th May 2026.

5.5.2 Review of the annual mean NO_2 concentrations predicted by the original model at the sensitive receptor locations indicated that the maximum value was predicted at R5. The sensitivity analysis therefore focused on the influence of different scenarios on pollutant concentrations at this location.

5.5.3 The maximum NO_2 concentration at R5 was predicted using the 2020 meteorological data set. All scenarios were therefore run for this assessment year.

5.5.4 A total of three scenarios were considered, each with a single change to modelling inputs. The following parameters were considered in the analysis, as agreed with SEPA:

- Terrain;
- z_0 used to describe the dispersion site; and,
- MO used to describe the dispersion site.

5.5.5 A description of the modelling inputs for each scenario is provided in **Table 52**, with the varied input shown in bold. The original model, which is referred to as version 1 (V1), is included for completeness and ease of comparison.

Table 52 - Sensitivity Analysis Scenarios

Scenario	Terrain	z_0 Used to Describe Site (m)	Minimum MO Used to Describe Dispersion Site (m)
V1	On	0.5	30
V2	Off	0.5	30
V3	On	0.5	10
V4	On	0.3	30

5.5.6 Predicted annual mean NO_2 concentrations at R5 for each scenario are summarised in **Table 53**. The scenario which resulted in the maximum concentration is shown in bold.

Table 53 - Maximum Predicted Annual Mean NO_2 Concentrations - Sensitivity Analysis

Scenario	EQS (μg/m³)	PC (μg/m³)	PC proportion of EQS (%)	PEC (μg/m³)	PEC Proportion of EQS (%)
V1	40	0.90	2.2	13.26	33.1
V2	**40**	**0.94**	**2.3**	**13.30**	**33.2**
V3	40	0.88	2.2	13.24	33.1
V4	40	0.90	2.3	13.26	33.2

5.5.7 As shown in **Table 53**, the maximum concentration was predicted for model version 2. The PEC proportion of the EQS was 33.2%. As the PEC remains below 70% of the EQS, the findings of the sensitivity analysis support the conclusion that impacts as a result of the installation are not considered to be significant.

5.5.8 Predicted 43.15th %ile 1-hour mean NO_2 concentrations at R5 for each scenario are summarised in **Table 54**. The scenario which resulted in the maximum concentration is shown in bold.

Table 54 - Maximum Predicted 43.15th %ile 1-hour Mean NO_2 Concentrations - Sensitivity Analysis

Scenario	EQS (μg/m³)	PC (μg/m³)	PC Proportion of EQS (%)	PEC (μg/m³)	PEC Proportion of EQS (%)
V1	200	0.019	0.009	24.74	12.37
V2	200	0.006	0.003	24.73	12.36
V3	200	0.008	0.004	24.73	12.36
V4	200	0.002	0.001	24.72	12.36

5.5.9 As shown in **Table 54**, the maximum concentration was predicted for model version 1. The PC proportion of the EQS was 0.009%.

5.5.10 The results indicate that annual mean NO_2 concentrations are greater when terrain is not included in the model. However, assessment of changes in elevation throughout the modelling extents using Google Earth indicated the maximum gradient was greater than 10%. As such, excluding terrain from the model would not comply with guidance provided by CERC, the model developers. The results should therefore be viewed with caution.

5.6 Stack Height Analysis

5.6.1 Additional dispersion modelling was undertaken in order to predict annual mean NO_2 concentrations as a result of emissions from the proposed generators with different stack heights to identify the effectiveness of pollutant dispersal at various emission heights. It should be noted that the modelling has been based on generator container heights of 3.5m and 5.4m for the existing and new units, respectively. Each unit has an exhaust tailpipe situated 1m above the top of the container. Analysis of NO_2 emissions from the stack heights shown in **Table 55** was subsequently undertaken. It should be noted that the modelling undertaken in line with the methodology outlined in Section 4.0 has been based on generator stack heights of 7.5m and 9.4m for the existing and new units, respectively.

Table 55 - Stack Heights - Stack Height Analysis

Unit	Stack Height (m)[a]	Stack Height Above Tailpipe (m)
P2500	5.5	1
QSK78 - G24 and QSK78 - G16	7.4	
P2500	6.5	2
QSK78 - G24 and QSK78 - G16	8.4	
P2500	7.5	3
QSK78 - G24 and QSK78 - G16	9.4	
P2500	8.5	4
QSK78 - G24 and QSK78 - G16	10.4	
P2500	9.5	5
QSK78 - G24 and QSK78 - G16	11.4	
P2500	10.5	6
QSK78 - G24 and QSK78 - G16	12.4	

Note: (a) Emission release point above ground level.

5.6.2 The maximum annual mean NO_2 concentration within the assessment domain was predicted using the 2023 meteorological data set. As such, the stack height analysis focused on the influence of different stack heights on annual mean NO_2 concentrations for the 2023 meteorological year.

5.6.3 All other model inputs were the same as described in Section 4.0. The results are presented in the following Section.

5.6.4 The maximum predicted annual mean NO_2 concentrations for each stack arrangement during the 2023 metrological year are summarised in **Table 56**.

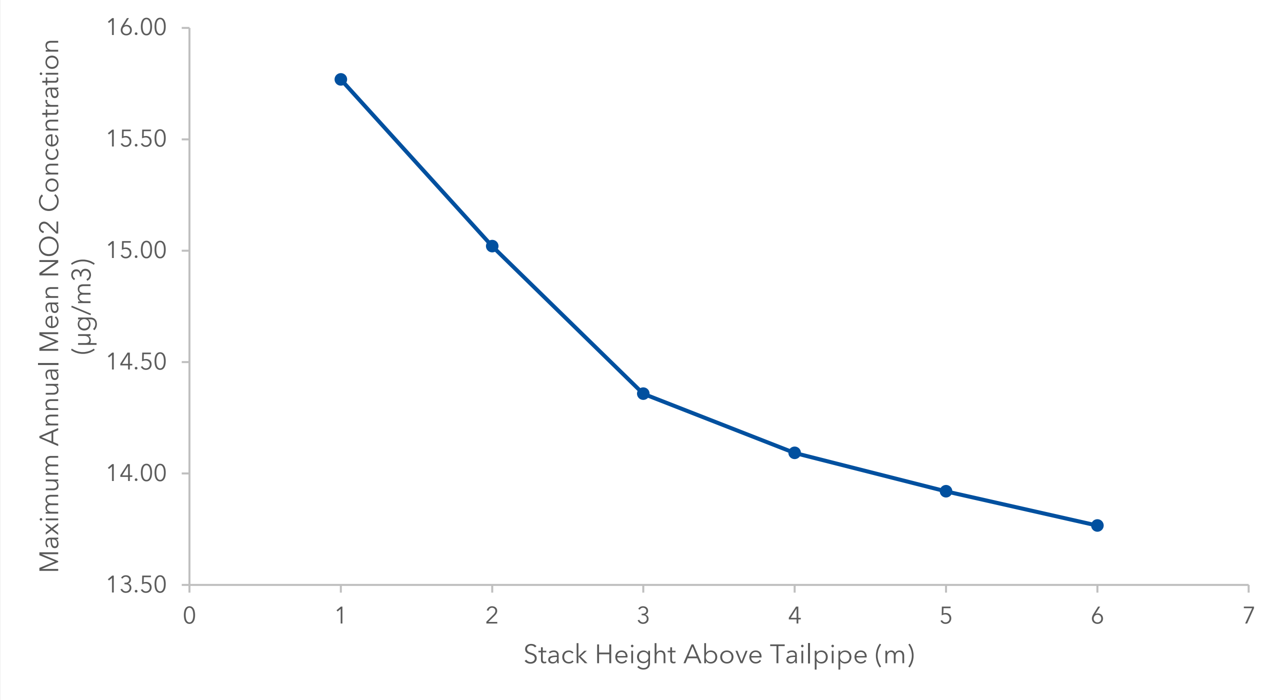
Table 56 - Maximum Predicted Annual Mean NO_2 Concentrations - Stack Height Analysis

Stack Height Above Tailpipe (m)	EQS ($\mu g/m^3$)	PC ($\mu g/m^3$)	PC proportion of EQS (%)	PEC ($\mu g/m^3$)	PEC proportion of EQS (%)
1	40	3.41	8.5	15.77	39.4
2	40	2.66	6.6	15.02	37.5
3	40	2.00	5.0	14.36	35.9
4	40	1.73	4.3	14.09	35.2
5	40	1.56	3.9	13.92	34.8
6	40	1.41	3.5	13.77	34.4

5.6.5 As shown in **Table 56**, the maximum predicted annual mean NO_2 concentrations decreased with increased stack height. The PEC is below 70% of the EQS under each scenario.

5.6.6 The maximum predicted annual mean NO_2 concentration was plotted against stack height above tailpipe. This shown in Graph 1.

Graph 1 Maximum Predicted Annual Mean NO_2 Concentration at Varying Stack Heights



5.6.7 As shown in Graph 1, maximum predicted annual mean NO_2 concentrations decreased at a diminishing rate with increased stack height. The rate of reduction decreased at stack heights of approximately 3m above the respective generator tailpipes. As such, the proposed stack heights of 3m above the tailpipes are considered appropriate in the context of air quality impacts.

6.0 Additional Analysis

6.1 Future Air Quality Objectives

6.1.1 As outlined previously, a Method Statement was produced and submitted to SEPA for comment. This summarised the proposed approach to assessment and relevant dispersion modelling inputs. Following a meeting on 15th May 2026 with SEPA, a number of proposed AQOs for 2030 that are under consideration by the Scottish Government were provided. These are summarised for pollutants considered within this assessment in **Table 57**.

Table 57 - Proposed Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (μg/m³)	Averaging Period
NO_2	20	Annual mean
	50[(a)]	24-hour mean, not to be exceeded more than 18 times per annum
	200	1-hour mean, not to be exceeded more than 3 times per annum
PM_{10}	15	Annual mean
$PM_{2.5}$	8	Annual mean

Note: (a) The total duration of Scenarios 1 and 2 was assumed as 41.7-hours. As such, emissions are unlikely to significantly affect concentrations in the context of the proposed 24-hour mean NO_2 AQO as 18 exceedances are permitted per annum. Results were therefore not considered in the context of this proposed AQO.

6.1.2 Although the proposed AQOs have not yet been formally consulted on or adopted in Scotland, consideration of compliance with the potential future air quality standards as a result of emissions from the facility is provided in the following Sections.

Short Term Averaging Periods

Scenario 1

6.1.3 As modelled previously for Scenario 1, an operating period of 17.7-hours per annum was assumed. Using the hypergeometric probability distribution method, it was determined that should the results indicate 556 or less instances of NO_2 concentrations over 200μg/m³ within a year, then the probability of producing 4 instances of NO_2 concentrations over 200μg/m³, multiplied by 2.5 in accordance with relevant guidance[23], is 4.9%.

6.1.4 Based on 556 instances, the 93.65th %ile was calculated for use in the modelling assessment. As such, should predicted 93.65th %ile 1-hour mean NO_2 concentrations be under 200μg/m³ then there is less than 5% probability of an AQO exceedance and impacts are not considered significant in accordance with the utilised guidance[24].

6.1.5 Maximum predicted 93.65th %ile 1-hour mean NO_2 concentrations at the receptor locations are summarised in **Table 58**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

23 https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.
24 https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.

Table 58 - Maximum Predicted 93.65th %ile 1-hour Mean NO_2 Concentrations

Receptor	Maximum Predicted 93.65th %ile 1-hour Mean NO_2 Conc. (µg/m^3)	
	PC	PEC
R1	28.83	53.55
R2	60.76	85.48
R3	114.19	138.91
R4	173.01	197.73
R5	162.94	187.66
R6	131.69	156.41
R7	122.67	147.39
R8	66.53	91.25
R9	57.91	82.63
R10	47.44	72.16
R11	7.45	32.17
R12	1.67	26.39

6.1.6 As shown in in **Table 58**, PECs were below 100% of the proposed AQO at all receptor locations. As such, predicted impacts on 1-hour mean NO_2 concentrations are not considered to be significant under Scenario 1.

Scenario 2

6.1.7 As modelled previously for Scenario 2, an operating period of 24-hours per annum was assumed. Using the hypergeometric probability distribution method, it was determined that, should the results indicate 387 or fewer instances of NO_2 concentrations over 200µg/m^3 within a year, then the probability of producing 4 instances of NO_2 concentrations over 200µg/m^3, multiplied by 2.5 in accordance with relevant guidance[25], is 4.9%.

6.1.8 Based on 387 instances, the 95.58th %ile was calculated for use in the modelling assessment. As such, should predicted 95.58th %ile 1-hour mean NO_2 concentrations be under 200µg/m^3 then there is less than 5% probability of an AQO exceedance and impacts are not considered significant in accordance with the utilised guidance[26].

6.1.9 Modelling was undertaken to determine impacts on the proposed 1-hour NO_2 AQO using the %ile derived above. Based on the modelled plant design, results indicated a greater than 5% probability of exceedance under Scenario 2, which represents a 24-hour emergency scenario.

Scenario 3

6.1.10 Due to the predicted future AQO exceedance outlined above, additional analysis was undertaken to consider the requirement for mitigation and whether this would provide compliance with the proposed AQO. This considered the installation of SCR to all 12 generators. The assessment of this additional mitigation is outlined in this Section and referred to as Scenario 3.

6.1.11 A summary of NO_x emissions from each source following the installation of SCR is summarised in **Table 59**. The SCR units that will be provided by the technology supplier will be of the same specification. It is therefore anticipated that NO_x emission concentrations from the SCR abatement systems will be similar to those from the QSK78 - G16 SCR unit, under the same reference conditions.

Table 59 – Scenario 3: Emissions Following the Installation of SCR

Parameter	Unit	P2500	QSK78 - G24	QSK78 - G16	QSK78 - G16 SCR
NO_x emission concentration	mg/Nm$^{3(a)}$	507	507	507	507

25 https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.
26 https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.

Parameter	Unit	P2500	QSK78 - G24	QSK78 - G16	QSK78 - G16 SCR
NO_x emission rate	g/s	1.0625	1.010	1.041	1.041

Note: (a) 273K, 5% O_2.

6.1.12 Modelling of emissions shown in **Table 59** was undertaken for Scenario 3. This considered the installation of SCR to all 12 generators. Maximum predicted 95.58th %ile 1-hour mean NO_2 concentrations for any meteorological data at the receptor locations are summarised in **Table 58**.

Table 60 – Scenario 3: Maximum Predicted 95.58th %ile 1-hour Mean NO_2 Concentrations

Receptor	Maximum Predicted 95.58th %ile 1-hour Mean NO_2 Conc. ($\mu g/m^3$)	
	PC	PEC
R1	56.04	80.76
R2	85.78	110.50
R3	118.81	143.53
R4	153.76	178.48
R5	142.92	167.64
R6	116.93	141.65
R7	109.52	134.24
R8	62.69	87.41
R9	54.86	79.58
R10	47.10	71.82
R11	27.11	51.83
R12	6.49	31.21

6.1.13 As shown in **Table 58**, PECs were below 100% of the proposed AQO at all receptor locations. As such, predicted impacts on 1-hour mean NO_2 concentrations are not considered to be significant under Scenario 3, which represents a 24-hour emergency scenario following the installation of SCR to all 12 generators.

6.1.14 The proposed 1-hour NO_2 AQO has not yet been consulted on or formally adopted by the Scottish Government. However, should the proposed standard be adopted, the Applicant has committed to fit SCR to the 12 generators to achieve compliance for a 24-hour emergency operation. This can be secured through a permit condition.

Long Term Averaging Periods

6.1.15 As outlined in **Table 57** there are a number of proposed long-term AQOs. However, as shown in **Table 35** there were no predicted exceedances of these standards at any point within the modelling extents for any meteorological data set prior to the installation of SCR to all 12 generators.

6.2 Emergency Operation

6.2.1 As outlined in Section 4.4, there is the potential for all generators to operate at 100% load in the event of a power outage. The Applicant has confirmed that emergency operation would occur for a maximum of 24-hours each year. However, in accordance with 'RIIO-ED2 Regulatory Instructions and Guidance'[27] published by Ofgem, standby generation would ideally have sufficient fuel for 72-hours operation. As such, additional analysis has been undertaken to assess emergency operation for 72-hours each year.

6.2.2 Modelling of a 72-hour emergency scenario was undertaken based on the NO_x emissions shown in **Table 59** and the remaining pollutant emissions summarised in **Table 17**. This considered air quality impacts at discrete receptor locations under a 72-hour scenario following the installation of SCR to all 12 generators and is referred to as Scenario 4.

[27] RIIO-ED2 Regulatory Instructions and Guidance - Glossary, Ofgem, 2025.

6.2.3 Reference should be made to Appendix D for a summary of the Scenario 4 assessment. This indicated compliance with all current and future AQOs at all receptors for the 72-hour emergency operation following installation of SCR to all 12 generators. Impacts were classified as not significant in accordance with the relevant methodology and statistical analysis.

7.0 Conclusion

7.1.1 Lucion was instructed to undertake a Dispersion Modelling Assessment in support of an Environmental Authorisation Permit Application under the EASR for a Data Centre (DV1) in Glasgow.

7.1.2 It is proposed to install ten HVO fired back-up generators to complement two existing generators. The back-up generators will ensure the availability of uninterrupted power supply to the Data Centre at all times. Beyond maintenance and testing, the plant will be utilised in emergency situations.

7.1.3 Atmospheric emissions associated with the operation of the standby generators have the potential to cause air quality impacts at sensitive receptor locations in the vicinity of the Site. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions, quantify pollutant levels at sensitive locations and consider potential effects.

7.1.4 Dispersion modelling was undertaken using ADMS-6 in order to predict pollutant concentrations as a result of emissions from the plant. Impacts at sensitive receptors were quantified and the results compared with the relevant EQSs and significance criteria.

7.1.5 The results of the assessment indicated that operation of the plant is not predicted to result in exceedances of the relevant EQSs at any sensitive receptor location within the vicinity of the Site. Impacts were classified as not significant in accordance with the relevant methodology and statistical analysis.

7.1.6 Consultation with SEPA indicated a number of proposed AQOs for 2030 that are under consideration by the Scottish Government. As such, an assessment was undertaken to consider future compliance with these potential air quality standards.

7.1.7 Based on the modelled plant design, the assessment indicated that operation of the plant is not predicted to result in exceedances of the proposed AQOs, with the exception of 1-hour NO_2 under Scenario 2, which represents a 24-hour emergency scenario. As such, additional analysis was undertaken to consider the requirement for mitigation and whether this would provide compliance with the proposed AQO. This considered the installation of SCR to all 12 generators and was referred to as Scenario 3.

7.1.8 The results of Scenario 3 modelling indicated a less than 5% probability of exceedance of the proposed 1-hour NO_2, which represents a 24-hour emergency scenario following the installation of SCR to all 12 generators. Impacts were therefore classified as not significant in accordance with the relevant methodology and statistical analysis. The proposed 1-hour NO_2 AQO has not yet been consulted on or formally adopted by the Scottish Government. However, should the proposed standard be adopted, the Applicant has committed to fit SCR to the 12 generators to achieve compliance for a 24-hour emergency operation. This can be secured through a permit condition.

7.1.9 Additional analysis has been undertaken to assess emergency operation for 72-hours each year. This considered air quality impacts at discrete receptor locations under a 72-hour scenario following the installation of SCR to all 12 generators and is referred to as Scenario 4.

7.1.10 The results of Scenario 4 modelling indicated that operation of the plant is not predicted to result in exceedances of the relevant EQSs at any sensitive receptor location within the vicinity of the Site. Impacts were classified as not significant in accordance with the relevant methodology and statistical analysis.

Figure 1 - Site Location Plan

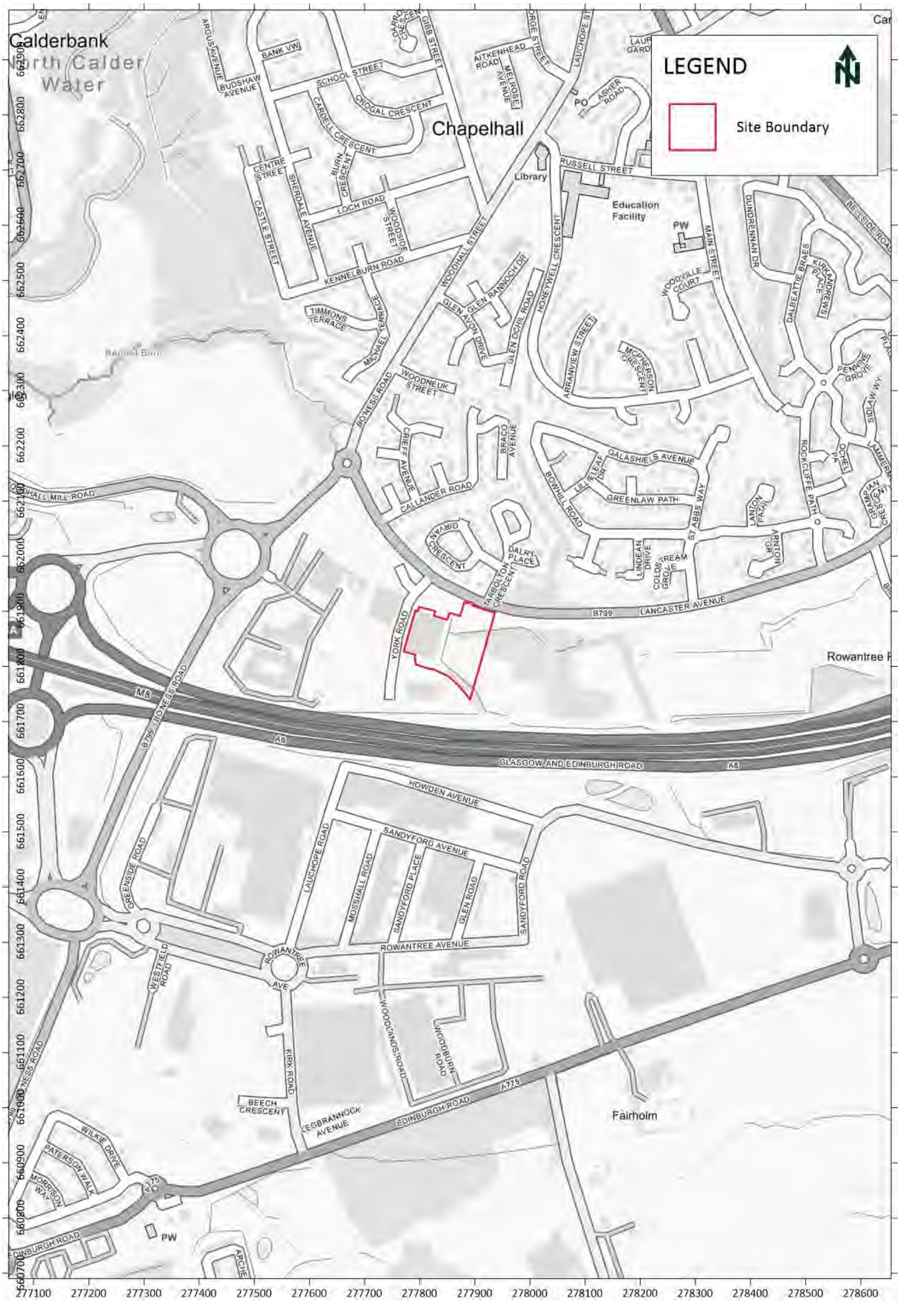


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Figure 2 - Site Layout

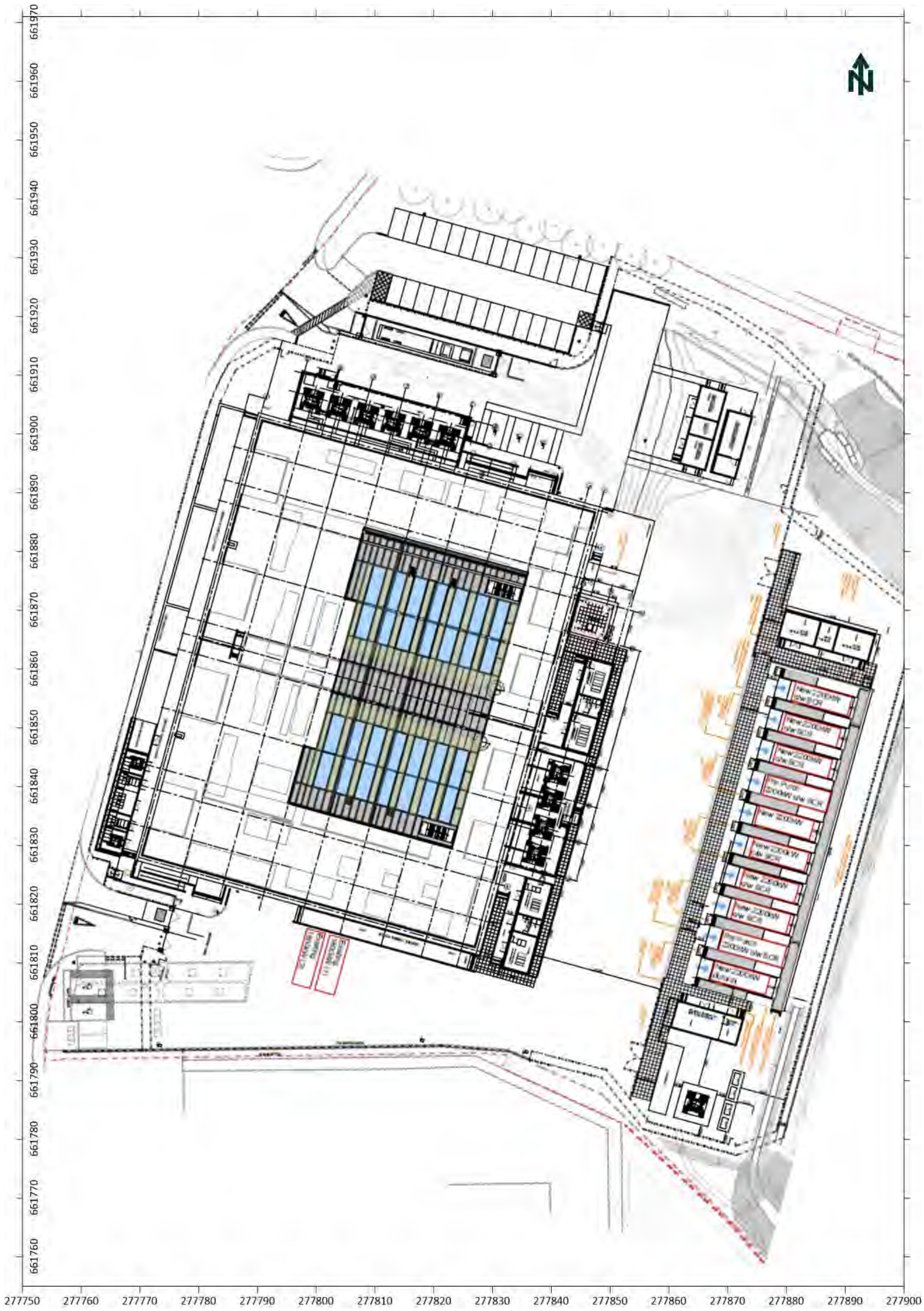

Figure 3 - Human Receptor Locations

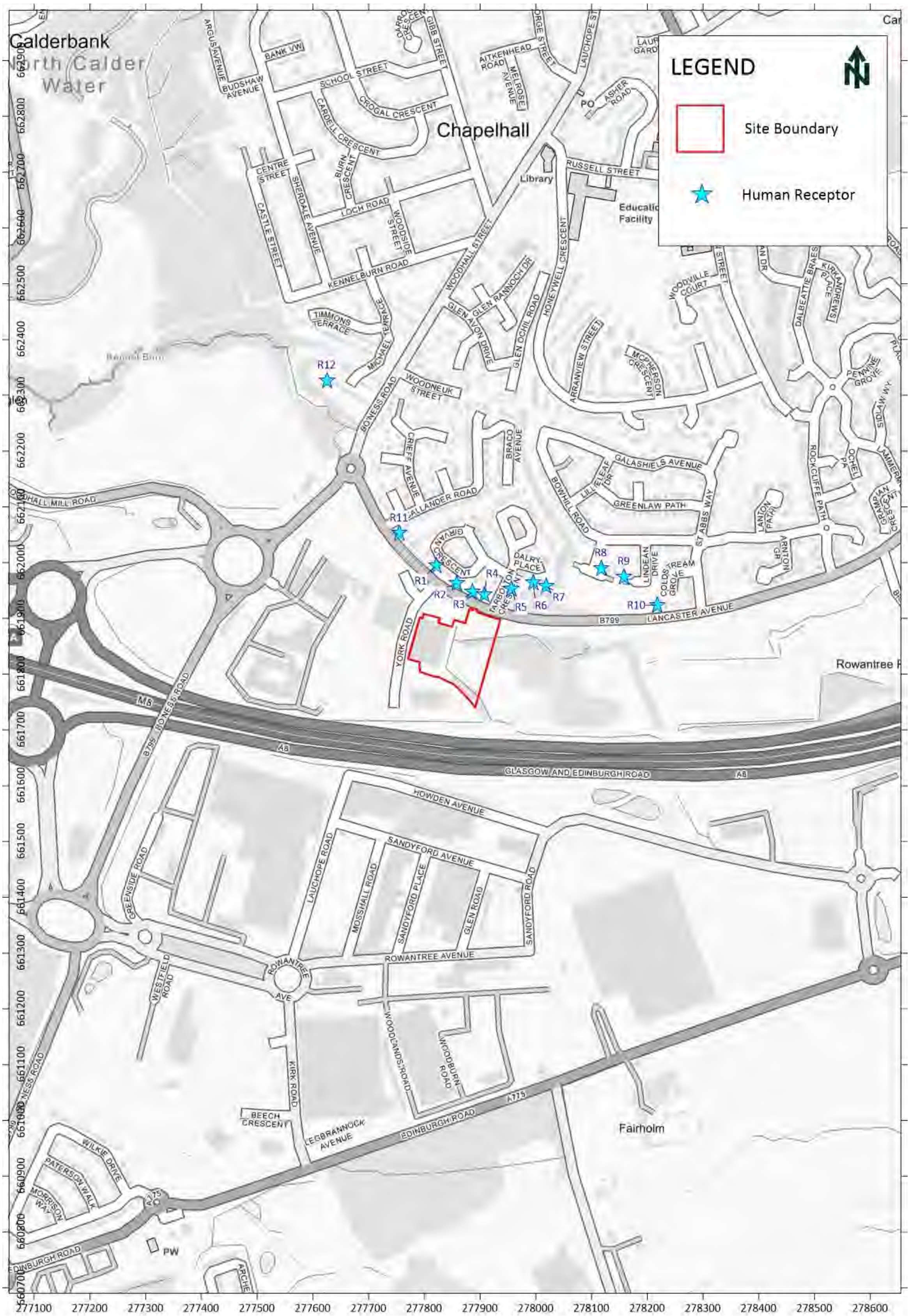

Figure 4 - Ecological Receptor Locations

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Figure 5 - ADMS-6 Inputs

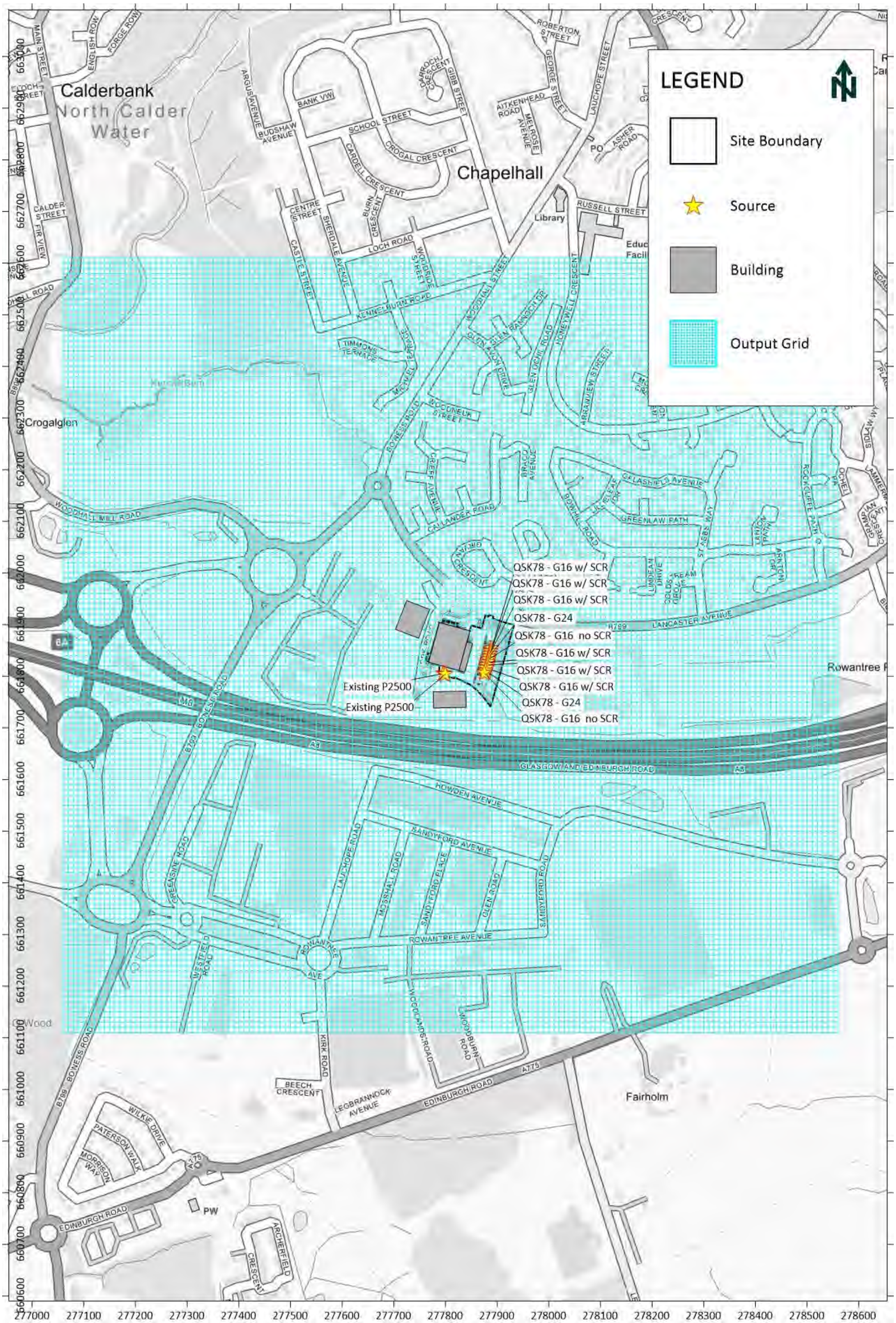

Figure 6 - Predicted 43.15th %ile 1-hour Mean NO_2 Concentrations (µg/m³) 2020 Meteorological Data

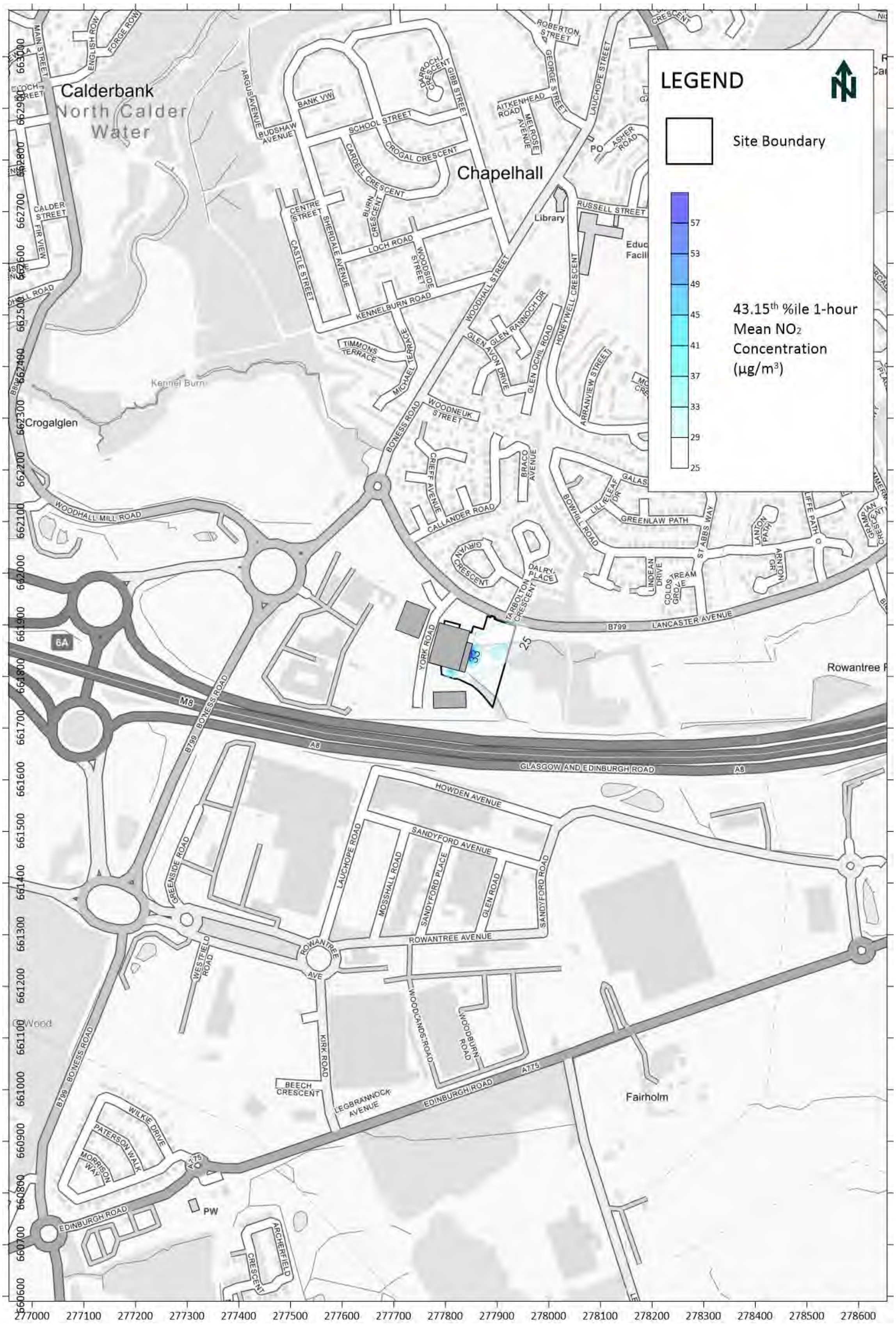

Figure 7 - Predicted 100th %ile 24-hour Mean C_6H_6 Concentrations (µg/m³) 2023 Meteorological Data

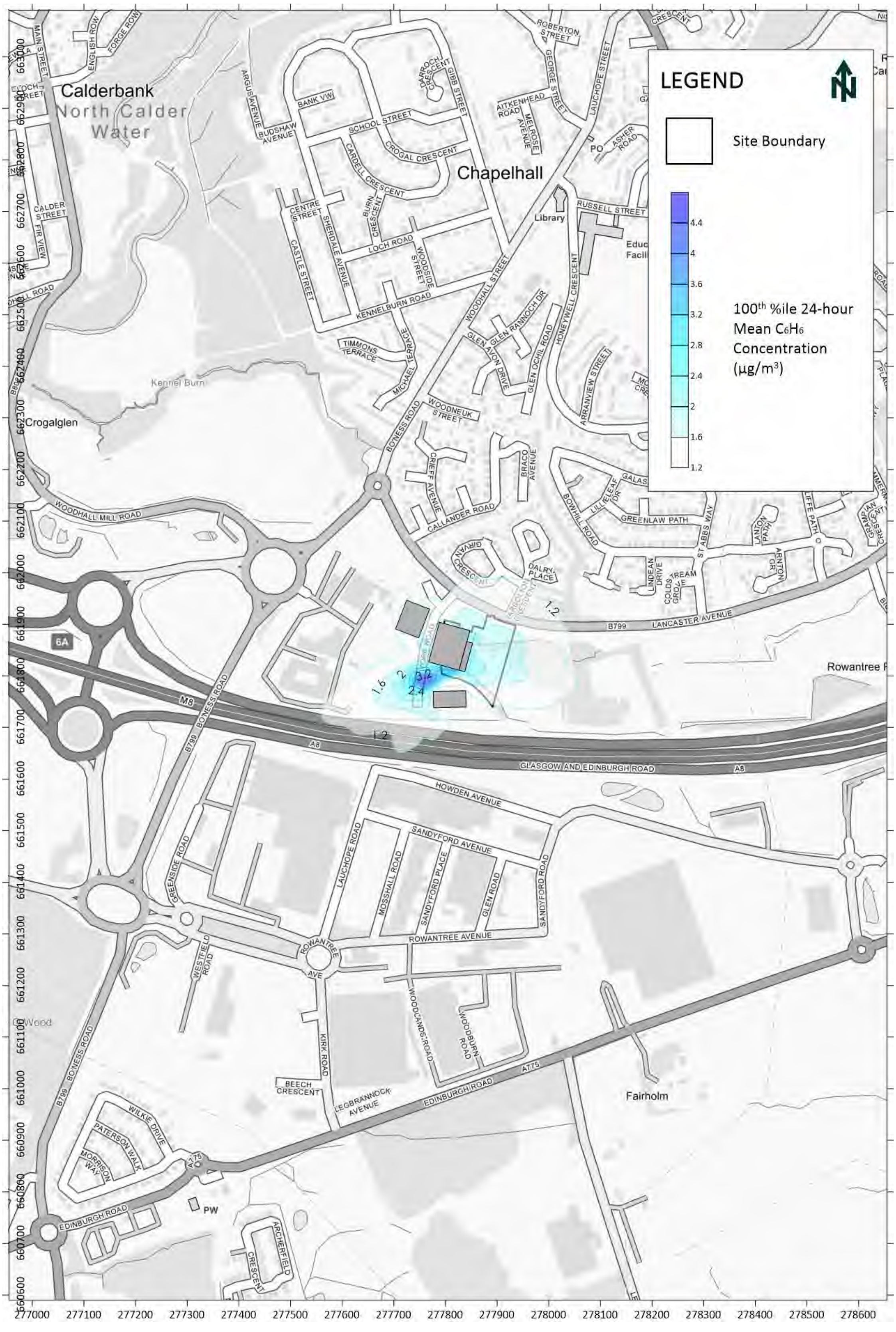

Figure 8 - Predicted 100th %ile 8-hour Rolling Mean CO Concentrations (µg/m³) 2020 Meteorological Data

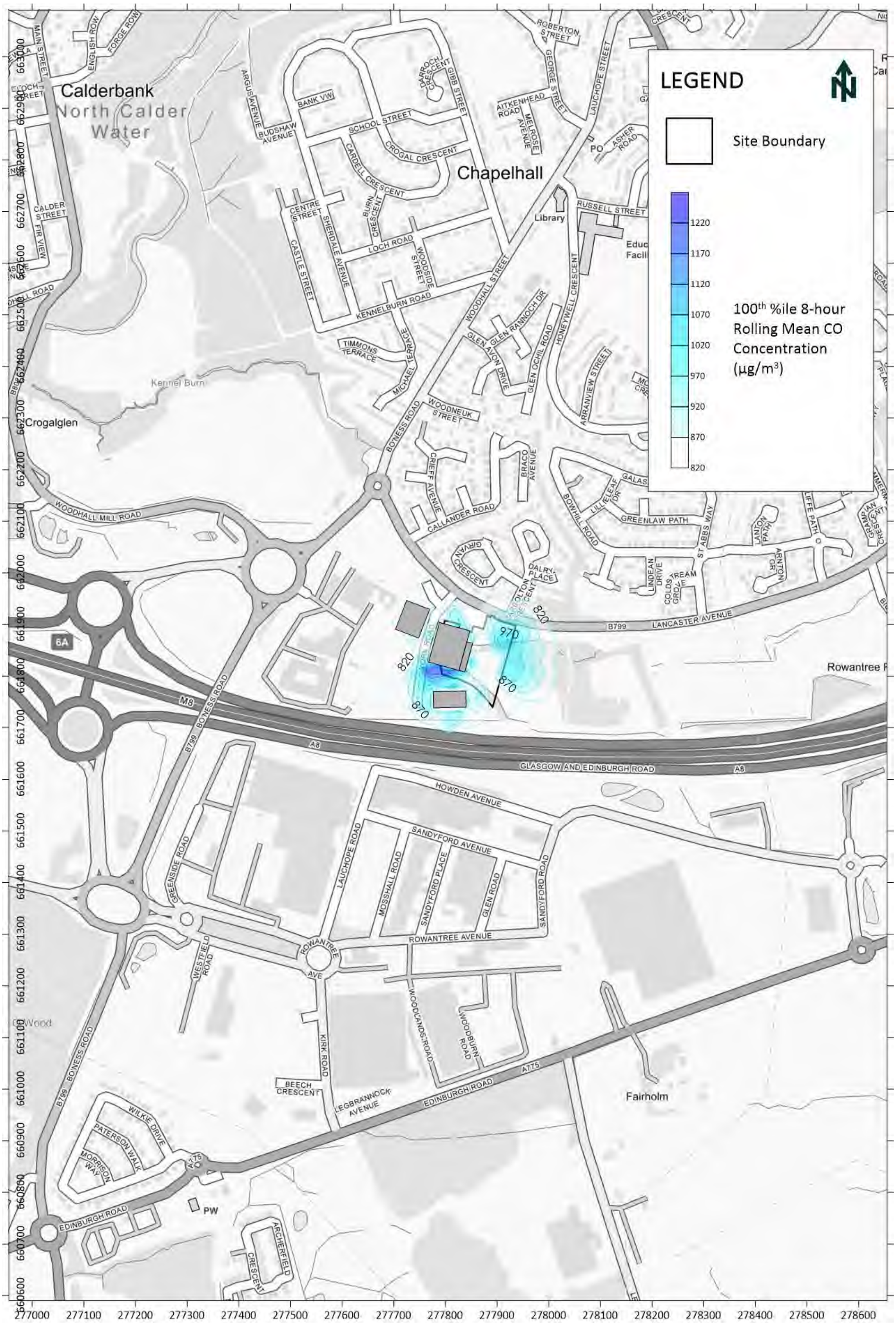

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Figure 9 - Predicted 99.9th %ile 15-minute Mean SO_2 Concentrations ($\mu g/m^3$) 2020 Meteorological Data

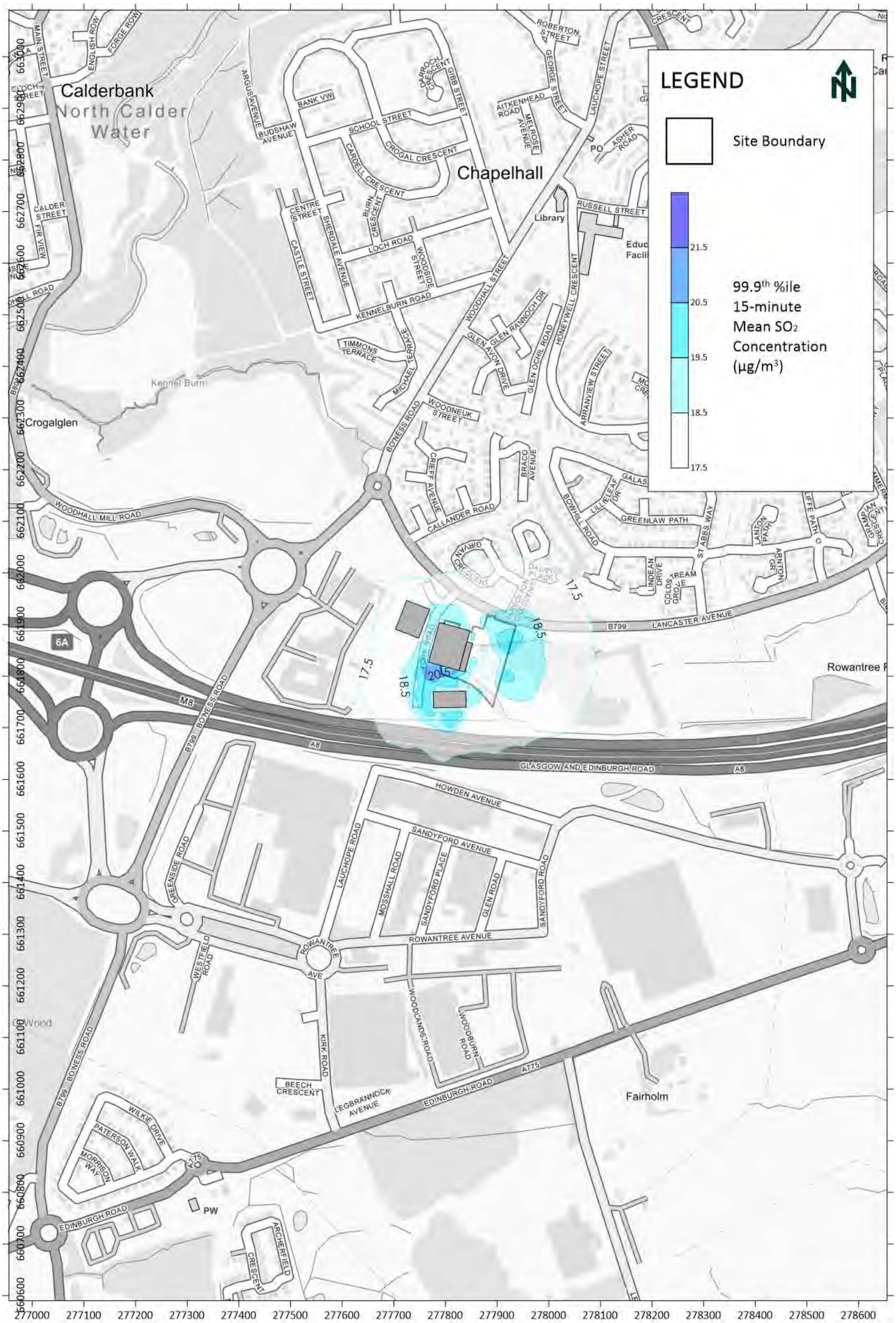

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Figure 10 - Predicted 99.7th %ile 1-hour Mean SO_2 Concentrations (μg/m³) 2023 Meteorological Data

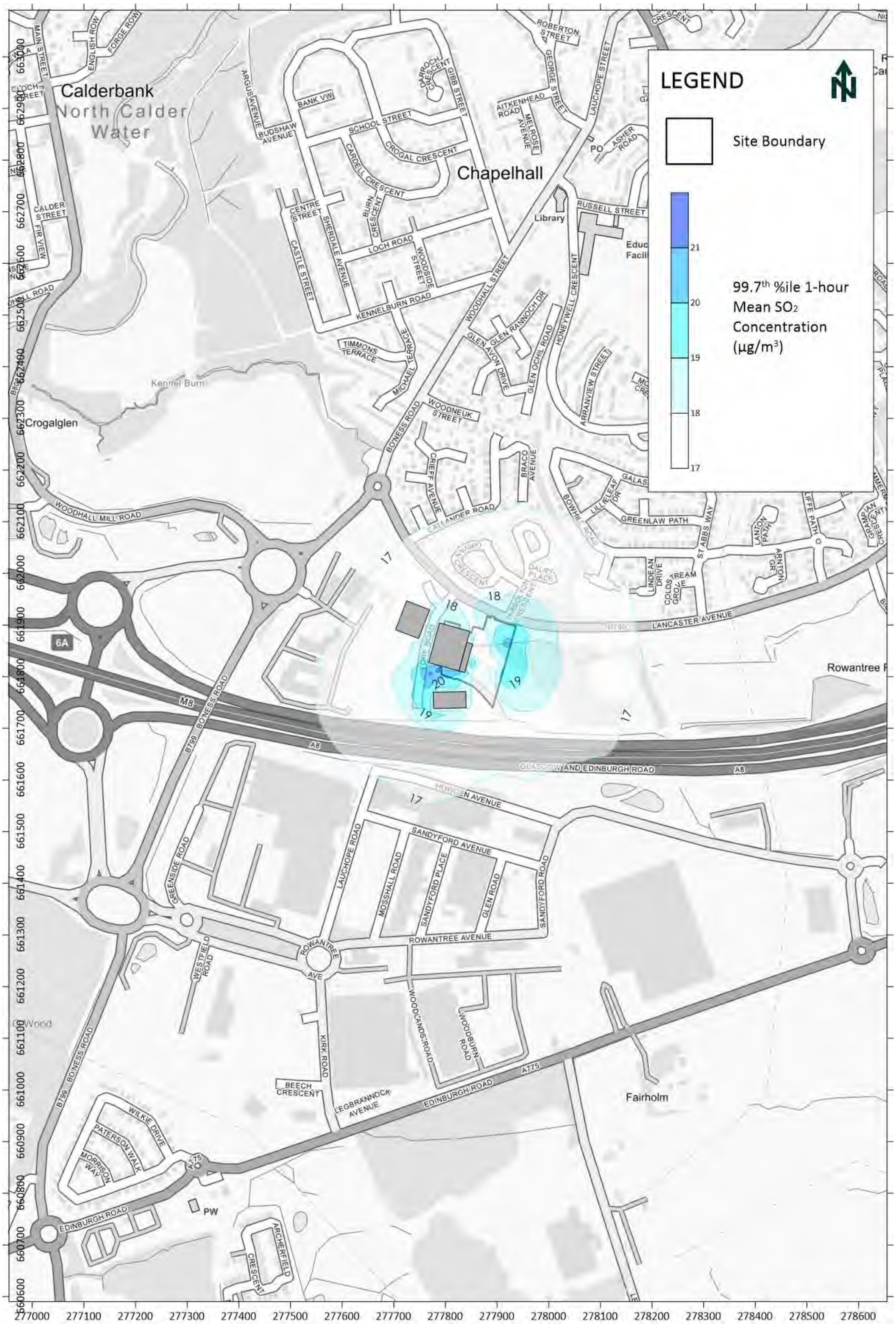

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Figure 11 - Predicted Annual Mean NO_2 Concentrations (µg/m³) 2023 Meteorological Data

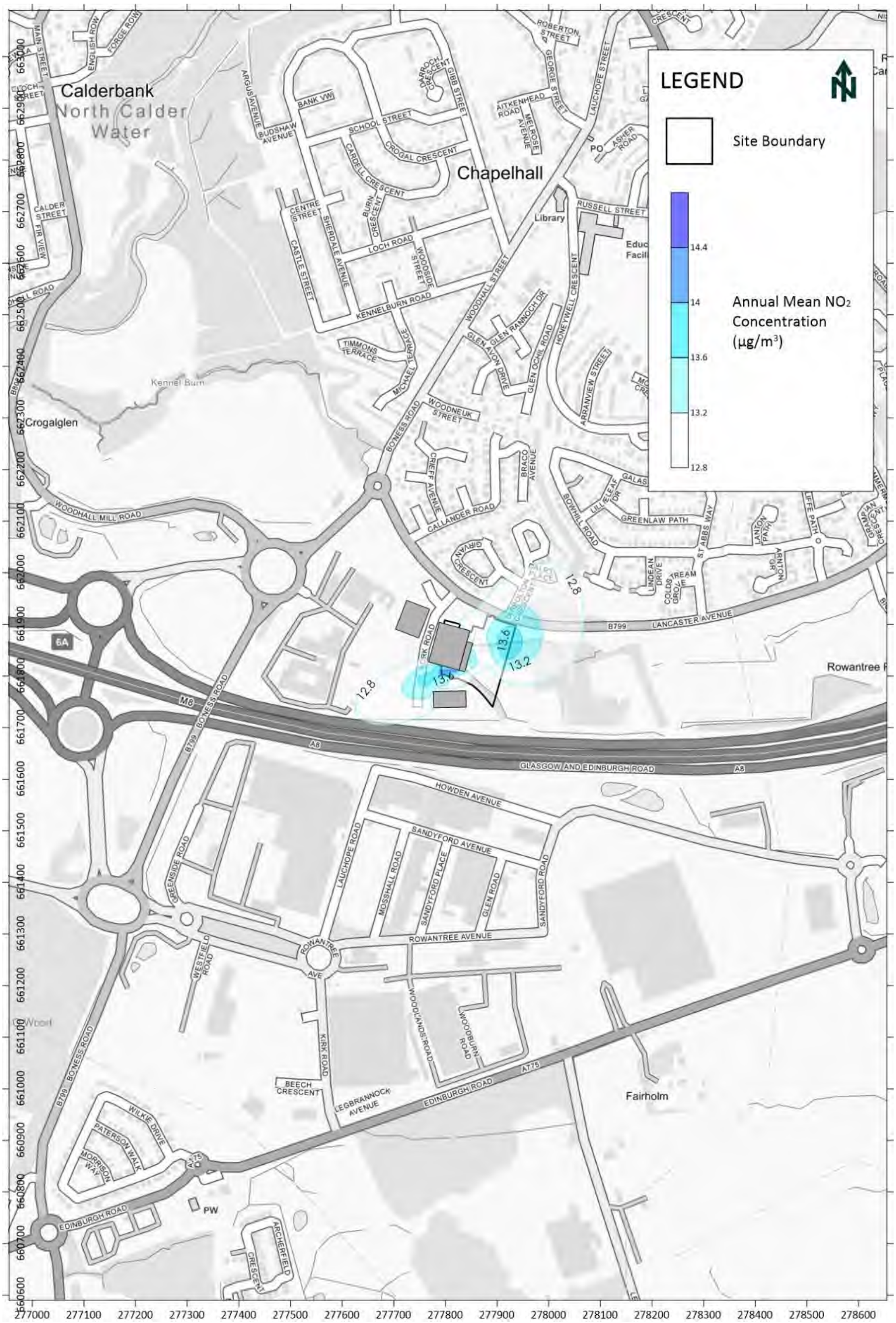

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Figure 12 - Predicted Annual Mean PM_{10} Concentrations (µg/m³) 2023 Meteorological Data

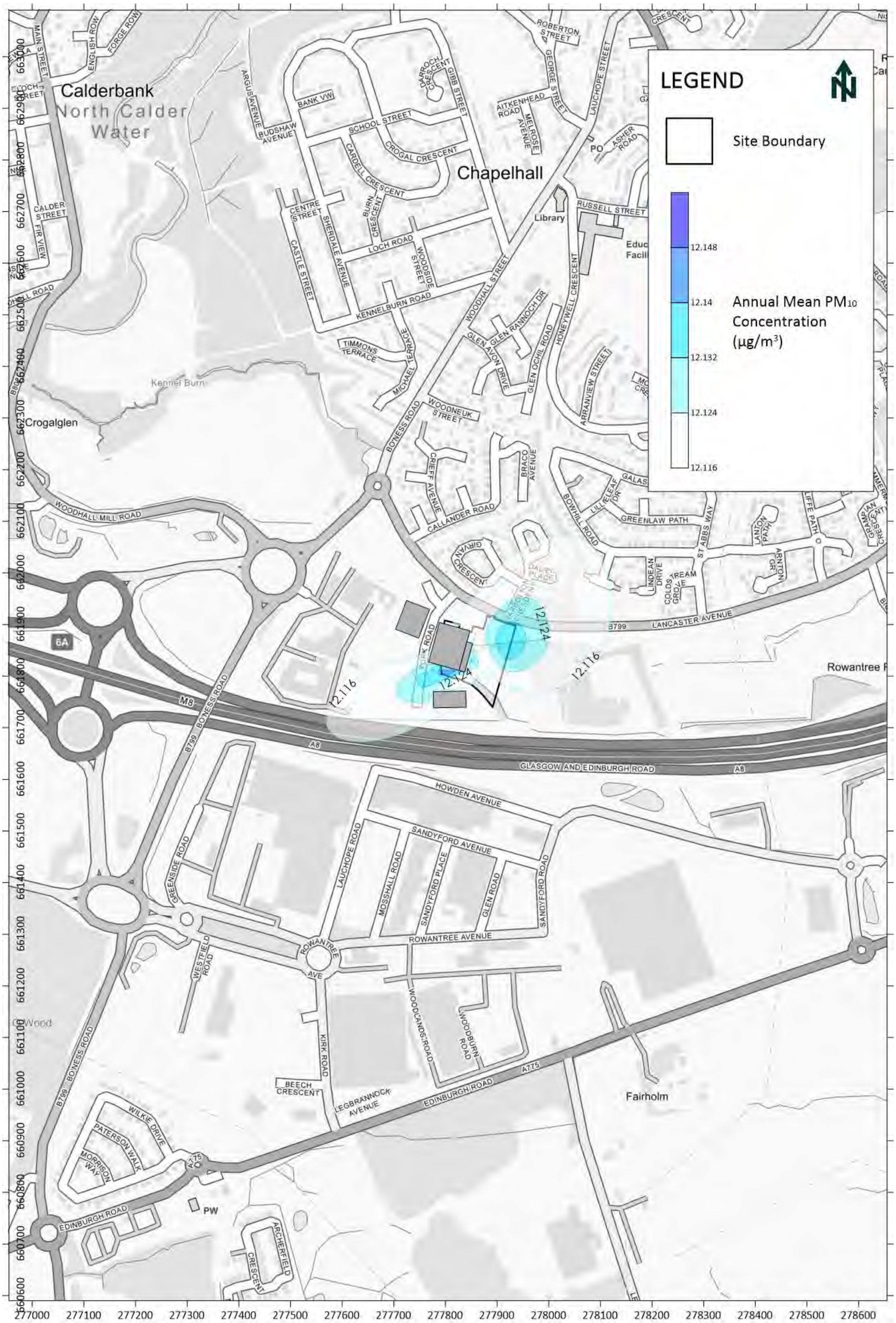


Figure 13 - Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m³) 2023 Meteorological Data

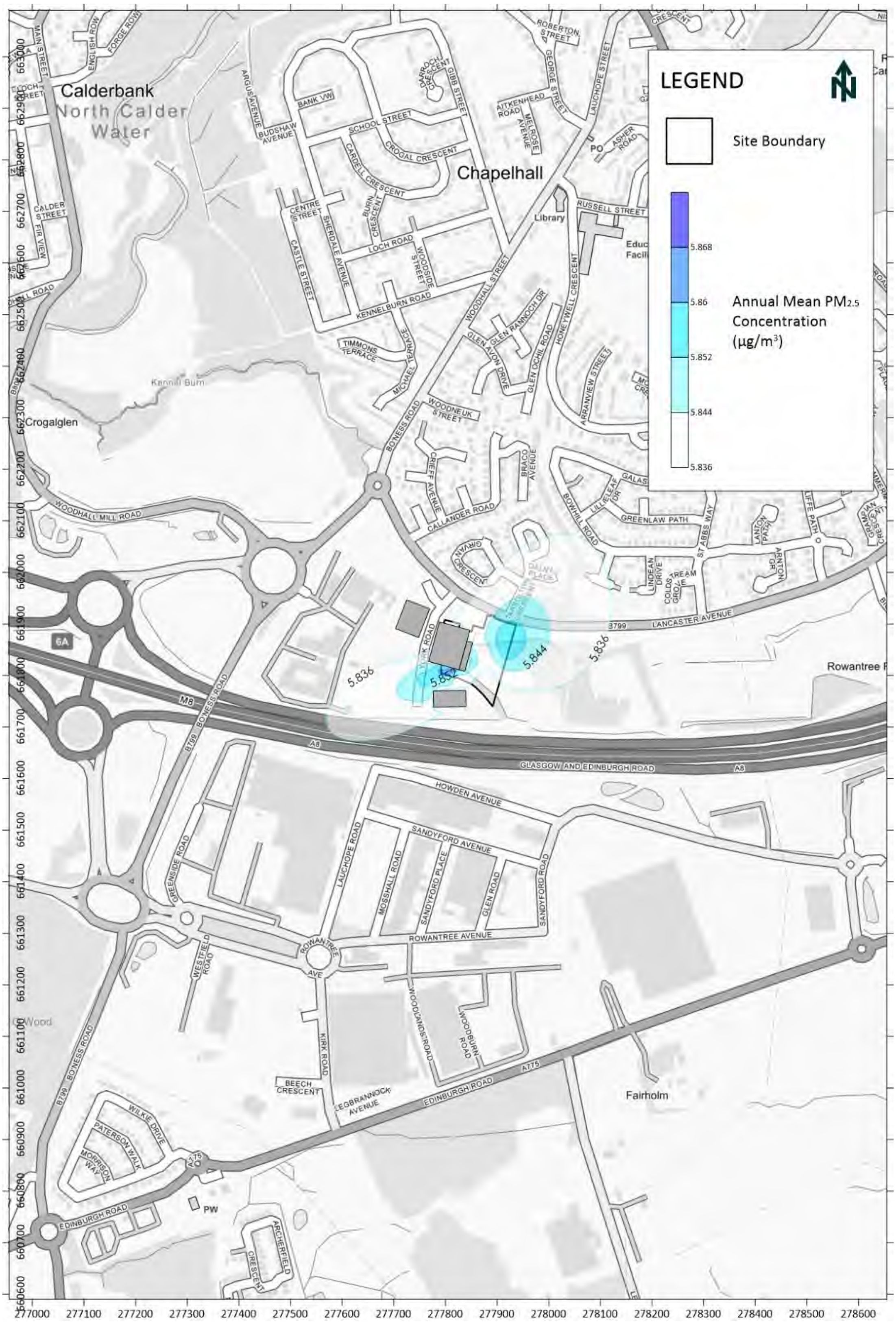
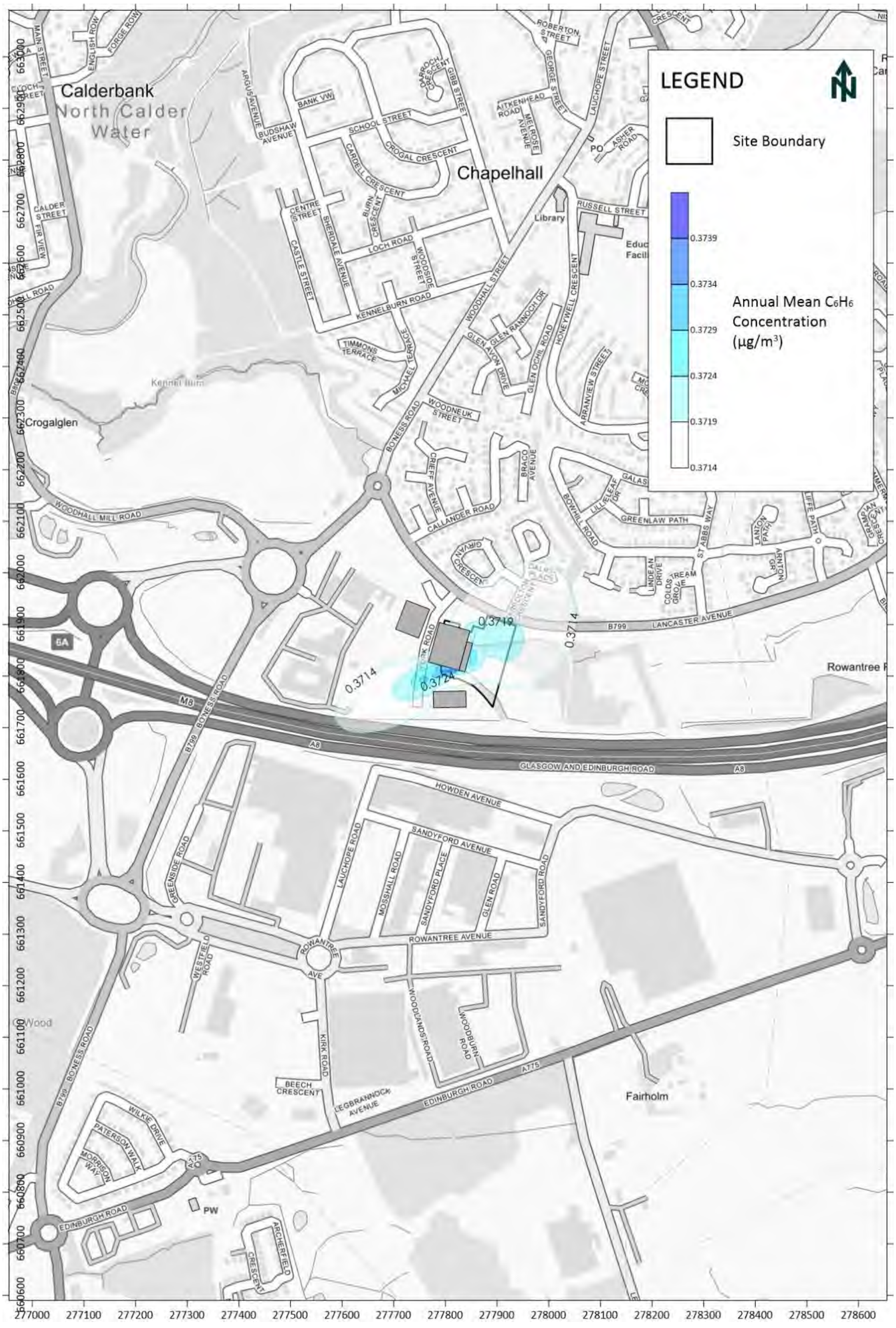


Figure 14 - Predicted Annual Mean C_6H_6 Concentrations (µg/m³) 2023 Meteorological Data



Appendix A - Limitations

Limitations

The recommendations contained in this Report represent Lucion's professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Lucion does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Lucion obtained, reviewed and evaluated information in preparing this Report from the Client and others. Lucion's conclusions, opinions and recommendations has been determined using this information. Lucion does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Lucion has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

This Report was prepared by Lucion for the sole and exclusive use of the Client and for the specific purpose for which Lucion was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Lucion and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Lucion does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Lucion from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B - Glossary

Term	Definition
AEGL	Acute Exposure Guideline Level
APIS	Air Pollution Information System
AQLV	Air Quality Limit Values
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
AURN	Automatic Urban and Rural Network
CERC	Cambridge Environmental Research Consultants
CO	Carbon monoxide
C_6H_6	Benzene
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EAL	Environmental Assessment Level
EASR	Environmental Authorisations (Scotland) Regulation
EQS	Environmental Quality Standard
HVO	Hydrotreated Vegetable Oil
LA	Local Authority
MO	Monin-Obukhov
NGR	National Grid Reference
NLC	North Lanarkshire Council
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
O_2	Oxygen
PC	Process Contribution

Term	Definition
PEC	Predicted Environmental Concentration
PM	Particulate matter
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µg
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5µg
SCR	Selective Catalytic Reduction
SEPA	Scottish Environmental Protection Agency
SO_2	Sulphur dioxide
SSSI	Site of Special Scientific Interest
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
z_0	Roughness Length
%ile	Percentile

Appendix C - Wind Roses of Glasgow 2020 - 2024 Meteorological Data

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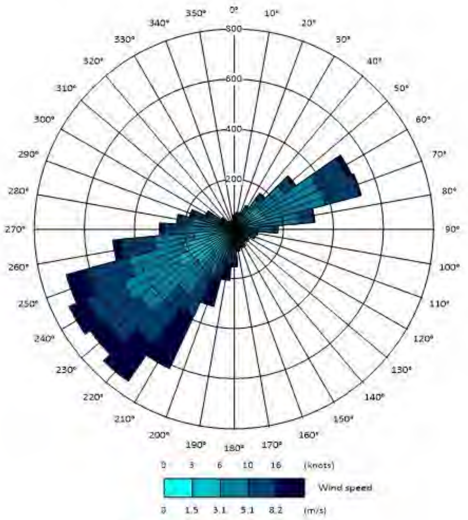
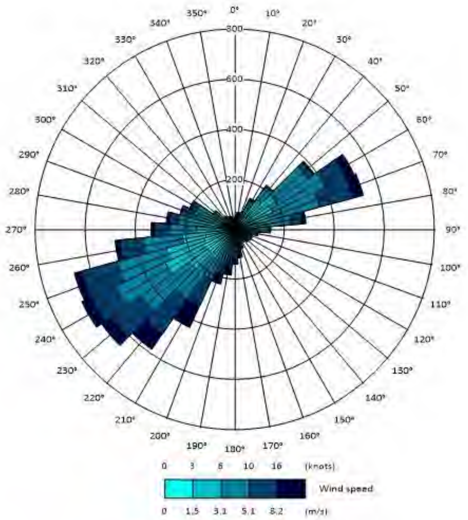
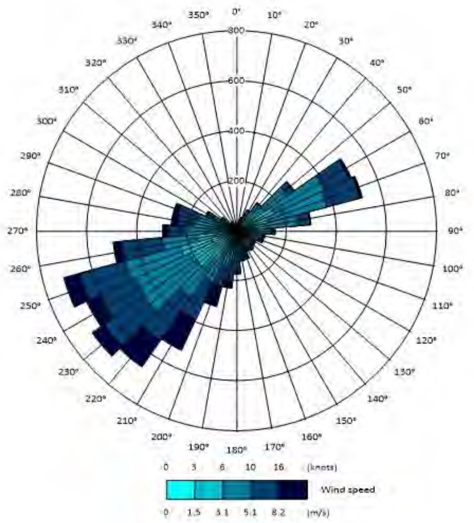


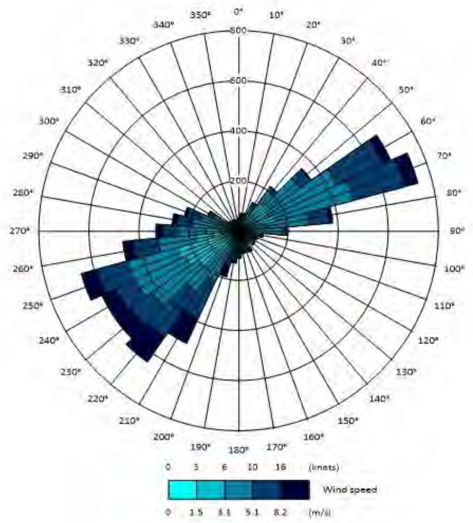
2020 Meteorological Data



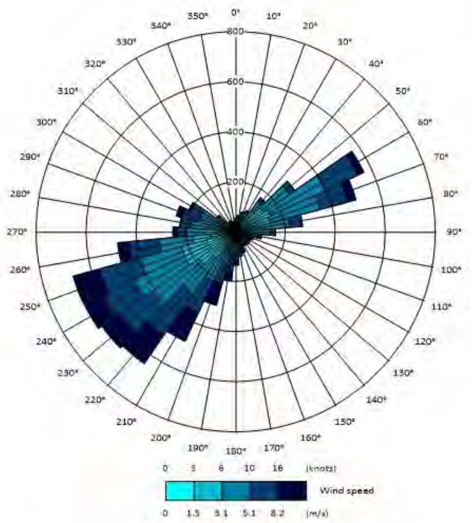
2021 Meteorological Data



2022 Meteorological Data



2023 Meteorological Data



2024 Meteorological Data

Appendix D - Scenario 4 Assessment

Introduction

For Scenario 4, emissions from all generators were modelled constantly to ensure a full range of meteorological conditions were included in the outputs. The approach to analysis of the results is summarised in the following Sections.

Modelling Scenarios

Short-Term Averaging Periods

Statistical analysis using the hypergeometric probability distribution to identify the potential for an exceedance of the 1-hour EQS for NO_2 was utilised. An operating period of 72-hours was assumed. Using the hypergeometric probability distribution method, it was determined that, should the results indicate 1,430 or fewer 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, multiplied by 2.5 in accordance with relevant guidance[28], is 4.9%.

Based on 1,430 instances, the 83.68th %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 EQS exceedance and impacts are not considered significant in accordance with the utilised guidance[29].

The maximum predicted concentrations of C_6H_6, CO and SO_2 for each short-term averaging period were identified and compared to the relevant EQS.

The duration of Scenario 4 was assumed as 72-hours. As such, emissions are unlikely to significantly affect the 24-hour mean EQSs for PM_{10} and SO_2 as seven and three exceedances are permitted per annum, respectively. These were therefore not included in the model

The relevant short-term EQSs for Scenario 4 are summarised in Table D1.

Table D1 - Scenario 4: Short Term Pollutant Averaging Periods

Pollutant	Receptor Type	Modelled As	EQS (µg/m^3)
NO_2	Human	83.68th %ile 1-hour mean[(a)]	200
C_6H_6	Human	100th %ile 24-hour mean	30
CO	Human	100th %ile 8-hour rolling mean	10,000
SO_2	Human	99.9th %ile 15-minute mean	266
	Human	99.7th %ile 1-hour mean	350
NO_x	Ecological	100th %ile 24-hour mean	75

Note: (a) %ile associated with 72-hours of operation per year. Calculated using the approach for hypergeometric mean calculation as outlined in EA guidance[30].

Long-term Averaging Periods

The relevant long-term EQSs for Scenario 4 are summarised in **Table D2**.

Table D2 - Scenario 4: Long Term Pollutant Averaging Periods

Pollutant	Receptor Type	Modelled As	EQS (µg/m^3)
NO_2	Human	Annual mean	40
PM_{10}	Human	Annual mean	18
$PM_{2.5}$	Human	Annual mean	10
C_6H_6	Human	Annual mean	3.25
NO_x	Ecological	Annual mean	30

28 https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.
29 https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.
30 https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.

Pollutant	Receptor Type	Modelled As	EQS ($\mu g/m^3$)
SO_2	Ecological	Annual mean	10
Nitrogen deposition	Ecological	Annual	As outlined in **Table 9**
Acid deposition	Ecological	Annual	As outlined in **Table 10**

To predict annual mean concentrations, the generators were modelled as operating simultaneously at 100% load, 365-days a year and the results subsequently factored to represent 89.7-hours operation of all generators. This consisted of:

- Scenario 1: 17.7-hours all generators operating; and,
- Scenario 4: 72-hours all generators operating.

The maximum predicted concentration for each averaging period was identified and compared to the relevant EQS.

Results

Short Term Averaging Periods - Human Receptors

Nitrogen Dioxide

Predicted 83.68th %ile 1-hour mean NO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table D3**.

Table D3 - Scenario 4: Predicted 83.68th %ile 1-hour Mean NO_2 Concentrations

Receptor	Predicted 83.68th %ile 1-hour Mean NO_2 PEC ($\mu g/m^3$)				
	2020	2021	2022	2023	2024
R1	30.22	26.95	31.28	26.99	29.16
R2	43.80	37.26	44.21	37.52	40.66
R3	67.83	49.61	62.61	49.81	58.30
R4	107.85	72.56	93.81	75.46	88.25
R5	121.19	107.30	117.60	109.45	115.90
R6	101.46	89.80	100.00	90.86	97.32
R7	92.03	83.73	90.51	83.13	87.72
R8	62.25	57.48	62.28	55.90	60.58
R9	56.80	51.98	55.89	49.33	54.75
R10	44.15	41.45	44.83	40.49	42.24
R11	24.95	24.75	25.16	24.75	24.85
R12	24.72	24.72	24.72	24.72	24.72

As indicated in **Table D3**, 83.68th %ile 1-hour mean NO_2 concentrations were below the EQS of 200$\mu g/m^3$ at all receptor locations for all meteorological data sets.

Maximum predicted 83.68th %ile 1-hour mean NO_2 concentrations at the receptor locations are summarised in **Table D4**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D4 - Scenario 4: Maximum Predicted 83.68th %ile 1-hour Mean NO_2 Concentrations

Receptor	Maximum Predicted 83.68th %ile 1-hour Mean NO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[(a)]
	PC	PEC		
R1	6.56	31.28	3.3	3.7
R2	19.49	44.21	9.7	11.1
R3	43.11	67.83	21.6	24.6
R4	83.13	107.85	41.6	47.4
R5	96.47	121.19	48.2	55.0
R6	76.74	101.46	38.4	43.8
R7	67.31	92.03	33.7	38.4
R8	37.56	62.28	18.8	21.4
R9	32.08	56.80	16.0	18.3
R10	20.11	44.83	10.1	11.5
R11	0.44	25.16	0.2	0.3
R12	0.00	24.72	0.0	0.0

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

As shown in in **Table D4**, the PC proportions were below 20% of the EQS headroom at all receptor locations with the exception of receptors R3 - R8. However, PECs were below 70% of the EQS at these locations. As such, predicted impacts on 1-hour mean NO_2 concentrations are not considered to be significant.

Benzene

Predicted 100th %ile 24-hour mean C_6H_6 PECs at the receptor locations, inclusive of background levels, are summarised in **Table D5**.

Table D5 - Scenario 4: Predicted 100th %ile 24-hour Mean C_6H_6 Concentrations

Receptor	Predicted 100th %ile 24-hour Mean C_6H_6 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	1.11	1.15	1.13	1.13	1.11
R2	1.32	1.25	1.26	1.28	1.26
R3	1.39	1.36	1.33	1.32	1.38
R4	1.42	1.37	1.39	1.35	1.44
R5	1.32	1.27	1.32	1.27	1.31
R6	1.22	1.22	1.25	1.15	1.21
R7	1.18	1.19	1.22	1.14	1.16
R8	1.00	1.00	1.00	0.98	0.98
R9	0.96	0.98	0.95	0.94	0.98
R10	0.92	0.93	0.94	0.93	0.95
R11	1.01	0.98	1.08	0.94	1.05
R12	0.84	0.82	0.84	0.80	0.85

As indicated in **Table D5**, 24-hour mean C_6H_6 concentrations were below the EQS of 30µg/m³ at all receptor locations for all meteorological data sets.

Maximum predicted 100th %ile 24-hour mean C_6H_6 concentrations at the receptor locations are summarised in **Table D6**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D6 - Scenario 4: Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Concentrations

Receptor	Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[(a)]
	PC	PEC		
R1	0.41	1.15	1.4	1.4
R2	0.58	1.32	1.9	2.0

Receptor	Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[(a)]
	PC	PEC		
R3	0.65	1.39	2.2	2.2
R4	0.70	1.44	2.3	2.4
R5	0.58	1.32	1.9	2.0
R6	0.51	1.25	1.7	1.7
R7	0.48	1.22	1.6	1.6
R8	0.26	1.00	0.9	0.9
R9	0.24	0.98	0.8	0.8
R10	0.21	0.95	0.7	0.7
R11	0.34	1.08	1.1	1.2
R12	0.11	0.85	0.4	0.4

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

As shown in in **Table D6**, PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 24-hour mean C_6H_6 concentrations are not considered to be significant, in accordance with the stated criteria.

Carbon Monoxide

Predicted 100th %ile 8-hour rolling mean CO PECs at the receptor locations, inclusive of background levels, are summarised in **Table D7**.

Table D7 - Scenario 4: Predicted 100th %ile 8-hour Rolling Mean CO Concentrations

Receptor	Predicted 100th %ile 8-hour Rolling Mean CO PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	742.75	744.85	744.51	739.03	736.46
R2	777.68	796.41	790.47	767.29	788.01
R3	823.56	832.78	834.88	835.60	841.54
R4	845.42	832.27	838.39	835.95	833.07
R5	811.79	807.60	808.26	808.61	803.37
R6	772.92	770.27	766.39	773.51	778.34
R7	762.70	761.78	755.88	752.78	761.15
R8	681.61	678.54	678.92	680.92	676.67
R9	667.65	667.88	666.17	665.88	667.03
R10	656.68	656.89	654.99	652.14	657.86
R11	695.60	678.20	691.03	693.30	680.80
R12	619.92	614.78	621.34	617.95	619.49

As indicated in **Table D7**, 8-hour rolling mean CO concentrations were below the EQS of 10,000µg/m³ at all receptor locations for all meteorological data sets.

Maximum predicted 100th %ile 8-hour rolling mean CO concentrations at the receptor locations are summarised in **Table D8**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D8 - Scenario 4: Maximum Predicted 100th %ile 8-hour Rolling Mean CO Concentrations

Receptor	Maximum Predicted 100th %ile 8-hour Rolling Mean CO Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[(a)]
	PC	PEC		
R1	162.85	744.85	1.6	1.7
R2	214.41	796.41	2.1	2.3
R3	259.54	841.54	2.6	2.8
R4	263.42	845.42	2.6	2.8
R5	229.79	811.79	2.3	2.4

Receptor	Maximum Predicted 100th %ile 8-hour Rolling Mean CO Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R6	196.34	778.34	2.0	2.1
R7	180.70	762.70	1.8	1.9
R8	99.61	681.61	1.0	1.1
R9	85.88	667.88	0.9	0.9
R10	75.86	657.86	0.8	0.8
R11	113.60	695.60	1.1	1.2
R12	39.34	621.34	0.4	0.4

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

As shown in in **Table D8** PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 8-hour rolling mean CO concentrations are not considered to be significant, in accordance with the stated criteria.

Sulphur Dioxide

Predicted 99.9th %ile 15-minute mean SO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table D9**.

Table D9 - Scenario 4: Predicted 99.9th %ile 15-minute Mean SO_2 Concentrations

Receptor	Predicted 99.9th %ile 15-minute Mean SO_2 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	17.55	17.52	17.56	17.55	17.54
R2	17.95	17.95	17.93	17.93	17.94
R3	18.24	18.24	18.24	18.24	18.24
R4	18.24	18.23	18.30	18.27	18.24
R5	18.11	18.12	18.12	18.11	18.15
R6	17.85	17.83	17.83	17.85	17.86
R7	17.76	17.79	17.76	17.78	17.78
R8	17.17	17.19	17.19	17.18	17.19
R9	17.11	17.09	17.10	17.13	17.09
R10	17.01	17.01	17.02	17.03	17.04
R11	17.22	17.18	17.22	17.20	17.18
R12	16.64	16.64	16.69	16.68	16.66

As indicated in **Table D9**, 99.9th %ile 15-minute mean SO_2 concentrations were below the EQS of 266µg/m³ at all receptor locations for all meteorological data sets.

Maximum predicted 99.9th %ile 15-minute mean SO_2 concentrations at the receptor locations are summarised in **Table D10**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D10 - Scenario 4: Maximum Predicted 99.9th %ile 15-minute Mean SO_2 Concentrations

Receptor	Maximum Predicted 99.9th %ile 15-minute Mean SO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R1	1.34	17.56	0.5	0.5
R2	1.73	17.95	0.6	0.7
R3	2.02	18.24	0.8	0.8
R4	2.08	18.30	0.8	0.8
R5	1.93	18.15	0.7	0.8
R6	1.64	17.86	0.6	0.7
R7	1.57	17.79	0.6	0.6

Receptor	Maximum Predicted 99.9th %ile 15-minute Mean SO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R8	0.97	17.19	0.4	0.4
R9	0.91	17.13	0.3	0.4
R10	0.82	17.04	0.3	0.3
R11	1.00	17.22	0.4	0.4
R12	0.47	16.69	0.2	0.2

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

As shown in in **Table D10** PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 15-minute mean SO_2 concentrations are not considered to be significant, in accordance with the stated criteria.

Predicted 99.7th %ile 1-hour mean SO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table D11**.

Table D11 - Scenario 4: Predicted 99.7th %ile 1-hour Mean SO_2 Concentrations

Receptor	Predicted 99.7th %ile 1-hour Mean SO_2 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	17.43	17.41	17.47	17.43	17.46
R2	17.82	17.81	17.81	17.81	17.82
R3	18.14	18.13	18.14	18.13	18.15
R4	18.17	18.15	18.17	18.16	18.17
R5	17.99	17.99	17.99	17.98	17.98
R6	17.73	17.72	17.72	17.73	17.73
R7	17.64	17.63	17.62	17.62	17.65
R8	17.06	17.05	17.06	17.06	17.06
R9	16.95	16.95	16.96	16.98	16.95
R10	16.86	16.86	16.86	16.88	16.87
R11	17.08	17.07	17.13	17.10	17.09
R12	16.57	16.54	16.59	16.58	16.57

As indicated in **Table D11**, 99.7th %ile 1-hour mean SO_2 concentrations were below the EQS of 350µg/m³ at all receptor locations for all meteorological data sets.

Maximum predicted 99.7th %ile 1-hour mean SO_2 concentrations at the receptor locations are summarised in **Table D12**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D12 - Scenario 4: Maximum Predicted 99.7th %ile 1-hour Mean SO_2 Concentrations

Receptor	Maximum Predicted 99.7th %ile 1-hour Mean SO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R1	1.25	17.47	0.4	0.4
R2	1.60	17.82	0.5	0.5
R3	1.93	18.15	0.6	0.6
R4	1.95	18.17	0.6	0.6
R5	1.77	17.99	0.5	0.5
R6	1.51	17.73	0.4	0.5
R7	1.43	17.65	0.4	0.4
R8	0.84	17.06	0.2	0.3
R9	0.76	16.98	0.2	0.2
R10	0.66	16.88	0.2	0.2
R11	0.91	17.13	0.3	0.3

Receptor	Maximum Predicted 99.7th %ile 1-hour Mean SO_2 Conc. (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
	PC	PEC		
R12	0.37	16.59	0.1	0.1

Note: (a) PC proportion of EQS minus twice the long-term background concentration.

As shown in in **Table D12** PCs were below 10% of the EQS at all receptor locations. As such, predicted impacts on 1-hour mean SO_2 concentrations are not considered to be significant, in accordance with the stated criteria.

Short Term Averaging Periods - Ecological Receptors

Predicted 24-hour mean NO_x PECs at the ecological receptor locations, inclusive of background levels, are summarised in **Table D13**.

Table D13 - Scenario 4: Predicted 24-hour Mean NO_x Concentrations

Receptor	Predicted 24-hour Mean NO_x PEC (µg/m³)				
	2020	2021	2022	2023	2024
E1	19.13	18.91	20.54	19.46	20.81
E2	29.88	27.53	27.27	28.23	27.75

As indicated in **Table D13**, 24-hour mean NO_x PECs were below the EQS of 75µg/m³ at all ecological receptors.

Maximum predicted 24-hour mean NO_x concentrations at the ecological receptors are summarised in **Table D14**.

Table D14 - Scenario 4: Maximum Predicted 24-hour Mean NO_x Concentrations

Receptor	Maximum Predicted 24-hour Mean NO_x Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
E1	5.89	20.81	7.9	27.8
E2	5.28	29.88	7.0	39.8

As indicated in **Table D14**, PCs were below 10% of the 24-hour mean EQS at all receptor locations. As such, predicted effects on 24-mean NO_x concentrations are not considered to be significant, in accordance with the stated criteria.

Long Term Averaging Periods - Human Receptors

Nitrogen Dioxide

Predicted annual mean NO_2 PECs at the receptor locations, inclusive of background levels, are summarised in **Table D15**. These are based on a total operational period of 89.7-hours per annum.

Table D15 - Predicted Annual Mean NO_2 Concentrations

Receptor	Predicted Annual Mean NO_2 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	12.47	12.45	12.50	12.45	12.47
R2	12.58	12.54	12.60	12.53	12.56
R3	12.77	12.67	12.75	12.65	12.72
R4	12.95	12.81	12.91	12.81	12.88
R5	13.04	12.90	12.99	12.91	12.97
R6	12.91	12.82	12.88	12.82	12.87
R7	12.87	12.79	12.85	12.78	12.83
R8	12.63	12.60	12.63	12.59	12.62
R9	12.58	12.56	12.58	12.55	12.57
R10	12.52	12.51	12.52	12.50	12.51

Receptor	Predicted Annual Mean NO_2 PEC (µg/m^3)				
	2020	2021	2022	2023	2024
R11	12.41	12.40	12.43	12.41	12.41
R12	12.37	12.37	12.38	12.38	12.37

As indicated in **Table D15**, annual mean NO_2 concentrations were below the EQS of 40µg/m^3 at all receptor locations for all meteorological data sets.

Maximum predicted annual mean NO_2 concentrations at the receptor locations are summarised in **Table D16**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D16 - Maximum Predicted Annual Mean NO_2 Concentrations

Receptor	Maximum Predicted Annual Mean NO_2 Conc. (µg/m^3)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.14	12.50	0.3	31.2
R2	0.24	12.60	0.6	31.5
R3	0.41	12.77	1.0	31.9
R4	0.59	12.95	1.5	32.4
R5	0.68	13.04	1.7	32.6
R6	0.55	12.91	1.4	32.3
R7	0.51	12.87	1.3	32.2
R8	0.27	12.63	0.7	31.6
R9	0.22	12.58	0.6	31.5
R10	0.16	12.52	0.4	31.3
R11	0.07	12.43	0.2	31.1
R12	0.02	12.38	0.1	31.0

As indicated in **Table D16**, PCs were below 1% of the EQS at all receptor locations with the exception of R3 to R7. However, PECs were below 70% of the EQS at these locations. As such, predicted effects on annual mean NO_2 concentrations are not considered to be significant, in accordance with the stated criteria.

<u>Particulate Matter</u>

Predicted annual mean PM_{10} PECs at the receptor locations, inclusive of background levels, are summarised in **Table D17**. These are based on a total operational period of 89.7-hours per annum.

Table D17 - Predicted Annual Mean PM_{10} Concentrations

Receptor	Predicted Annual Mean PM_{10} PEC (µg/m^3)				
	2020	2021	2022	2023	2024
R1	12.12	12.12	12.12	12.12	12.12
R2	12.13	12.12	12.13	12.12	12.12
R3	12.14	12.13	12.14	12.13	12.13
R4	12.14	12.14	12.14	12.14	12.14
R5	12.15	12.14	12.14	12.14	12.14
R6	12.14	12.13	12.14	12.13	12.14
R7	12.14	12.13	12.14	12.13	12.14
R8	12.13	12.12	12.12	12.12	12.12
R9	12.12	12.12	12.12	12.12	12.12
R10	12.12	12.12	12.12	12.12	12.12
R11	12.11	12.11	12.11	12.11	12.11
R12	12.11	12.11	12.11	12.11	12.11

As indicated in **Table D17**, annual mean PM_{10} concentrations were below the EQS of 18µg/m^3 at all receptor locations for all meteorological data sets.

Maximum predicted annual mean PM_{10} concentrations at the receptor locations are summarised in **Table D18**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D18 - Maximum Predicted Annual Mean PM_{10} Concentrations

Receptor	Maximum Predicted Annual Mean PM_{10} Conc. ($\mu g/m^3$)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.01	12.12	0.1	67.3
R2	0.02	12.13	0.1	67.4
R3	0.03	12.14	0.1	67.4
R4	0.03	12.14	0.2	67.5
R5	0.04	12.15	0.2	67.5
R6	0.03	12.14	0.2	67.4
R7	0.03	12.14	0.2	67.4
R8	0.02	12.13	0.1	67.4
R9	0.01	12.12	0.1	67.3
R10	0.01	12.12	0.1	67.3
R11	0.00	12.11	0.0	67.3
R12	0.00	12.11	0.0	67.3

As indicated in **Table D18**, PCs were below 1% of the EQS at all receptor locations. As such, predicted effects on annual mean PM_{10} concentrations are not considered to be significant, in accordance with the stated criteria.

Predicted annual mean $PM_{2.5}$ PECs at the receptor locations, inclusive of background levels, are summarised in **Table D19**. These are based on a total operational period of 89.7-hours per annum.

Table D19 - Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor	Predicted Annual Mean $PM_{2.5}$ PEC ($\mu g/m^3$)				
	2020	2021	2022	2023	2024
R1	5.84	5.84	5.84	5.84	5.84
R2	5.85	5.84	5.85	5.84	5.84
R3	5.86	5.85	5.86	5.85	5.85
R4	5.86	5.86	5.86	5.86	5.86
R5	5.87	5.86	5.86	5.86	5.86
R6	5.86	5.85	5.86	5.85	5.86
R7	5.86	5.85	5.86	5.85	5.86
R8	5.85	5.84	5.84	5.84	5.84
R9	5.84	5.84	5.84	5.84	5.84
R10	5.84	5.84	5.84	5.84	5.84
R11	5.83	5.83	5.83	5.83	5.83
R12	5.83	5.83	5.83	5.83	5.83

As indicated in **Table D19**, annual mean $PM_{2.5}$ concentrations were below the EQS of $10\mu g/m^3$ at all receptor locations for all meteorological data sets.

Maximum predicted annual mean $PM_{2.5}$ concentrations at the receptor locations are summarised in **Table D20**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D20 - Maximum Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor	Maximum Predicted Annual Mean $PM_{2.5}$ Conc. ($\mu g/m^3$)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.01	5.84	0.1	58.4
R2	0.02	5.85	0.2	58.5

Receptor	Maximum Predicted Annual Mean $PM_{2.5}$ Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R3	0.03	5.86	0.3	58.6
R4	0.03	5.86	0.3	58.6
R5	0.04	5.87	0.4	58.7
R6	0.03	5.86	0.3	58.6
R7	0.03	5.86	0.3	58.6
R8	0.02	5.85	0.2	58.5
R9	0.01	5.84	0.1	58.4
R10	0.01	5.84	0.1	58.4
R11	0.00	5.83	0.0	58.3
R12	0.00	5.83	0.0	58.3

As indicated in **Table D20**, PCs were below 1% of the EQS at all receptor locations. As such, predicted effects on annual mean $PM_{2.5}$ concentrations are not considered to be significant, in accordance with the stated criteria.

Benzene

Predicted annual mean C_6H_6 PECs at the receptor locations, inclusive of background levels, are summarised in **Table D21**. These are based on a total operational period of 89.7-hours per annum.

Table D21 - Predicted Annual Mean C_6H_6 Concentrations

Receptor	Predicted Annual Mean C_6H_6 PEC (µg/m³)				
	2020	2021	2022	2023	2024
R1	0.37	0.37	0.37	0.37	0.37
R2	0.37	0.37	0.37	0.37	0.37
R3	0.37	0.37	0.37	0.37	0.37
R4	0.37	0.37	0.37	0.37	0.37
R5	0.37	0.37	0.37	0.37	0.37
R6	0.37	0.37	0.37	0.37	0.37
R7	0.37	0.37	0.37	0.37	0.37
R8	0.37	0.37	0.37	0.37	0.37
R9	0.37	0.37	0.37	0.37	0.37
R10	0.37	0.37	0.37	0.37	0.37
R11	0.37	0.37	0.37	0.37	0.37
R12	0.37	0.37	0.37	0.37	0.37

As indicated in **Table D21**, annual mean C_6H_6 concentrations were below the EQS of 3.25µg/m³ at all receptor locations for all meteorological data sets.

Maximum predicted annual mean C_6H_6 concentrations at the receptor locations are summarised in **Table D22**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D22 - Maximum Predicted Annual Mean C_6H_6 Concentrations

Receptor	Maximum Predicted Annual Mean C_6H_6 Conc. (µg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R1	0.001	0.372	0.0	11.4
R2	0.001	0.372	0.0	11.5
R3	0.002	0.373	0.1	11.5
R4	0.002	0.373	0.1	11.5
R5	0.002	0.373	0.1	11.5
R6	0.001	0.372	0.0	11.5
R7	0.001	0.372	0.0	11.5

Receptor	Maximum Predicted Annual Mean C_6H_6 Conc. (μg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
R8	0.001	0.372	0.0	11.4
R9	0.001	0.372	0.0	11.4
R10	0.000	0.371	0.0	11.4
R11	0.000	0.371	0.0	11.4
R12	0.000	0.371	0.0	11.4

As indicated in **Table D22**, PCs were below 1% of the EQS at all receptor locations. As such, predicted effects on annual mean C_6H_6 concentrations are not considered to be significant, in accordance with the stated criteria.

Long Term Averaging Periods - Ecological Receptors

Nitrogen Oxides

Predicted annual mean NO_x PECs at the ecological receptor locations, inclusive of background levels, are summarised in **Table D23**. These are based on a total operational period of 89.7-hours per annum.

Table D23 - Predicted Annual Mean NO_x Concentrations

Receptor	Predicted Annual Mean NO_x PEC (μg/m³)				
	2020	2021	2022	2023	2024
E1	7.47	7.47	7.47	7.47	7.47
E2	12.30	12.30	12.30	12.30	12.30

As indicated in **Table D23**, annual mean NO_x PECs were below the EQS of 30μg/m³ at all ecological receptors for all meteorological data sets.

Maximum predicted annual mean NO_x concentrations at the ecological receptors are summarised in **Table D24**.

Table D24 - Maximum Predicted Annual Mean NO_x Concentrations

Receptor	Maximum Predicted Annual Mean NO_x Conc. (μg/m³)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
E1	0.010	7.470	0.03	24.90
E2	0.004	12.304	0.01	41.01

As shown in **Table D24**, PCs were below 1% of the annual mean NO_x EQS at all locations. As such, predicted effects on annual mean NO_x concentrations are not considered to be significant in accordance with the stated criteria.

Sulphur Dioxide

Predicted annual mean SO_2 PECs at the ecological receptor locations, inclusive of background levels, are summarised in **Table D25**. These are based on a total operational period of 89.7-hours per annum.

Table D25 - Predicted Annual Mean SO_2 Concentrations

Receptor	Predicted Annual Mean SO_2 PEC (μg/m³)				
	2020	2021	2022	2023	2024
E1	0.99004	0.99004	0.99004	0.99003	0.99000
E2	1.18001	1.18001	1.18001	1.18001	1.18000

As indicated in **Table D25**, annual mean SO_2 were below the EQS of 10μg/m³ at all ecological receptors for all meteorological data sets.

Maximum predicted annual mean SO_2 concentrations at the ecological receptors are summarised in **Table D26**.

Table D26 - Maximum Predicted Annual Mean SO_2 Concentrations

Receptor	Maximum Predicted Annual Mean SO_2 Conc. ($\mu g/m^3$)		Proportion of EQS (%)	
	PC	PEC	PC	PEC
E1	0.00004	0.99004	0.0004	9.90
E2	0.00001	1.18001	0.0001	11.80

As shown in **Table D26**, PCs were below 1% of the annual mean SO_2 EQS at all locations. As such, predicted effects on annual mean SO_2 concentrations are not considered to be significant in accordance with the stated criteria.

<u>Nitrogen Deposition</u>

Predicted annual nitrogen PC deposition rates at the ecological receptor locations are summarised in **Table D27**.

Table D27 - Predicted Annual Nitrogen Deposition Rates

Receptor	Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
	2020	2021	2022	2023	2024
E1	0.0010	0.0010	0.0009	0.0009	0.0009
E2	0.0003	0.0004	0.0003	0.0003	0.0003

Maximum predicted annual nitrogen deposition rates at the ecological receptors are summarised in **Table D28**.

Table D28 - Maximum Predicted Annual Nitrogen Deposition Rates

Receptor	Maximum Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)	Proportion of EQS (%)	
		Low EQS	High EQS
E1	0.0010	0.02	0.01
E2	0.0004	-	-

As shown in **Table D28**, PCs were below 1% of the EQS at the relevant location. As such, predicted effects on nitrogen deposition are not considered to be significant in accordance with the stated criteria.

<u>Acid Deposition</u>

Predicted annual acid PC deposition rates at the ecological receptor locations are summarised in **Table D29**.

Table D29 - Predicted Annual Acid Deposition Rates

Receptor	Predicted Annual PC Acid Deposition Rate (keq/ha/yr)				
	2020	2021	2022	2023	2024
E1	0.00008	0.00008	0.00008	0.00007	0.00006
E2	0.00002	0.00003	0.00002	0.00003	0.00002

Maximum predicted annual acid deposition rates at the ecological receptors are summarised in **Table D30**.

Table D30 - Maximum Predicted Annual Acid Deposition Rates

Receptor	Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)	Proportion of EQS (%)
E1	0.00008	0.01
E2	0.00003	-

As shown in Table D30, PCs were below 1% of the EQS at all relevant location. As such, predicted effects on acid deposition are not considered to be significant in accordance with the stated criteria.

Future Air Quality Objectives

A number of proposed AQOs for 2030 that are under consideration by the Scottish Government are summarised for pollutants considered within this assessment in **Table 57**.

It should be noted that the total duration of Scenarios 1 and 4 was assumed as 89.7-hours. As such, emissions are unlikely to significantly affect concentrations in the context of the proposed 24-hour mean NO_2 AQO as 18 exceedances are permitted per annum. Results were therefore not considered in the context of this proposed AQO.

Short Term Averaging Periods

Scenario 4

As modelled previously for Scenario 4, an operating period of 72-hours was assumed. Using the hypergeometric probability distribution method, it was determined that, should the results indicate 125 or fewer instances of NO_2 concentrations over 200µg/m^3 within a year, then the probability of producing 4 instances of NO_2 concentrations over 200µg/m^3, multiplied by 2.5 in accordance with relevant guidance[31], is 4.9%.

Based on 125 instances, the 98.57th %ile was calculated for use in the modelling assessment. As such, should predicted 98.57th %ile 1-hour mean NO_2 concentrations be under 200µg/m^3 then there is less than 5% probability of an AQO exceedance and impacts are not considered significant in accordance with the utilised guidance[32].

Maximum predicted 98.57th %ile 1-hour mean NO_2 concentrations at the receptor locations are summarised in **Table D31**. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table D31 - Maximum Predicted 98.57th %ile 1-hour Mean NO_2 Concentrations

Receptor	Maximum Predicted 93.65th %ile 1-hour Mean NO_2 Conc. (µg/m^3)	
	PC	PEC
R1	97.14	121.86
R2	128.01	152.73
R3	157.30	182.02
R4	169.52	194.24
R5	155.46	180.18
R6	128.64	153.36
R7	119.72	144.44
R8	70.77	95.49
R9	62.73	87.45
R10	54.27	78.99
R11	66.79	91.51
R12	24.02	48.74

As shown in in **Table D31**, PECs were below 100% of the proposed AQO at all receptor locations. As such, predicted impacts on 1-hour mean NO_2 concentrations are not considered to be significant under Scenario 4.

Long Term Averaging Periods

As outlined in **Table 57** there are a number of proposed long-term AQOs. However, as shown in **Table D16**, **Table D18**, **Table D20** and **Table D22** there were no predicted exceedances of these standards at any discrete receptor location for any meteorological data set under Scenario 4.

[31] https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.
[32] https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment.