Air Quality Assessment

Coder Road, Ludlow

Client: Shropshire Council

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Executive Summary

Redmore Environmental Ltd was commissioned by Shropshire Council to undertake an Air Quality Assessment in support of a proposed pyrolysis plant off Coder Lane, Ludlow.

Atmospheric emissions from the proposed plant have the potential to cause air quality impacts during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects.

Dispersion modelling was undertaken 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 Environmental Quality Standards and significance criteria.

The results indicated that impacts on pollutant concentrations were not predicted to be significant at any human or ecological receptor location in the vicinity of the site.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Shropshire Council to undertake an Air Quality Assessment in support of a proposed pyrolysis plant off Coder Lane, Ludlow.

1.1.2 Atmospheric emissions from the proposed plant have the potential to cause air quality impacts during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects.

1.2 Site Location and Context

1.2.1 The site is located off Coder Lane, Ludlow, at approximate National Grid Reference (NGR): 352718, 274710. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 It is proposed to operate one Woodtek C1000 pyrolysis unit. The plant will be installed within a dedicated building and process emissions will be released to atmosphere through a dispersion stack at a height of 10m. The site will operate in accordance with Schedule 13A of the Environmental Permitting Regulations. It will therefore be authorised as a Small Waste Incineration Plant (SWIP).

1.2.3 The operation of the plant will result in atmospheric emissions of combustion gases. These have the potential to cause air quality impacts at sensitive locations within the vicinity of the site. As such, potential effects have been assessed within the following report.

2.0 LEGISLATION

2.1 Legislation

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

- Nitrogen dioxide (NO_2);
- Sulphur dioxide (SO_2);
- Lead (Pb);
- 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 (AQTVs) were also provided for an additional five pollutants. These include:

- Ozone;
- Arsenic (As);
- Cadmium (Cd);
- Nickel (Ni); and,
- Benzo(a)pyrene.

2.1.3 It should be noted that the AQLV for $PM_{2.5}$ stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

2.1.4 The Environmental Improvement Plan 2023[1] was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to $PM_{2.5}$. The Concentration Target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

[1] The Environmental Improvement Plan 2023, DEFRA, 2023.

2.1.5 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in April 2023[2]. The document contains standards, objectives, and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.6 Table 1 presents the AQOs, Interim Target and Concentration Target for pollutants considered within this assessment.

Table 1 Air Quality Objectives / Interim Target / Concentration Target

Pollutant	Air Quality Objective/ Interim Target/ Concentration Target	
	Concentration (µg/m^3)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
$PM_{2.5}$	12[(a)]	Annual mean
	10[(b)]	Annual mean
C_6H_6	5	Annual mean
SO_2	125	24-hour Mean, not to be exceeded on more than three occasions per annum
	350	1-hour Mean, not to be exceeded on more than 24 occasions per annum
	266	15-minute mean, not to be exceeded on more than 35 occasions per annum
CO	10,000	8-hour running mean

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

Pollutant	Air Quality Objective/ Interim Target/ Concentration Target	
	Concentration (µg/m³)	Averaging Period
Pb	0.25	Annual mean

Note: (a) Interim Target to be achieved by end of January 2028.
(b) Concentration Target to be achieved by end of December 2040.

2.1.7 Table 2 presents the AQTVs for pollutants considered within this assessment.

Table 2 Air Quality Target Values

Pollutant	Air Quality Target Values	
	Concentration (µg/m³)	Averaging Period
As	0.006	Annual mean
Cd	0.005	Annual mean

2.1.8 Table 3 summarises the advice provided in DEFRA guidance[3] on where the AQOs for pollutants considered within this report apply.

Table 3 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.

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

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
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 the 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 the UK through the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. The operation of a pyrolysis plant is included in the regulations. As such, the plant will require an Environmental Permit in order to authorise its operation. Conditions of operation will include specific Emission Limit Values (ELVs) for various pollutants produced by the process. Compliance with these conditions must be demonstrated through periodic monitoring requirements, which have been set in order to limit potential impacts in the surrounding area.

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 (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, 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 EALs used in this assessment were obtained from Environment Agency (EA) guidance 'Air emissions risk assessment for your environmental permit'[4] and are summarised in Table 4.

Table 4 Environmental Assessment Levels

Pollutant	Environmental Assessment Level (µg/m³)		
	Long Term	Short Term	
	Annual	24-hour	1-hour
Antimony (Sb)	5	-	150
C_6H_6	5	30	-
Cd	-	0.03	-
Cr (VI)	0.00025	-	-

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

Pollutant	Environmental Assessment Level (µg/m³)		
	Long Term	Short Term	
	Annual	24-hour	1-hour
Copper (Cu)	-	0.05	-
Hydrogen chloride (HCl)	-	-	750
Hydrogen fluoride (HF)	-	-	160
Manganese (Mn)	0.15	-	1,500
Mercury (Hg)	-	0.06	0.6
Ni	-	-	0.7
$PM_{2.5}$	20	-	-
Vanadium (V)	-	1	-

2.4.4 It should be noted that the Concentration Target for $PM_{2.5}$ was used in order to provide a conservative assessment of potential impacts as it is lower than the EAL of 20µg/m³.

2.5 Critical Loads and Levels

2.5.1 A critical load is defined by the UK Air Pollution Information System (APIS)[5] as:

> "A quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."

2.5.2 A critical level is defined as:

> "Concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge."

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

2.5.3 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).

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

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

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

Table 5 Critical Levels for the Protection of Vegetation

Pollutant	Critical Level	
	Concentration (µg/m^3)	Averaging Period
Oxides of nitrogen (NO_x)	30	Annual mean
	75	24-hour mean
HF	0.5	Weekly mean
	5.0	Daily 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

2.5.7 Critical loads have been designated within the UK based on the sensitivity of the receiving habitat and have been reviewed for the purpose of this assessment. These are summarised 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), Shropshire Council (SC) has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO_2 are above the AQO within the area. As such, two AQMAs have been declared. The closest of these to the development is described as follows:

> "An area encompassing Pound Street and the junction of Whitburn Street and Salop Street."

3.2.2 The site is located approximately 26.2km south-west of the AQMA. It is considered highly unlikely that the proposals would affect air quality over a distance of this magnitude. As such, the AQMA has not been considered further in the context of this assessment.

3.3 Air Quality Monitoring

Local Authority Monitoring

3.3.1 Monitoring of pollutant concentrations is undertaken by SC throughout their area of jurisdiction. However, the closest survey location to the facility is approximately 26.1km north-east of the site. Due to the distance between the two locations, it is not considered likely that similar pollution levels would occur. As such, this source of data has not been considered further in the context of the assessment.

3.3.2 SC do not undertake monitoring of any other pollutant concentrations within the vicinity of the site.

Heavy Metals Monitoring

3.3.3 Monitoring of heavy metals is carried out by DEFRA at 24 industrial sites and 10 rural locations throughout the UK. The closest site to the facility is Walsall Pleck at NGR: 399832, 296868, approximately 52km north-east of the facility. The most recent data available from the station is from 2023, as summarised in Table 6. It should be noted that monitoring of Hg and Sb is not undertaken at Walsall Pleck. As such, data for the pollutant was obtained from Cwmystwyth, which is located at 277138, 274242, approximately 76km west of the facility. The most recent data available from Cwmystwyth station is from 2013.

Table 6 Heavy Metals Monitoring Results

Species	Annual Mean Concentration (ng/m^3)
As	0.830
Cd	0.216
Cr	2.3
Cu	14.30
Hg	1.658
Ni	0.753

Acid Gas Monitoring

3.3.4 Concentrations of HCl are monitored in the UK through the UK Eutrophying and Acidifying Pollutants (UKEAP) network. The closest site is Rosemaund at NGR: 356535, 247200, approximately 27.8km south of the facility. The most recent data available for HCl from the monitoring station is from 2015 which is summarised in Table 7.

Table 7 Acid Gas Monitoring Results

Species	Annual Mean Concentration (µg/m^3)
HCl	0.26

3.3.5 Baseline concentrations of HF are not measured locally or nationally, since these are not generally of concern in terms of local air quality. However, the Expert Panel on Air Quality Standards (EPAQS) report "Guidelines for halogens and hydrogen halides in ambient air

for protecting human health against acute irritancy effects"[6] contains some estimates of baseline levels. This indicates that measured concentrations have been in the range of 0.036µg/m^3 to 2.35µg/m^3.

3.3.6 In lieu of local monitoring, the maximum measured baseline HF concentration has been used for the purpose of this assessment.

Dioxins and Furans Monitoring

3.3.7 Monitoring of dioxins and furans is undertaken throughout the UK through the Toxic Organic Micro Pollutants (TOMPs) network. Throughout this report, the term 'dioxins' is taken to mean the family of 210 compounds or congeners comprising polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). If both PCDDs and PCDFs are present, these have been referred to as PCDD/Fs. The summation of the concentrations of 17 toxic PCDD and PCDF congeners, weighted relative to the toxicity of 2,3,7,8-TCDD, is given in the form of Toxic Equivalents (TEQ).

3.3.8 The closest TOMPS monitor is Manchester Law Courts at NGR: 383375, 398260 approximately 127km north-north-east of the facility. The most recent data available from this site is from 2016 and is summarised in Table 8.

Table 8 Dioxins and Furans Monitoring Results

Species	Annual Mean Concentration (TEQ fg/m^3)
PCDD/ F	12.4

3.4 Background Pollutant Concentrations

3.4.1 Predictions of background pollutant concentrations on a 1km-by-1km grid basis have been produced by DEFRA for the entire of the UK to assist Local Authorities in their Review and Assessment of air quality. The site is located in grid square NGR: 352500, 274500. Data

[6] EPAQS Guidelines for halogens and hydrogen halides in ambient air for protecting human health against acute irritancy effects, DEFRA, Scottish Executive, National Assembly of Wales, Department of the Environment in Northern Ireland, 2006.

for this location was downloaded from the DEFRA website[7] for the purpose of the assessment and is summarised in Table 9.

Table 9 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m^3)
NO_2	4.31
PM_{10}	10.08
$PM_{2.5}$	5.63
C_6H_6	0.156
SO_2	2.35
CO	206

3.4.2 It should be noted that concentrations of NO_2, PM_{10} and $PM_{2.5}$ are predicted for 2024, C_6H_6 for 2010, and SO_2 and CO for 2001. These are the most recent predictions available from DEFRA and are therefore considered to provide a reasonable representation of background concentrations in the vicinity of the site.

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 10.

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

Table 10 Sensitive Human Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Eco Park Road	352981.3	274453.0
R2	Education Facility - Eco Park Road	352906.1	274460.1
R3	Medical Facility - Eco Park Road	352840.1	274360.3
R4	Residential - Sheet Road	352661.1	274295.2
R5	Residential - Parys Road	352632.0	274428.3
R6	Residential - Honey Meadow	352628.8	274493.9
R7	Residential - Langford Close	352624.6	274548.5
R8	Residential - Langford Close	352595.9	274593.7
R9	Residential - Blashfield Road	352563.7	274629.7
R10	Residential - Blashfield Road	352497.8	274717.6
R11	Residential - Shearman Road	352472.3	274776.1
R12	Residential - James Close	352456.7	274851.5
R13	Residential - Ballard Close	352464.3	274925.5
R14	Residential - Ballard Close	352493.7	274990.2
R15	Residential - Baker Close	352583.2	274983.6
R16	Residential - Baker Close	352644.1	274983.9
R17	Residential - Squirrel Lane	353330.7	274662.9
R18	Residential - Squirrel Lane	353334.7	274587.1

3.5.3 Reference should be made to Figure 2 for a map of the sensitive human receptor locations.

Ecological Receptors

3.5.4 Atmospheric emissions from the plant also have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2010) and subsequent amendments require competent authorities

to review applications and consents that have the potential to impact on ecological designations. A study was therefore undertaken to identify the following sites of ecological or nature conservation importance:

- Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Ramsar sites within 10km of the facility; and,
- Sites of Special Scientific Interest (SSSI), National Nature Reserves, Local Wildlife Sites (LWS) and Ancient Woodland (AW) within 2km of the facility.

3.5.5 A pre-application request was submitted to the EA in order to identify any sites of ecological or nature conservation importance that required consideration within the assessment. The response indicated the following should be included:

- River Teme SSSI;
- Temeside SSSI;
- Teme Bank SSSI;
- Downton Gorge SAC;
- Ploughnhill Wood AW;
- Tinkershill Wood AW;
- Ledwyche Brook LWS;
- Whitcliffe Common Reserve LWS; and,
- Meadows below Caynham Camp LWS.

3.5.6 Review of the relevant data indicated that Temeside SSSI and Teme Bank SSSI are designated for geological features. As such, there are no qualifying ecological features that are sensitive to air quality impacts and therefore these designations have not been considered further in the assessment.

3.5.7 For the purpose of the modelling assessment discrete receptors were placed at the closest points of each designation to the site to ensure the maximum potential impact was predicted. These are summarised in Table 11.

Table 11 Ecological Receptor Locations

Receptor		NGR (m)	
		X	Y
E1	River Teme SSSI	352175.1	274139.9
E2	River Teme SSSI	351822.6	274293.0
E3	River Teme SSSI	352203.9	273767.1
E4	Downton Gorge SAC	346169.9	275438.3
E5	Downton Gorge SAC	346020.0	275019.6
E6	Ploughnhill Wood AW	353621.6	273448.0
E7	Ploughnhill Wood AW	353248.3	273178.3
E8	Tinkershill Wood AW	352759.5	272863.7
E9	Tinkershill Wood AW	352335.5	272467.9
E10	Ledwyche Brook LWS	353498.3	274702.9
E11	Ledwyche Brook LWS	353478.2	275004.3
E12	Ledwyche Brook LWS	353363.1	274426.5
E13	Whitcliffe Common Reserve LWS	351163.1	274150.3
E14	Meadows below Caynham Camp LWS	354218.7	273561.7

3.5.8 Reference should be made to Figure 3 for a map of the sensitive ecological receptor locations.

3.5.9 Critical loads have been designated within the UK based on the sensitivity and relevant features of the receiving habitat. A review of the APIS[8] and MAGIC[9] websites, as well as the relevant site designations and publicly available information, was undertaken in order to identify the most suitable habitat description and associated critical load for the area of each designation considered within the assessment.

3.5.10 The relevant nitrogen deposition critical loads are presented in Table 12.

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

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

Table 12 Critical Loads for Nitrogen Deposition

Receptor		Feature	Relevant Nitrogen Critical Load Class	Nitrogen Critical Load (kgN/ha/yr)	
				Low	High
E1 - E3	River Teme SSSI	Flowing waters	-(a)	-	-
E4, E5	Downton Gorge SAC	Tilio-Acerion forests of slopes, screes and ravines	Carpinus and Quercus mesic deciduous forest	15	20
E6, E7	Ploughnhill Wood AW	Broadleaved, mixed and yew woodland	Broadleaved deciduous woodland	10	15
E8, E9	Tinkershill Wood AW	Broadleaved, mixed and yew woodland	Broadleaved deciduous woodland	10	15
E10 - E12	Ledwyche Brook LWS	Hedgerows	Broadleaved deciduous woodland	10	15
E13	Whitcliffe Common Reserve LWS	Broadleaved, Mixed and Yew Woodland	Broadleaved deciduous woodland	10	15
E14	Meadows below Caynham Camp LWS	Calcareous grassland	Arctic-alpine calcareous grassland	5	10

Note: (a) Critical load not available on APIS.

3.5.11 The relevant acid deposition critical loads are presented are summarised in Table 13.

Table 13 Critical Loads for Acid Deposition

Receptor		Feature	Relevant Acid Critical Load Class	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E1 - E3	River Teme SSSI	Flowing waters	-(a)	-	-	-
E4, E5	Downton Gorge SAC	Tilio-Acerion forests of slopes, screes and ravines	Unmanaged Broadleafed/ Coniferous Woodland	0.142	1.536	1.678
E6, E7	Ploughnhill Wood AW	Broadleaved, mixed and yew woodland	Broadleafed/ Coniferous unmanaged woodland	0.142	1.501	1.643

Receptor		Feature	Relevant Acid Critical Load Class	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E8, E9	Tinkershill Wood AW	Broadleaved, mixed and yew woodland	Broadleafed /Coniferous unmanaged woodland	0.142	1.502	1.644
E10	Ledwyche Brook LWS	Hedgerows	Broadleafed /Coniferous unmanaged woodland	0.142	1.502	1.644
E11	Ledwyche Brook LWS	Hedgerows	Broadleafed /Coniferous unmanaged woodland	0.142	1.529	1.671
E12	Ledwyche Brook LWS	Hedgerows	Broadleafed /Coniferous unmanaged woodland	0.142	1.502	1.644
E13	Whitcliffe Common Reserve LWS	Broadleaved, Mixed and Yew Woodland	Broadleafed /Coniferous unmanaged woodland	0.142	1.504	1.646
E14	Meadows below Caynham Camp LWS	Calcareous grassland	Calcareous grassland (using base cation)	0.856	4	4.856

Note: (a) Critical load not available on APIS.

3.5.12 Baseline pollutant concentrations and deposition rates at each ecological receptor were obtained from the APIS[10] website and are summarised in Table 14.

Table 14 Baseline Pollution Levels at Ecological Receptors

Receptor		Annual Mean Concentration (µg/m³)		Deposition Rate	
		NO_x	SO_2	Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)
E1	River Teme SSSI	6.10	1.29	18.50	1.38
E2	River Teme SSSI	6.04	1.15	18.57	1.38

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

Receptor		Annual Mean Concentration (µg/m³)		Deposition Rate	
		NO_x	SO_2	Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)
E3	River Teme SSSI	4.99	0.76	18.66	1.39
E4	Downton Gorge SAC	3.87	0.63	31.33	2.33
E5	Downton Gorge SAC	3.87	0.63	31.33	2.33
E6	Ploughnhill Wood AW	4.32	0.73	32.91	2.44
E7	Ploughnhill Wood AW	4.32	0.73	32.91	2.44
E8	Tinkershill Wood AW	4.41	0.70	33.61	2.48
E9	Tinkershill Wood AW	4.41	0.70	33.61	2.48
E10	Ledwyche Brook LWS	4.61	0.82	32.55	2.42
E11	Ledwyche Brook LWS	4.51	0.80	32.20	2.39
E12	Ledwyche Brook LWS	4.61	0.82	32.55	2.42
E13	Whitcliffe Common Reserve LWS	6.04	1.15	32.77	2.43
E14	Meadows below Caynham Camp LWS	4.17	0.72	18.29	1.36

4.0 METHODOLOGY

4.1 Introduction

4.1.1 Atmsopheric emissions from the proposed pyrolysis plant have the potential to cause air quality impacts at sensitive locations in the vicinity of the site. These have been quantified through dispersion modelling in accordance with the methodology outlined in the following Sections.

4.2 Dispersion Model

4.2.1 Dispersion modelling was undertaken using ADMS-6 (v6.0.2.0), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-6 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

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

4.3 Modelling Scenarios

4.3.1 The scenarios considered in the modelling assessment for human receptors are summarised in Table 15.

Table 15 Human Receptor Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
NO_2	99.8th percentile (%ile) 1-hour mean	Annual mean
PM_{10}	90.4th %ile 24-hour mean	Annual mean

Parameter	Modelled As	
	Short Term	Long Term
$PM_{2.5}$	-	Annual mean
C_6H_6	100th %ile 24-hour mean	Annual mean
SO_2	99.2nd %ile 24-hour mean	-
	99.7th %ile 1-hour mean	
	99.9th %ile 15-minute mean	
HCl	100th %ile 1-hour mean	-
HF	100th %ile 1-hour mean	-
CO	100th %ile 8-hour rolling mean	-
Cd and Tl (as Cd)	100th %ile 24-hour mean	Annual Mean
Hg	100th %ile 1-hour mean	-
	100th %ile 24-hour mean	
Metals (total As, Cr, Cu, Ni, and their compounds)	100th %ile 1-hour mean (for Ni)	Annual Mean (for As and Cr (VI))
	100th %ile 24-hour mean (for Cu)	
PCDD/F	-	Annual mean

4.3.2 Some short-term air quality criteria are framed in terms of the number of occasions in a calendar year on which the concentration should not be exceeded. As such, the %iles shown in Table 15 were selected to represent the relationship between the permitted number of exceedences of short-period concentrations and the number of periods within a calendar year.

4.3.3 The scenarios considered in the modelling assessment for ecological receptors are summarised in Table 16.

Table 16 Ecological Receptor Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
NO_x	100th %ile 24-hour mean	Annual mean

Parameter	Modelled As	
	Short Term	Long Term
SO_2	-	Annual mean
HF	100th %ile 24-hour mean	-
	100th %ile Weekly mean	-
Nitrogen deposition	-	Annual deposition
Acid deposition	-	Annual deposition

4.3.4 Predicted pollutant concentrations were summarised in the following formats:

- Process Contribution (PC) - Predicted pollutant concentration as a result of emissions from the pyrolysis plant only; and,
- Predicted Environmental Concentration (PEC) - Total predicted pollutant concentration as a result of emissions from the pyrolysis plant and existing baseline levels.

4.3.5 Predicted ground level pollutant concentrations and deposition rates were compared with the relevant AQOs, Concentration Target, EALs, and AQTVs. These criteria are collectively referred to as Environmental Quality Standards (EQSs).

4.4 Assessment Area

4.4.1 The assessment area was defined based on the facility location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 351970, 273960 to 353470, 275460. One Cartesian grid with a resolution of 10m was used within the model to produce data suitable for contour plotting using the Surfer software package.

4.4.2 Reference should be made to Figure 4 for a graphical representation of the assessment grid extents.

4.5 Process Conditions

4.5.1 A summary of the inputs used in the assessment is provided in Table 17. These were obtained from the equipment supplier (Woodtek) and an Air Quality Assessment[11] for a pyrolysis plant produced by Ricardo-AEA Ltd.

Table 17 Stack Parameters

Parameter	Unit	Value
Stack position	NGR	352722.7, 274712.0
Stack height	m	10
Stack diameter	m	0.35
Exhaust gas temperature	°C	60
Exhaust stack oxygen	%	8.1
Exhaust stack moisture	%	13.6
Exhaust gas flow rate	m^3/s	0.73
Exhaust gas flow rate(a)	Nm^3/s	0.67
Exhaust gas efflux velocity	m/s	7.58

Note: (a) Stated at 11% oxygen, dry gas, 273K.

4.5.2 Reference should be made to Figure 4 for a visual representation of the emission point location.

4.6 Emissions

4.6.1 The Industrial Emissions Directive[12] specifies a number of ELVs for pollutants that are applicable to the operation of the plant. As such, these were utilised in order to ensure a comprehensive, robust assessment of potential impacts as a result of emissions from the facility. A summary of the ELVs is provided in Table 18.

11 'Bioccus Phase 2 Air Quality Assessment Report' Ricardo-AEA, 2022.

12 Directive 2010/75/EU Of The European Parliament And Of The Council, November 2010.

Table 18 Pollutant Emission Concentrations

Pollutant	Pollutant Concentration (mg/m³)[a]	
NO_x	400[b]	
Particulate matter (PM)	10	
C_6H_6	20 (half-hour mean)	10 (24-hour mean)
SO_2	200 (half-hour mean)	50 (24-hour mean)
CO	100	
HCl	60 (half-hour mean)	10 (24-hour mean)
HF	4 (half-hour mean)	1 (24-hour mean)
Cd and thallium (Tl)	0.05	
Hg	0.05	
Metals (total Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds)	0.5	
PCDD/Fs	0.0000001	

Note: (a) Stated at 11% oxygen, dry gas, 273K.
(b) 100% compliance required at all times. An ELV of 200mg/m³ over a 24-hour period is to be achieved for a minimum of 97% of the time.

4.6.2 The pollutant mass emission rates for use in the assessment were derived from the concentrations shown in Table 18 and the exhaust gas flow rate shown in Table 17. The results are summarised in Table 19.

Table 19 Pollutant Mass Emission Rates

Pollutant	Pollutant Mass Emission Rate (g/s)	
NO_x	0.2667	
PM	0.0067	
CO	0.0667	
C_6H_6	0.0133 (half hour mean)	0.0067 (24-hour mean)
SO_2	0.1333 (half hour mean)	0.0333 (24-hour mean)
HCl	0.0400 (half hour mean)	0.0067 (24-hour mean)
HF	0.0027 (half-hour mean)	0.0007 (24-hour mean)

Pollutant	Pollutant Mass Emission Rate (g/s)
Cd	0.00003
Hg	0.00003
Metals (total Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V, and their compounds)	0.00033
PCDD/Fs	6.7×10^{-11}

4.6.3 The maximum average annual NO_x emission concentration for the plant is 206mg/m^3 based on the relevant ELVs and associated compliance periods. The annual mean NO_x model output was therefore factored to provide an accurate representation of ground level concentrations within the vicinity of the site.

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

4.6.5 The ELV for organic carbon is stated as total VOC. However, for the purposes of dispersion modelling it was considered that the entire VOC emission consisted of only C_6H_6. Actual plant emissions of VOC are unlikely to only consist of one species, resulting in a worst-case assessment.

4.6.6 The emission concentration provided for Cd and Tl is stated as the total permitted level for both species in combination. However, Tl does not have an associated EQS and was therefore not considered as part of the assessment. As such, the purpose of the dispersion modelling it was assumed that 50% of the emission consisted of Cd.

4.6.7 The ELV for Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V is stated as total Group 3 metals. Due to the low EQSs that have been designated for Cr (VI), As, Cu, and Ni, the EA have issued guidance on the modelling of Group 3 metals[13]. This was reviewed for the purpose of the assessment and the following staged approach adopted:

[13] Guidance to Applicants on Impact Assessment for Group 3 Metals Stack, EA, 2012.

- Potential impacts on annual mean Cr (VI) and As, 1-hour Ni and 24-hour mean Cu concentrations were assessed as these represent the lowest EQSs;
- Stage 1 - The full metal emission was considered to consist of only one species. Any species with predicted exceedences of the EQSs or that could not be screened out in accordance with the EA criteria were progressed to Stage 2;
- Stage 2 - The emission was apportioned equally between the relevant species. This resulted in 11% of the ELV being apportioned to each metal. Any species with predicted exceedences of the EQSs or that could not be screened out in accordance with the EA criteria were progressed to Stage 3; and,
- Stage 3 - Review EA data for specific species.

4.6.8 Emissions from the proposed plant were modelled for 24-hours per day, 365 days a year, in order to represent a worst-case assessment. This is considered to provide a worst-case assessment scenario as plant shutdown or periods of reduced work-load are not reflected in the modelled emissions.

4.6.9 It should be noted that pyrolysis plants thermally treat fuels, gasifying material and subsequently combusting the evolved gas. Pyrolysis plants therefore do not combust waste, other than the emitted gases. As such, PM and metal emission predictions are likely to have been overestimated.

4.7 NO_x to NO_2 Conversion

4.7.1 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 NO to 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.

4.7.2 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 EA guidance[14].

[14] https://www.gov.uk/guidance/environmental-permitting-air-dispersion-modelling-reports.

4.8 Building Effects

4.8.1 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.

4.8.2 Analysis of the site layout indicated that a number of structures should be included within the model in order to take account of effects on pollutant dispersion. Input geometries are shown in Table 20.

Table 20 Building Geometries

Building	NGR (m)		Height (m)	Length / diameter (m)	Width (m)	Angle (°)
	X	Y				
Main building	352715.9	274710.0	8.2	40.4	15.0	162.2
Tank 1	352726.9	274730.0	11.2	10.7	-	-
Tank 2	352725.9	274715.7	4.6	4.9	-	-
Tank 3	352733.5	274710.0	11.2	10.5	-	-
Tank 4	352733.8	274699.0	7.0	7.0	-	-
North building	352710.2	274754.5	8.3	30.7	27.1	162.1
North-west building 1	352679.5	274756.1	8.2	51.2	23.5	162.2
North-west building 2	352662.4	274734.0	8.2	19.6	22.5	162.3
West building	352665.5	274714.3	7.3	11.1	18.7	162.1

4.9 Meteorological Data

4.9.1 Meteorological data used in the assessment was taken from Shobdon Airfield meteorological station over the period 1st January 2017 to 31st December 2021 (inclusive). This observation station is located at NGR: 340192, 260797, which is approximately 18.7km south-west of the facility. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

4.9.2 All meteorological files used in the assessment were provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 5 for wind roses of utilised meteorological records.

4.10 Roughness Length

4.10.1 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 value is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for 'parkland, open suburbia'.

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

4.11 Monin-Obukhov Length

4.11.1 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents. This value is considered appropriate for the nature of the area and is suggested within ADMS-6 as being suitable for 'mixed urban/industrial'.

4.11.2 A minimum Monin-Obukhov length of 1m was used to describe the meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-6 as being suitable for 'rural areas'.

4.12 Terrain Data

4.12.1 Ordnance Survey OS Terrain 50 data was included in the model for the site and surrounding area in order to take account of the specific flow field produced by variations in ground height throughout the assessment extents. This was pre-processed using the method suggested by CERC[15].

[15] Note 105: Setting up Terrain Data for Input to CERC Models, CERC, 2016.

4.13 Nitrogen Deposition

4.13.1 Nitrogen deposition rates were calculated using the conversion factors provided within EA document 'Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06'[16]. 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 21.

Table 21 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

4.13.2 The relevant deposition velocity for each ecological receptor was selected from Table 21 based on the vegetation type present within the designation.

4.14 Acid Deposition

4.14.1 Acid deposition occurs as a result of NO_2, SO_2 and HCl. Predicted ground level pollutant concentrations of all these species were converted to kilo-equivalent ion depositions (keq/ha/yr) for comparison with the critical load for acid deposition at each of the identified ecological receptors. The conversion to units of equivalents, a measure of the potential acidifying effect of a species, was undertaken using the standard conversion factors shown in Table 22.

[16] Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06, EA, 2014.

Table 22 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
HCl	0.025	0.06	8.63

4.14.2 The following formula was used to calculate predicted PCs as a proportion of the critical load function where PECs were identified to be greater than the CLminN value:

PC as %CL function = ((PC of N deposition)/CLmaxN) x 100

4.14.3 The above formula was obtained from the APIS website[17].

4.14.4 It should be noted that in accordance with the AQTAG 06 guidance[18], the PC of HCl and SO_2 was added to the PC of nitrogen and treated as N in the above formula.

4.15 Background Concentrations

4.15.1 Review of existing data in the vicinity of the site was undertaken in Section 3.0 in order to identify suitable background values for use in the assessment. These were subsequently utilised to represent existing concentrations at sensitive human receptors in the vicinity of the site. A summary of the relevant values is provided in Table 23.

Table 23 Background Pollutant Concentrations - Sensitive Receptors

Pollutant	Background Pollutant Concentration Used in Model	Unit	Source
NO_2	4.31	µg/m³	DEFRA mapping
PM_{10}	10.08	µg/m³	DEFRA mapping

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

18 Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06, EA, 2014.

Pollutant	Background Pollutant Concentration Used in Model	Unit	Source
$PM_{2.5}$	5.63	µg/m³	DEFRA mapping
C_6H_6	0.156	µg/m³	DEFRA mapping
SO_2	2.35	µg/m³	DEFRA mapping
CO	206	µg/m³	DEFRA mapping
As	0.830	ng/m³	DEFRA (Walsall Pleck)
Cd	0.216	ng/m³	DEFRA (Walsall Pleck)
Cr (VI)	0.5[(a)]	ng/m³	DEFRA (Walsall Pleck)
Cu	14.30	ng/m³	DEFRA (Walsall Pleck)
Hg	1.658	ng/m³	DEFRA (Walsall Pleck)
Ni	0.753	ng/m³	DEFRA (Walsall Pleck)
HCl	0.26	µg/m³	UKEAP Network (Rosemaund)
HF	2.35	µg/m³	EPAQS report
PCDD/F	18.1	fg/m³	TOMPS Network (Manchester Law Courts)

Note: (a) Taken Cr (VI) as 20% of the total monitored Cr concentration, as per EA Group 3 Metal Guidance.

4.15.2 Baseline pollutant levels at the sensitive ecological receptors were obtained from the APIS website, as summarised in Table 14.

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 in EA guidance 'Air emissions risk assessment for your environmental permit'[19], 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.

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

4.16 Assessment Criteria

Human Receptors

4.16.1 EA guidance 'Air emissions risk assessment for your environmental permit'[20] 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 PECs 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.

4.16.3 Should these criteria be exceeded then additional consideration to potential impacts should be provided.

Ecological Receptors

4.16.4 EA guidance 'Air emissions risk assessment for your environmental permit'[21] states that PCs at SSSIs and SACs can be screened as insignificant if they meet the following criteria:

- The short-term PC is less than 10% of the short-term environmental standard for protected conservation areas;
- The long-term PC is less than 1% of the long-term environmental standard for protected conservation areas; or,
- The long-term PC is greater than 1% and the long term PEC is less than 70% of the long term environmental standard.

4.16.5 PCs at AWs and LWSs can be screened as insignificant if they meet the following criteria:

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

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

- The short-term PC is less than 100% of the short-term environmental standard for protected conservation areas; and,
- The long-term PC is less than 100% of the long-term environmental standard for protected conservation areas.

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

4.16.7 It should be noted that the EA guidance has been used throughout the assessment as it is specific to emissions from permitted facilities. As stated in Section 2.2, SWIPs are included in the Environmental Permitting (England and Wales) Regulations (2016) and the plant will therefore require an Environmental Permit in order to operate. As such, use of the EA guidance is considered appropriate.

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 analysis was based on the worst-case year for each averaging period to ensure maximum concentrations were considered;

- Surface characteristics - The z_0 and Monin-Obukhov length were determined for both the dispersion and meteorological sites based on the surrounding land uses and guidance provided by CERC. Terrain data was included and processed using the method outlined by CERC;
- Plant operating conditions - Operational parameters were provided by the equipment supplier (Woodtek) and an Air Quality Assessment[22] for a pyrolysis plant produced by Ricardo-AEA Ltd. As such, input parameters are considered to be representative of normal operating conditions;
- Emission rates - Emission rates were derived from the relevant ELVs. These are considered to provide a robust representation of maximum anticipated pollutant releases associated with the plant;
- Background concentrations - Background pollutant levels were obtained from the DEFRA mapping study, APIS and the relevant national monitoring networks. As such, these are considered representative of baseline air quality conditions at sensitive locations within the vicinity of the site;
- Receptor locations - Sensitive human and ecological locations were identified through review of mapping resources to ensure impacts were predicted at worst-case positions within the vicinity of the site; 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 EA 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.

22 'Bioccus Phase 2 Air Quality Assessment' Ricardo-AEA Ltd, 2022.

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.

5.1.2 Reference should be made to Figure 6 to Figure 27 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 annual mean NO_2 concentration was predicted using the 2017 meteorological data set. As such, the contours shown in Figure 6 were produced from the 2017 model outputs.

5.2 Maximum Pollutant Concentrations

5.2.1 The maximum predicted pollutant concentrations at any point within the modelling extents for any meteorological data set are summarised in Table 24.

Table 24 Maximum Predicted Pollutant Concentrations

Pollutant	Averaging Period	Units	EQS	PC	PC Proportion of EQS (%)	PEC	PEC Proportion of EQS (%)
NO_2	Annual	µg/m³	40	18.11	45.3	22.42	56.1
	99.8th %ile 1-hour	µg/m³	200	79.91	40.0	88.52	44.3
PM_{10}	Annual	µg/m³	40	1.26	3.2	11.34	28.3
	90.4th %ile 24-hour	µg/m³	50	1.85	3.7	22.00	44.0
$PM_{2.5}$	Annual	µg/m³	10	1.26	12.6	6.89	68.9
C_6H_6	Annual	µg/m³	5	1.37	27.3	1.52	30.5
	24-hour	µg/m³	30	6.20	20.7	6.51	21.7

Pollutant	Averaging Period	Units	EQS	PC	PC Proportion of EQS (%)	PEC	PEC Proportion of EQS (%)
SO_2	99.2nd %ile 24-hour	µg/m³	125	13.08	10.5	17.78	14.2
	99.7th %ile 1-hour	µg/m³	350	105.00	30.0	109.70	31.3
	99.9th %ile 15-minute	µg/m³	266	131.35	49.4	136.05	51.1
HCl	1-hour	µg/m³	750	44.33	5.9	44.85	6.0
HF	Monthly	µg/m³	16	0.13	0.8	2.48	15.5
	1-hour	µg/m³	160	2.99	1.9	7.69	4.8
CO	Rolling 8-hour	µg/m³	10,000	43.19	0.4	455.19	4.6
Cd	Annual	ng/m³	5	2.83	56.5	3.26	65.2
	24-hour	ng/m³	30	6.45	21.5	6.89	23.0
Hg	24-hour	ng/m³	60	14.57	24.3	16.22	27.0
	1-hour	ng/m³	600	33.25	5.5	36.56	6.1
PCDD/Fs	Annual	fg/m³	n/a	12.57	-	24.97	-
	1-hour	fg/m³	n/a	73.92	-	98.72	-

5.2.2 As shown in Table 24, there were no predicted exceedences of any EQS at any location for any pollutant or averaging period of interest.

5.3 Metal Concentrations

5.3.1 A staged assessment methodology was utilised for the prediction of grouped metal concentrations as outlined previously. Potential impacts on annual mean Cr (VI) and As, 24-hour mean Cu and 1-hour mean Ni concentrations were assessed as these represent the lowest EQSs. The results are outlined below.

Stage 1

5.3.2 Predicted concentrations with the full metal emission considered to consist of only one species are summarised in Table 25.

Table 25 Predicted Metal Concentrations - Stage 1

Pollutant	Averaging Period	Units	EQS	PC	PC Proportion of EQS (%)	PEC	PEC Proportion of EQS (%)
As	Annual	ng/m^3	6	62.17	1,036.2	63.00	1,050.0
Cr (VI)	Annual	ng/m^3	0.25	62.17	24,869.2	62.64	25,056.6
Cu	24-hour	ng/m^3	50	156.71	313.4	158.05	316.1
Ni	1-hour	ng/m^3	700	365.722	52.2	367.23	52.5

5.3.3 As indicated in Table 25, the PEC proportion of the EQS was below 100% for 1-hour mean Ni concentrations. This species was therefore not considered further in the assessment. The EA criteria were exceeded for predicted PCs of As, Cr (VI) and Cu. As such, these were progressed to the Stage 2 Assessment.

Stage 2

5.3.4 Predicted concentrations with the metal emission distributed equally between all species are summarised in Table 26.

Table 26 Predicted Metal Concentrations - Stage 2

Pollutant	Averaging Period	Units	EQS	PC	PC Proportion of EQS (%)	PEC	PEC Proportion of EQS (%)
As	Annual	ng/m^3	6	6.84	114.0	7.67	127.8
Cr (VI)	Annual	ng/m^3	0.25	6.84	2,735.6	7.31	2,923.0
Cu	24-hour	ng/m^3	50	17.24	34.5	45.83	91.7

5.3.5 As indicated in Table 26, the PEC proportion of the EQS was below 100% for 24-hour mean Cu concentrations. This species was therefore not considered further in the assessment. The EA criteria were exceeded for the PCs of As and Cr (VI). As such, these were progressed to the Stage 3 Assessment.

Stage 3

5.3.6 The EA metals guidance[23] provides a range of emission concentrations (corresponding fractions of the total metals emission) measured at 18 waste incineration facilities in the UK. The data suggests that, on average, As comprises 0.2% of the IED group 3 ELV and provides a mean concentration of 0.001mg/Nm^3. On average, Cr (VI) comprises 0.01% of the IED group 3 ELV and provides a mean concentration of 3.5 x 10^{-5} mg/Nm^3. The predicted maximum PCs and PECs utilising this data are summarised in Table 27.

Table 27 Predicted Metal Concentrations - Stage 3

Pollutant	Averaging Period	Units	EQS	PC	PC Proportion of EQS (%)	PEC	PEC Proportion of EQS (%)
As	Annual	ng/m^3	6	0.124	2.1	1.266	21.1
Cr (VI)	Annual	ng/m^3	0.25	0.0044	1.7	0.473	189.2

5.3.7 As indicated in Table 27, the PEC proportion of the EQS was below 100% for annual mean As concentrations. This species was therefore was not considered further in the assessment. The Cr(VI) PEC is greater than the EQS. However, the maximum PC is only slightly above 1% of the EQS and the point of impact is not considered a location of relevant exposure, as outlined in Table 3 and shown in Figure 23. It should be noted that the background Cr (VI) concentration exceeds the EQS as a baseline.

5.3.8 Maximum annual mean Cr(VI) PCs at locations of relevant exposure are summarised in Table 28.

Table 28 Maximum Predicted Annual Mean Cr (VI) Concentrations

Receptor		Maximum Predicted Annual Mean Cr (VI) PC (µg/m^3)	PC Proportion of EQS (%)
R1	Residential - Eco Park Road	0.00010	0.040
R2	Education Facility - Eco Park Road	0.00010	0.038
R3	Medical Facility - Eco Park Road	0.00004	0.016

[23] Guidance to Applicants on Impact Assessment for Group 3 Metals Stack, EA, 2012.

Receptor		Maximum Predicted Annual Mean Cr (VI) PC (µg/m³)	PC Proportion of EQS (%)
R4	Residential - Sheet Road	0.00003	0.014
R5	Residential - Parys Road	0.00007	0.026
R6	Residential - Honey Meadow	0.00010	0.038
R7	Residential - Langford Close	0.00014	0.056
R8	Residential - Langford Close	0.00021	0.084
R9	Residential - Blashfield Road	0.00028	0.113
R10	Residential - Blashfield Road	0.00011	0.043
R11	Residential - Shearman Road	0.00008	0.032
R12	Residential - James Close	0.00006	0.022
R13	Residential - Ballard Close	0.00004	0.016
R14	Residential - Ballard Close	0.00003	0.013
R15	Residential - Baker Close	0.00004	0.018
R16	Residential - Baker Close	0.00006	0.023
R17	Residential - Squirrel Lane	0.00006	0.022
R18	Residential - Squirrel Lane	0.00007	0.027

5.3.9 As shown in Table 28, PCs were below 1% of the EQS at all locations of relevant exposure. As such, predicted effects on annual mean Cr(VI) concentrations are not considered to be significant, in accordance with the EA criteria.

5.4 Sensitive Human Receptors

5.4.1 Predicted concentrations of each pollutant at the sensitive human receptor locations identified in Table 10 are summarised in the following Sections.

Nitrogen Dioxide

5.4.2 Predicted annual mean NO_2 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 29.

Table 29 Maximum Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	4.72	4.60	4.66	4.59	4.66
R2	Education Facility - Eco Park Road	4.71	4.61	4.65	4.61	4.68
R3	Medical Facility - Eco Park Road	4.47	4.42	4.44	4.44	4.47
R4	Residential - Sheet Road	4.40	4.43	4.43	4.40	4.45
R5	Residential - Parys Road	4.45	4.57	4.52	4.50	4.58
R6	Residential - Honey Meadow	4.50	4.70	4.60	4.61	4.70
R7	Residential - Langford Close	4.57	4.89	4.67	4.77	4.87
R8	Residential - Langford Close	4.73	5.17	4.82	5.08	5.18
R9	Residential - Blashfield Road	4.98	5.48	5.26	5.35	5.47
R10	Residential - Blashfield Road	4.62	4.74	4.76	4.65	4.73
R11	Residential - Shearman Road	4.55	4.63	4.64	4.53	4.57
R12	Residential - James Close	4.48	4.54	4.54	4.45	4.47
R13	Residential - Ballard Close	4.44	4.46	4.47	4.42	4.43
R14	Residential - Ballard Close	4.43	4.43	4.44	4.40	4.43
R15	Residential - Baker Close	4.49	4.47	4.49	4.45	4.47
R16	Residential - Baker Close	4.54	4.53	4.54	4.50	4.51
R17	Residential - Squirrel Lane	4.54	4.47	4.50	4.49	4.48
R18	Residential - Squirrel Lane	4.59	4.51	4.54	4.52	4.52

5.4.3 As indicated in Table 29, NO_2 PECs were below the annual mean EQS of 40µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.4 Maximum predicted annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 30. Reference should be made to Figure 6 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 30 Maximum Predicted Annual Mean NO_2 Concentrations

Receptor		Maximum Predicted Annual Mean NO_2 Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Eco Park Road	0.41	4.72	1.0	11.8
R2	Education Facility - Eco Park Road	0.40	4.71	1.0	11.8
R3	Medical Facility - Eco Park Road	0.16	4.47	0.4	11.2
R4	Residential - Sheet Road	0.14	4.45	0.4	11.1
R5	Residential - Parys Road	0.27	4.58	0.7	11.4
R6	Residential - Honey Meadow	0.40	4.70	1.0	11.8
R7	Residential - Langford Close	0.58	4.89	1.5	12.2
R8	Residential - Langford Close	0.88	5.18	2.2	13.0
R9	Residential - Blashfield Road	1.18	5.48	2.9	13.7
R10	Residential - Blashfield Road	0.45	4.76	1.1	11.9
R11	Residential - Shearman Road	0.34	4.64	0.8	11.6
R12	Residential - James Close	0.23	4.54	0.6	11.3
R13	Residential - Ballard Close	0.16	4.47	0.4	11.2
R14	Residential - Ballard Close	0.13	4.44	0.3	11.1
R15	Residential - Baker Close	0.18	4.49	0.5	11.2
R16	Residential - Baker Close	0.24	4.54	0.6	11.4
R17	Residential - Squirrel Lane	0.23	4.54	0.6	11.3
R18	Residential - Squirrel Lane	0.28	4.59	0.7	11.5

5.4.5 As indicated in Table 30, PECs were below 70% of the EQS at all sensitive receptor locations. As such, predicted effects on annual mean NO_2 concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.6 Predicted 99.8th %ile 1-hour mean NO_2 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 31.

Table 31 Predicted 99.8th %ile 1-hour Mean NO_2 Concentrations

Receptor		Predicted 99.8th %ile 1-hour Mean NO_2 PEC ($\mu g/m^3$)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	15.26	15.19	15.50	15.13	15.33
R2	Education Facility - Eco Park Road	16.39	16.34	16.50	16.50	16.34
R3	Medical Facility - Eco Park Road	13.50	13.45	13.36	13.72	14.15
R4	Residential - Sheet Road	12.64	12.88	12.65	13.14	12.79
R5	Residential - Parys Road	14.21	14.53	14.26	14.46	14.56
R6	Residential - Honey Meadow	15.55	16.23	15.92	16.10	15.97
R7	Residential - Langford Close	17.33	18.30	17.79	18.42	17.97
R8	Residential - Langford Close	19.16	18.97	18.76	19.61	19.33
R9	Residential - Blashfield Road	25.21	25.69	25.71	25.74	25.69
R10	Residential - Blashfield Road	18.00	17.97	17.73	17.94	18.33
R11	Residential - Shearman Road	16.38	16.25	16.29	15.88	15.96
R12	Residential - James Close	15.53	15.02	15.53	14.73	14.78
R13	Residential - Ballard Close	14.13	13.50	13.98	13.72	13.59
R14	Residential - Ballard Close	13.80	13.20	13.49	13.43	14.15
R15	Residential - Baker Close	15.22	14.20	14.74	13.85	14.26
R16	Residential - Baker Close	16.20	15.49	15.36	15.51	15.25
R17	Residential - Squirrel Lane	11.83	11.26	11.50	11.64	11.34
R18	Residential - Squirrel Lane	12.60	12.21	12.13	12.33	12.30

5.4.7 As indicated in Table 31, 1-hour mean NO_2 PECs were below the EQS of 200$\mu g/m^3$ at all sensitive receptor locations for all meteorological data sets.

5.4.8 Maximum predicted 99.8th %ile 1-hour mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 32. Reference should be made to Figure 7 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 32 Maximum Predicted 99.8th %ile 1-hour Mean NO_2 Concentrations

Receptor		Maximum Predicted 99.8th %ile 1-hour Mean NO_2 Concentration ($\mu g/m^3$)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Eco Park Road	6.89	15.50	3.4	3.6
R2	Education Facility - Eco Park Road	7.89	16.50	3.9	4.1
R3	Medical Facility - Eco Park Road	5.53	14.15	2.8	2.9
R4	Residential - Sheet Road	4.52	13.14	2.3	2.4
R5	Residential - Parys Road	5.94	14.56	3.0	3.1
R6	Residential - Honey Meadow	7.62	16.23	3.8	4.0
R7	Residential - Langford Close	9.81	18.42	4.9	5.1
R8	Residential - Langford Close	10.99	19.61	5.5	5.7
R9	Residential - Blashfield Road	17.12	25.74	8.6	8.9
R10	Residential - Blashfield Road	9.72	18.33	4.9	5.1
R11	Residential - Shearman Road	7.77	16.38	3.9	4.1
R12	Residential - James Close	6.92	15.53	3.5	3.6
R13	Residential - Ballard Close	5.52	14.13	2.8	2.9
R14	Residential - Ballard Close	5.54	14.15	2.8	2.9
R15	Residential - Baker Close	6.61	15.22	3.3	3.5
R16	Residential - Baker Close	7.58	16.20	3.8	4.0
R17	Residential - Squirrel Lane	3.22	11.83	1.6	1.7
R18	Residential - Squirrel Lane	3.99	12.60	2.0	2.1

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

5.4.9 As indicated in Table 32, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 1-hour mean NO_2 concentrations are not considered to be significant, in accordance with the EA criteria.

Particulate Matter

5.4.10 Predicted annual mean PM_{10} PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 33.

Table 33 Predicted Annual Mean PM_{10} Concentrations

Receptor		Predicted Annual Mean PM_{10} PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	10.10	10.10	10.10	10.09	10.10
R2	Education Facility - Eco Park Road	10.10	10.10	10.10	10.10	10.10
R3	Medical Facility - Eco Park Road	10.09	10.08	10.08	10.08	10.09
R4	Residential - Sheet Road	10.08	10.08	10.08	10.08	10.09
R5	Residential - Parys Road	10.09	10.09	10.09	10.09	10.09
R6	Residential - Honey Meadow	10.09	10.10	10.10	10.10	10.10
R7	Residential - Langford Close	10.09	10.12	10.10	10.11	10.11
R8	Residential - Langford Close	10.11	10.14	10.11	10.13	10.14
R9	Residential - Blashfield Road	10.12	10.16	10.14	10.15	10.16
R10	Residential - Blashfield Road	10.10	10.11	10.11	10.10	10.11
R11	Residential - Shearman Road	10.09	10.10	10.10	10.09	10.09
R12	Residential - James Close	10.09	10.09	10.09	10.09	10.09
R13	Residential - Ballard Close	10.08	10.09	10.09	10.08	10.08
R14	Residential - Ballard Close	10.08	10.08	10.08	10.08	10.08
R15	Residential - Baker Close	10.09	10.09	10.09	10.09	10.09
R16	Residential - Baker Close	10.09	10.09	10.09	10.09	10.09
R17	Residential - Squirrel Lane	10.09	10.09	10.09	10.09	10.09
R18	Residential - Squirrel Lane	10.10	10.09	10.09	10.09	10.09

5.4.11 As indicated in Table 33, PM_{10} PECs were below the annual mean EQS of 40µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.12 Maximum predicted annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 34. Reference should be made to Figure 8 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 34 Maximum Predicted Annual Mean PM_{10} Concentrations

Receptor		Maximum Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Eco Park Road	0.03	10.10	0.1	25.3
R2	Education Facility - Eco Park Road	0.03	10.10	0.1	25.3
R3	Medical Facility - Eco Park Road	0.01	10.09	0.0	25.2
R4	Residential - Sheet Road	0.01	10.09	0.0	25.2
R5	Residential - Parys Road	0.02	10.09	0.0	25.2
R6	Residential - Honey Meadow	0.03	10.10	0.1	25.3
R7	Residential - Langford Close	0.04	10.12	0.1	25.3
R8	Residential - Langford Close	0.06	10.14	0.2	25.3
R9	Residential - Blashfield Road	0.08	10.16	0.2	25.4
R10	Residential - Blashfield Road	0.03	10.11	0.1	25.3
R11	Residential - Shearman Road	0.02	10.10	0.1	25.2
R12	Residential - James Close	0.02	10.09	0.0	25.2
R13	Residential - Ballard Close	0.01	10.09	0.0	25.2
R14	Residential - Ballard Close	0.01	10.08	0.0	25.2
R15	Residential - Baker Close	0.01	10.09	0.0	25.2
R16	Residential - Baker Close	0.02	10.09	0.0	25.2
R17	Residential - Squirrel Lane	0.02	10.09	0.0	25.2
R18	Residential - Squirrel Lane	0.02	10.10	0.0	25.2

5.4.13 As indicated in Table 34, PCs were below 1% of the EQS at all sensitive receptor locations. As such, predicted effects on annual mean PM_{10} concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.14 Predicted 90.4th %ile 24-hour mean PM_{10} PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 35.

Table 35 Predicted 90.4th %ile 24-hour Mean PM_{10} Concentrations

Receptor		Predicted 90.4th %ile 24-hour Mean PM_{10} PEC ($\mu g/m^3$)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	20.24	20.22	20.23	20.21	20.24
R2	Education Facility - Eco Park Road	20.25	20.22	20.23	20.21	20.24
R3	Medical Facility - Eco Park Road	20.20	20.17	20.19	20.18	20.19
R4	Residential - Sheet Road	20.18	20.19	20.18	20.18	20.19
R5	Residential - Parys Road	20.19	20.24	20.22	20.21	20.22
R6	Residential - Honey Meadow	20.20	20.28	20.24	20.24	20.26
R7	Residential - Langford Close	20.24	20.33	20.27	20.29	20.32
R8	Residential - Langford Close	20.28	20.38	20.28	20.40	20.41
R9	Residential - Blashfield Road	20.36	20.46	20.43	20.45	20.51
R10	Residential - Blashfield Road	20.22	20.24	20.25	20.23	20.24
R11	Residential - Shearman Road	20.21	20.22	20.21	20.19	20.19
R12	Residential - James Close	20.18	20.20	20.19	20.18	20.17
R13	Residential - Ballard Close	20.18	20.19	20.18	20.18	20.17
R14	Residential - Ballard Close	20.18	20.18	20.17	20.17	20.17
R15	Residential - Baker Close	20.19	20.20	20.18	20.19	20.18
R16	Residential - Baker Close	20.21	20.20	20.19	20.20	20.19
R17	Residential - Squirrel Lane	20.19	20.18	20.19	20.19	20.18
R18	Residential - Squirrel Lane	20.20	20.19	20.19	20.19	20.19

5.4.15 As indicated in Table 35, 24-hour mean PM_{10} PECs were below the EQS of $50\mu g/m^3$ at all sensitive receptor locations for all meteorological data sets.

5.4.16 Maximum predicted 90.4th %ile 24-hour mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 36. Reference should be made to Figure 9 for

a graphical representation of predicted concentrations throughout the assessment extents.

Table 36 Maximum Predicted 90.4th %ile 24-hour Mean PM_{10} Concentrations

Receptor		Maximum Predicted 90.4th %ile 24-hour Mean PM_{10} Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	0.09	20.24	0.2	0.3
R2	Education Facility - Eco Park Road	0.10	20.25	0.2	0.3
R3	Medical Facility - Eco Park Road	0.05	20.20	0.1	0.2
R4	Residential - Sheet Road	0.04	20.19	0.1	0.1
R5	Residential - Parys Road	0.09	20.24	0.2	0.3
R6	Residential - Honey Meadow	0.13	20.28	0.3	0.4
R7	Residential - Langford Close	0.18	20.33	0.4	0.6
R8	Residential - Langford Close	0.26	20.41	0.5	0.9
R9	Residential - Blashfield Road	0.36	20.51	0.7	1.2
R10	Residential - Blashfield Road	0.10	20.25	0.2	0.3
R11	Residential - Shearman Road	0.07	20.22	0.1	0.2
R12	Residential - James Close	0.05	20.20	0.1	0.2
R13	Residential - Ballard Close	0.04	20.19	0.1	0.1
R14	Residential - Ballard Close	0.03	20.18	0.1	0.1
R15	Residential - Baker Close	0.05	20.20	0.1	0.2
R16	Residential - Baker Close	0.06	20.21	0.1	0.2
R17	Residential - Squirrel Lane	0.04	20.19	0.1	0.1
R18	Residential - Squirrel Lane	0.05	20.20	0.1	0.2

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

5.4.17 As indicated in Table 36, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 24-hour mean PM_{10} concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.18 Predicted annual mean $PM_{2.5}$ PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 37.

Table 37 Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor		Predicted Annual Mean $PM_{2.5}$ PEC (µg/m^3)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	5.65	5.65	5.65	5.64	5.65
R2	Education Facility - Eco Park Road	5.65	5.65	5.65	5.65	5.65
R3	Medical Facility - Eco Park Road	5.64	5.63	5.63	5.63	5.64
R4	Residential - Sheet Road	5.63	5.63	5.63	5.63	5.64
R5	Residential - Parys Road	5.64	5.64	5.64	5.64	5.64
R6	Residential - Honey Meadow	5.64	5.65	5.65	5.65	5.65
R7	Residential - Langford Close	5.64	5.67	5.65	5.66	5.66
R8	Residential - Langford Close	5.66	5.69	5.66	5.68	5.69
R9	Residential - Blashfield Road	5.67	5.71	5.69	5.70	5.71
R10	Residential - Blashfield Road	5.65	5.66	5.66	5.65	5.66
R11	Residential - Shearman Road	5.64	5.65	5.65	5.64	5.64
R12	Residential - James Close	5.64	5.64	5.64	5.64	5.64
R13	Residential - Ballard Close	5.63	5.64	5.64	5.63	5.63
R14	Residential - Ballard Close	5.63	5.63	5.63	5.63	5.63
R15	Residential - Baker Close	5.64	5.64	5.64	5.64	5.64
R16	Residential - Baker Close	5.64	5.64	5.64	5.64	5.64
R17	Residential - Squirrel Lane	5.64	5.64	5.64	5.64	5.64
R18	Residential - Squirrel Lane	5.65	5.64	5.64	5.64	5.64

5.4.19 As indicated in Table 37, $PM_{2.5}$ PECs were below the annual mean EQS of 10µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.20 Maximum predicted annual mean $PM_{2.5}$ concentrations at the sensitive receptor locations are summarised in Table 38. Reference should be made to Figure 10 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 38 Maximum Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor		Maximum Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Eco Park Road	0.03	5.65	0.1	56.5
R2	Education Facility - Eco Park Road	0.03	5.65	0.1	56.5
R3	Medical Facility - Eco Park Road	0.01	5.64	0.0	56.4
R4	Residential - Sheet Road	0.01	5.64	0.0	56.4
R5	Residential - Parys Road	0.02	5.64	0.1	56.4
R6	Residential - Honey Meadow	0.03	5.65	0.1	56.5
R7	Residential - Langford Close	0.04	5.67	0.2	56.7
R8	Residential - Langford Close	0.06	5.69	0.2	56.9
R9	Residential - Blashfield Road	0.08	5.71	0.3	57.1
R10	Residential - Blashfield Road	0.03	5.66	0.1	56.6
R11	Residential - Shearman Road	0.02	5.65	0.1	56.5
R12	Residential - James Close	0.02	5.64	0.1	56.4
R13	Residential - Ballard Close	0.01	5.64	0.0	56.4
R14	Residential - Ballard Close	0.01	5.63	0.0	56.3
R15	Residential - Baker Close	0.01	5.64	0.1	56.4
R16	Residential - Baker Close	0.02	5.64	0.1	56.4
R17	Residential - Squirrel Lane	0.02	5.64	0.1	56.4
R18	Residential - Squirrel Lane	0.02	5.65	0.1	56.5

5.4.21 As indicated in Table 38, PCs were below 1% of the EQS at all sensitive receptor locations. As such, predicted effects on annual mean $PM_{2.5}$ concentrations are not considered to be significant, in accordance with the EA criteria.

Benzene

5.4.22 Predicted annual mean C_6H_6 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 39.

Table 39 Predicted Annual Mean C_6H_6 Concentrations

Receptor		Predicted Annual Mean C_6H_6 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	0.19	0.18	0.18	0.18	0.18
R2	Education Facility - Eco Park Road	0.19	0.18	0.18	0.18	0.18
R3	Medical Facility - Eco Park Road	0.17	0.16	0.17	0.17	0.17
R4	Residential - Sheet Road	0.16	0.17	0.17	0.16	0.17
R5	Residential - Parys Road	0.17	0.18	0.17	0.17	0.18
R6	Residential - Honey Meadow	0.17	0.19	0.18	0.18	0.19
R7	Residential - Langford Close	0.18	0.20	0.18	0.19	0.20
R8	Residential - Langford Close	0.19	0.22	0.20	0.21	0.22
R9	Residential - Blashfield Road	0.21	0.24	0.23	0.23	0.24
R10	Residential - Blashfield Road	0.18	0.19	0.19	0.18	0.19
R11	Residential - Shearman Road	0.17	0.18	0.18	0.17	0.18
R12	Residential - James Close	0.17	0.17	0.17	0.17	0.17
R13	Residential - Ballard Close	0.17	0.17	0.17	0.16	0.17
R14	Residential - Ballard Close	0.17	0.16	0.17	0.16	0.16
R15	Residential - Baker Close	0.17	0.17	0.17	0.17	0.17
R16	Residential - Baker Close	0.17	0.17	0.17	0.17	0.17
R17	Residential - Squirrel Lane	0.17	0.17	0.17	0.17	0.17
R18	Residential - Squirrel Lane	0.18	0.17	0.17	0.17	0.17

5.4.23 As indicated in Table 39, C_6H_6 PECs were below the annual mean EQS of 5µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.24 Maximum predicted annual mean C_6H_6 concentrations at the sensitive receptor locations are summarised in Table 40. Reference should be made to Figure 11 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 40 Maximum Predicted Annual Mean C_6H_6 Concentrations

Receptor		Maximum Predicted Annual Mean C_6H_6 Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Eco Park Road	0.03	0.19	0.6	3.7
R2	Education Facility - Eco Park Road	0.03	0.19	0.6	3.7
R3	Medical Facility - Eco Park Road	0.01	0.17	0.2	3.4
R4	Residential - Sheet Road	0.01	0.17	0.2	3.3
R5	Residential - Parys Road	0.02	0.18	0.4	3.5
R6	Residential - Honey Meadow	0.03	0.19	0.6	3.7
R7	Residential - Langford Close	0.04	0.20	0.9	4.0
R8	Residential - Langford Close	0.07	0.22	1.3	4.4
R9	Residential - Blashfield Road	0.09	0.24	1.8	4.9
R10	Residential - Blashfield Road	0.03	0.19	0.7	3.8
R11	Residential - Shearman Road	0.03	0.18	0.5	3.6
R12	Residential - James Close	0.02	0.17	0.4	3.5
R13	Residential - Ballard Close	0.01	0.17	0.2	3.4
R14	Residential - Ballard Close	0.01	0.17	0.2	3.3
R15	Residential - Baker Close	0.01	0.17	0.3	3.4
R16	Residential - Baker Close	0.02	0.17	0.4	3.5
R17	Residential - Squirrel Lane	0.02	0.17	0.3	3.5
R18	Residential - Squirrel Lane	0.02	0.18	0.4	3.5

5.4.25 As indicated in Table 40, PCs were below 1% of the EQS at all sensitive receptor locations, with the exception of R8 and R9. However, the PEC was below 70% of the EQS at these locations. As such, predicted effects on annual mean C_6H_6 concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.26 Predicted 100th %ile 24-hour mean C_6H_6 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 41.

Table 41 Predicted 100th %ile 24-hour Mean C_6H_6 Concentrations

Receptor		Predicted 100th %ile 24-hour Mean C_6H_6 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	0.67	0.65	0.70	0.63	0.69
R2	Education Facility - Eco Park Road	0.79	0.70	0.81	0.70	0.90
R3	Medical Facility - Eco Park Road	0.51	0.51	0.54	0.62	0.59
R4	Residential - Sheet Road	0.55	0.50	0.58	0.52	0.60
R5	Residential - Parys Road	0.65	0.77	0.75	0.72	0.82
R6	Residential - Honey Meadow	0.77	0.93	0.84	0.86	0.98
R7	Residential - Langford Close	0.82	1.21	1.07	1.00	1.14
R8	Residential - Langford Close	1.06	1.11	0.87	1.26	1.37
R9	Residential - Blashfield Road	1.26	1.54	1.67	1.60	1.52
R10	Residential - Blashfield Road	0.77	0.86	0.78	0.90	0.84
R11	Residential - Shearman Road	0.80	0.66	0.68	0.64	0.66
R12	Residential - James Close	0.64	0.65	0.55	0.57	0.57
R13	Residential - Ballard Close	0.58	0.58	0.52	0.50	0.55
R14	Residential - Ballard Close	0.52	0.51	0.49	0.45	0.51
R15	Residential - Baker Close	0.57	0.55	0.54	0.58	0.66
R16	Residential - Baker Close	0.64	0.67	0.60	0.65	0.73
R17	Residential - Squirrel Lane	0.45	0.44	0.43	0.47	0.42
R18	Residential - Squirrel Lane	0.52	0.48	0.47	0.51	0.47

5.4.27 As indicated in Table 41, 100th %ile 24-hour mean C_6H_6 PECs were below the EQS of 30µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.28 Maximum predicted 100th %ile 24-hour mean C_6H_6 concentrations at the sensitive receptor locations are summarised in Table 42. Reference should be made to Figure 12 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 42 Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Concentrations

Receptor		Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Eco Park Road	0.39	0.70	1.3	1.3
R2	Education Facility - Eco Park Road	0.58	0.90	1.9	2.0
R3	Medical Facility - Eco Park Road	0.31	0.62	1.0	1.0
R4	Residential - Sheet Road	0.29	0.60	1.0	1.0
R5	Residential - Parys Road	0.50	0.82	1.7	1.7
R6	Residential - Honey Meadow	0.67	0.98	2.2	2.2
R7	Residential - Langford Close	0.90	1.21	3.0	3.0
R8	Residential - Langford Close	1.06	1.37	3.5	3.6
R9	Residential - Blashfield Road	1.36	1.67	4.5	4.6
R10	Residential - Blashfield Road	0.59	0.90	2.0	2.0
R11	Residential - Shearman Road	0.49	0.80	1.6	1.7
R12	Residential - James Close	0.34	0.65	1.1	1.1
R13	Residential - Ballard Close	0.27	0.58	0.9	0.9
R14	Residential - Ballard Close	0.21	0.52	0.7	0.7
R15	Residential - Baker Close	0.35	0.66	1.2	1.2
R16	Residential - Baker Close	0.42	0.73	1.4	1.4
R17	Residential - Squirrel Lane	0.16	0.47	0.5	0.5

Receptor		Maximum Predicted 100th %ile 24-hour Mean C_6H_6 Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R18	Residential - Squirrel Lane	0.21	0.52	0.7	0.7

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

5.4.29 As indicated in Table 42, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 100th 24-hour mean C_6H_6 concentrations are not considered to be significant, in accordance with the EA criteria.

Sulphur Dioxide

5.4.30 Predicted 99.2nd %ile 24-hour mean SO_2 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 43.

Table 43 Predicted 99.2nd %ile 24-hour Mean SO_2 Concentrations

Receptor		Predicted 99.2nd %ile 24-hour Mean SO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	5.48	5.49	5.50	5.33	5.55
R2	Education Facility - Eco Park Road	5.52	5.57	5.63	5.54	5.66
R3	Medical Facility - Eco Park Road	5.13	5.08	5.12	5.12	5.25
R4	Residential - Sheet Road	5.06	5.14	5.29	5.09	5.27
R5	Residential - Parys Road	5.25	5.40	5.72	5.38	5.66
R6	Residential - Honey Meadow	5.42	5.97	5.87	5.64	6.12
R7	Residential - Langford Close	5.79	6.38	6.15	6.19	6.43
R8	Residential - Langford Close	6.36	6.42	5.83	6.79	6.89
R9	Residential - Blashfield Road	6.63	7.26	7.43	7.49	7.43
R10	Residential - Blashfield Road	5.63	5.70	5.65	5.73	5.92
R11	Residential - Shearman Road	5.40	5.50	5.52	5.41	5.50

Receptor		Predicted 99.2nd %ile 24-hour Mean SO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R12	Residential - James Close	5.21	5.41	5.24	5.16	5.19
R13	Residential - Ballard Close	5.17	5.23	5.16	4.96	5.05
R14	Residential - Ballard Close	5.16	5.08	5.00	5.00	5.06
R15	Residential - Baker Close	5.22	5.16	5.08	5.20	5.17
R16	Residential - Baker Close	5.40	5.45	5.33	5.34	5.32
R17	Residential - Squirrel Lane	4.96	4.97	4.97	5.03	4.94
R18	Residential - Squirrel Lane	5.03	5.04	5.05	5.09	5.03

5.4.31 As indicated in Table 43, 99.2nd %ile 24-hour mean SO_2 PECs were below EQS of 125µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.32 Maximum predicted 99.2nd %ile 24-hour mean SO_2 concentrations at the sensitive receptor locations are summarised in Table 44. Reference should be made to Figure 13 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 44 Predicted 99.2nd %ile 24-hour Mean SO_2 Concentrations

Receptor		Maximum Predicted 99.2nd %ile 24-hour Mean SO_2 Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Eco Park Road	0.85	5.55	0.7	0.7
R2	Education Facility - Eco Park Road	0.96	5.66	0.8	0.8
R3	Medical Facility - Eco Park Road	0.55	5.25	0.4	0.5
R4	Residential - Sheet Road	0.59	5.29	0.5	0.5
R5	Residential - Parys Road	1.02	5.72	0.8	0.8
R6	Residential - Honey Meadow	1.42	6.12	1.1	1.2
R7	Residential - Langford Close	1.73	6.43	1.4	1.4

Receptor		Maximum Predicted 99.2nd %ile 24-hour Mean SO_2 Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R8	Residential - Langford Close	2.19	6.89	1.8	1.8
R9	Residential - Blashfield Road	2.79	7.49	2.2	2.3
R10	Residential - Blashfield Road	1.22	5.92	1.0	1.0
R11	Residential - Shearman Road	0.82	5.52	0.7	0.7
R12	Residential - James Close	0.71	5.41	0.6	0.6
R13	Residential - Ballard Close	0.53	5.23	0.4	0.4
R14	Residential - Ballard Close	0.46	5.16	0.4	0.4
R15	Residential - Baker Close	0.52	5.22	0.4	0.4
R16	Residential - Baker Close	0.75	5.45	0.6	0.6
R17	Residential - Squirrel Lane	0.33	5.03	0.3	0.3
R18	Residential - Squirrel Lane	0.39	5.09	0.3	0.3

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

5.4.33 As indicated in Table 44, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 24-hour SO_2 concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.34 Predicted 99.7th %ile 1-hour mean SO_2 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 45.

Table 45 Predicted 99.7th %ile 1-hour Mean SO_2 Concentrations

Receptor		Predicted 99.7th %ile 1-hour Mean SO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	14.01	13.94	14.09	13.43	13.98
R2	Education Facility - Eco Park Road	15.57	15.20	15.65	15.75	15.35
R3	Medical Facility - Eco Park Road	11.50	11.26	11.37	11.69	11.89

Receptor		Predicted 99.7th %ile 1-hour Mean SO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R4	Residential - Sheet Road	10.06	10.54	10.36	10.52	10.44
R5	Residential - Parys Road	11.95	12.90	12.44	12.68	12.84
R6	Residential - Honey Meadow	13.84	15.33	14.71	14.99	14.97
R7	Residential - Langford Close	16.50	18.21	17.32	17.77	17.65
R8	Residential - Langford Close	19.13	19.31	18.77	19.92	19.66
R9	Residential - Blashfield Road	26.89	26.86	28.77	26.96	27.30
R10	Residential - Blashfield Road	17.44	17.22	17.41	17.29	17.83
R11	Residential - Shearman Road	15.55	14.92	15.34	14.68	14.87
R12	Residential - James Close	13.87	13.35	13.91	13.04	12.84
R13	Residential - Ballard Close	11.96	11.14	11.72	11.60	10.97
R14	Residential - Ballard Close	11.39	10.44	11.30	10.74	11.33
R15	Residential - Baker Close	13.33	11.75	13.02	11.49	12.10
R16	Residential - Baker Close	14.70	13.92	14.13	13.98	13.61
R17	Residential - Squirrel Lane	8.90	8.37	8.54	8.89	8.41
R18	Residential - Squirrel Lane	10.08	9.29	9.44	9.92	9.75

5.4.35 As indicated in Table 45, 99.7th %ile 1-hour mean SO_2 PECs were below the EQS of 350µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.36 Maximum predicted 99.7th %ile 1-hour mean SO_2 concentrations at the sensitive receptor locations are summarised in Table 46. Reference should be made to Figure 14 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 46 Maximum Predicted 99.7th %ile 1-hour Mean SO_2 Concentrations

Receptor		Maximum Predicted 99.7th %ile 1-hour Mean SO_2 Concentration ($\mu g/m^3$)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	9.39	14.09	2.7	2.7
R2	Education Facility - Eco Park Road	11.05	15.75	3.2	3.2
R3	Medical Facility - Eco Park Road	7.19	11.89	2.1	2.1
R4	Residential - Sheet Road	5.84	10.54	1.7	1.7
R5	Residential - Parys Road	8.20	12.90	2.3	2.4
R6	Residential - Honey Meadow	10.63	15.33	3.0	3.1
R7	Residential - Langford Close	13.51	18.21	3.9	3.9
R8	Residential - Langford Close	15.22	19.92	4.3	4.4
R9	Residential - Blashfield Road	24.07	28.77	6.9	7.0
R10	Residential - Blashfield Road	13.13	17.83	3.8	3.8
R11	Residential - Shearman Road	10.85	15.55	3.1	3.1
R12	Residential - James Close	9.21	13.91	2.6	2.7
R13	Residential - Ballard Close	7.26	11.96	2.1	2.1
R14	Residential - Ballard Close	6.69	11.39	1.9	1.9
R15	Residential - Baker Close	8.63	13.33	2.5	2.5
R16	Residential - Baker Close	10.00	14.70	2.9	2.9
R17	Residential - Squirrel Lane	4.20	8.90	1.2	1.2
R18	Residential - Squirrel Lane	5.38	10.08	1.5	1.6

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

5.4.37 As indicated in Table 46, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 1-hour mean SO_2 concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.38 Predicted 99.9th %ile 15-minute mean SO_2 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 47.

Table 47 Predicted 99.9th %ile 15-minute Mean SO_2 Concentrations

Receptor		Predicted 99.9th %ile 15-minute Mean SO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	18.98	18.90	18.91	18.85	19.01
R2	Education Facility - Eco Park Road	21.31	21.00	21.10	21.30	20.71
R3	Medical Facility - Eco Park Road	15.47	15.50	15.08	17.25	16.18
R4	Residential - Sheet Road	14.01	14.09	14.03	14.26	14.42
R5	Residential - Parys Road	16.69	18.29	17.31	17.52	18.46
R6	Residential - Honey Meadow	19.56	20.77	20.32	20.58	20.99
R7	Residential - Langford Close	21.95	24.18	22.16	23.14	22.88
R8	Residential - Langford Close	23.56	23.79	24.12	24.30	25.60
R9	Residential - Blashfield Road	36.53	39.00	39.28	39.31	38.17
R10	Residential - Blashfield Road	24.47	24.53	24.40	24.80	25.46
R11	Residential - Shearman Road	21.20	20.47	21.36	20.28	19.61
R12	Residential - James Close	19.27	19.58	19.47	17.87	17.92
R13	Residential - Ballard Close	16.44	15.28	15.98	16.18	15.53
R14	Residential - Ballard Close	16.76	14.77	16.24	14.83	16.71
R15	Residential - Baker Close	18.53	16.72	17.72	16.83	16.57
R16	Residential - Baker Close	21.04	19.40	20.00	20.43	19.77
R17	Residential - Squirrel Lane	10.94	10.25	10.55	11.21	10.10
R18	Residential - Squirrel Lane	12.96	12.41	12.53	12.59	12.77

5.4.39 As indicated in Table 47, 99.9th %ile 15-minute mean SO_2 PECs were below the EQS of 266µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.40 Maximum predicted 99.9th %ile 15-minute mean SO_2 concentrations at the sensitive receptor locations are summarised in Table 48. Reference should be made to Figure 15 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 48 Maximum Predicted 99.9th %ile 15-minute Mean SO_2 Concentrations

Receptor		Maximum Predicted 99.9th %ile 15-minute Mean SO_2 Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	14.31	19.01	5.4	5.5
R2	Education Facility - Eco Park Road	16.61	21.31	6.2	6.4
R3	Medical Facility - Eco Park Road	12.55	17.25	4.7	4.8
R4	Residential - Sheet Road	9.72	14.42	3.7	3.7
R5	Residential - Parys Road	13.76	18.46	5.2	5.3
R6	Residential - Honey Meadow	16.29	20.99	6.1	6.2
R7	Residential - Langford Close	19.48	24.18	7.3	7.5
R8	Residential - Langford Close	20.90	25.60	7.9	8.0
R9	Residential - Blashfield Road	34.61	39.31	13.0	13.2
R10	Residential - Blashfield Road	20.76	25.46	7.8	7.9
R11	Residential - Shearman Road	16.66	21.36	6.3	6.4
R12	Residential - James Close	14.88	19.58	5.6	5.7
R13	Residential - Ballard Close	11.74	16.44	4.4	4.5
R14	Residential - Ballard Close	12.06	16.76	4.5	4.6
R15	Residential - Baker Close	13.83	18.53	5.2	5.3
R16	Residential - Baker Close	16.34	21.04	6.1	6.3
R17	Residential - Squirrel Lane	6.51	11.21	2.4	2.5
R18	Residential - Squirrel Lane	8.26	12.96	3.1	3.2

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

5.4.41 As indicated in Table 48, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 15-minute mean SO_2 concentrations are not considered to be significant, in accordance with the EA criteria.

Hydrogen Chloride

5.4.42 Predicted 100th %tile 1-hour mean HCl PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 49.

Table 49 Predicted 100th %tile 1-hour Mean HCl Concentrations

Receptor		Predicted 100th %tile 1-hour Mean HCl PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	3.69	3.74	3.70	3.71	3.61
R2	Education Facility - Eco Park Road	4.35	4.21	4.35	4.28	4.21
R3	Medical Facility - Eco Park Road	3.23	3.43	3.47	3.33	3.43
R4	Residential - Sheet Road	2.77	2.71	2.88	2.88	3.05
R5	Residential - Parys Road	3.63	3.60	3.41	3.83	3.62
R6	Residential - Honey Meadow	4.16	4.60	4.45	4.51	4.59
R7	Residential - Langford Close	5.07	5.26	4.96	5.32	5.13
R8	Residential - Langford Close	6.97	6.47	9.25	6.66	7.91
R9	Residential - Blashfield Road	10.47	10.51	10.46	10.15	9.47
R10	Residential - Blashfield Road	4.97	5.53	5.82	5.82	5.77
R11	Residential - Shearman Road	4.82	4.78	4.72	4.66	4.44
R12	Residential - James Close	4.56	4.49	4.51	4.51	4.55
R13	Residential - Ballard Close	3.72	4.14	4.15	3.68	4.12
R14	Residential - Ballard Close	3.96	3.73	3.95	3.53	3.49
R15	Residential - Baker Close	4.41	4.25	4.36	4.59	4.05
R16	Residential - Baker Close	4.96	4.96	4.94	4.84	4.83
R17	Residential - Squirrel Lane	2.14	2.18	2.19	2.22	2.10
R18	Residential - Squirrel Lane	2.55	2.53	2.54	2.56	2.38

5.4.43 As indicated in Table 49, 100th %tile 1-hour mean HCl PECs were below the EQS of 750µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.44 Maximum predicted 100th %tile 1-hour mean HCl concentrations at the sensitive receptor locations are summarised in Table 50. Reference should be made to Figure 16 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 50 Maximum Predicted 100th %tile 1-hour Mean HCl Concentrations

Receptor		Maximum Predicted 100th %tile 1-hour Mean HCl Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	3.22	3.74	0.4	0.4
R2	Education Facility - Eco Park Road	3.82	4.35	0.5	0.5
R3	Medical Facility - Eco Park Road	2.95	3.47	0.4	0.4
R4	Residential - Sheet Road	2.53	3.05	0.3	0.3
R5	Residential - Parys Road	3.30	3.83	0.4	0.4
R6	Residential - Honey Meadow	4.08	4.60	0.5	0.5
R7	Residential - Langford Close	4.79	5.32	0.6	0.6
R8	Residential - Langford Close	8.73	9.25	1.2	1.2
R9	Residential - Blashfield Road	9.98	10.51	1.3	1.3
R10	Residential - Blashfield Road	5.30	5.82	0.7	0.7
R11	Residential - Shearman Road	4.30	4.82	0.6	0.6
R12	Residential - James Close	4.04	4.56	0.5	0.5
R13	Residential - Ballard Close	3.63	4.15	0.5	0.5
R14	Residential - Ballard Close	3.44	3.96	0.5	0.5
R15	Residential - Baker Close	4.06	4.59	0.5	0.5
R16	Residential - Baker Close	4.44	4.96	0.6	0.6
R17	Residential - Squirrel Lane	1.70	2.22	0.2	0.2
R18	Residential - Squirrel Lane	2.04	2.56	0.3	0.3

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

5.4.45 As indicated in Table 50, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 100th %tile 1-hour mean HCl concentrations are not considered to be significant, in accordance with the EA criteria.

Hydrogen Fluoride

5.4.46 Predicted 100th %tile 1-hour mean HF PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 51.

Table 51 Predicted 100th %tile 1-hour Mean HF Concentrations

Receptor		Predicted 100th %tile 1-hour Mean HF PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	4.91	4.92	4.91	4.92	4.91
R2	Education Facility - Eco Park Road	4.96	4.95	4.96	4.95	4.95
R3	Medical Facility - Eco Park Road	4.88	4.90	4.90	4.89	4.90
R4	Residential - Sheet Road	4.85	4.85	4.86	4.86	4.87
R5	Residential - Parys Road	4.91	4.91	4.90	4.92	4.91
R6	Residential - Honey Meadow	4.95	4.98	4.96	4.97	4.97
R7	Residential - Langford Close	5.01	5.02	5.00	5.02	5.01
R8	Residential - Langford Close	5.13	5.10	5.29	5.11	5.20
R9	Residential - Blashfield Road	5.37	5.37	5.37	5.35	5.30
R10	Residential - Blashfield Road	5.00	5.04	5.06	5.06	5.05
R11	Residential - Shearman Road	4.99	4.99	4.98	4.98	4.96
R12	Residential - James Close	4.97	4.97	4.97	4.97	4.97
R13	Residential - Ballard Close	4.92	4.94	4.94	4.91	4.94
R14	Residential - Ballard Close	4.93	4.92	4.93	4.90	4.90
R15	Residential - Baker Close	4.96	4.95	4.96	4.97	4.94
R16	Residential - Baker Close	5.00	5.00	5.00	4.99	4.99
R17	Residential - Squirrel Lane	4.81	4.81	4.81	4.81	4.81
R18	Residential - Squirrel Lane	4.84	4.84	4.84	4.84	4.83

5.4.47 As indicated in Table 51, 100th %tile 1-hour mean HF PECs were below the EQS of 160µg/m3 at all sensitive receptor locations for all meteorological data sets.

5.4.48 Maximum predicted 100th %tile 1-hour mean HF concentrations at the sensitive receptor locations are summarised in Table 52. Reference should be made to Figure 17 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 52 Maximum Predicted 100th %tile 1-hour Mean HF Concentrations

Receptor		Maximum Predicted 100th %tile 1-hour Mean HF Concentration (µg/m3)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	0.22	4.92	0.14	0.14
R2	Education Facility - Eco Park Road	0.26	4.96	0.16	0.17
R3	Medical Facility - Eco Park Road	0.20	4.90	0.12	0.13
R4	Residential - Sheet Road	0.17	4.87	0.11	0.11
R5	Residential - Parys Road	0.22	4.92	0.14	0.14
R6	Residential - Honey Meadow	0.28	4.98	0.17	0.18
R7	Residential - Langford Close	0.32	5.02	0.20	0.21
R8	Residential - Langford Close	0.59	5.29	0.37	0.38
R9	Residential - Blashfield Road	0.67	5.37	0.42	0.43
R10	Residential - Blashfield Road	0.36	5.06	0.22	0.23
R11	Residential - Shearman Road	0.29	4.99	0.18	0.19
R12	Residential - James Close	0.27	4.97	0.17	0.18
R13	Residential - Ballard Close	0.24	4.94	0.15	0.16
R14	Residential - Ballard Close	0.23	4.93	0.15	0.15
R15	Residential - Baker Close	0.27	4.97	0.17	0.18
R16	Residential - Baker Close	0.30	5.00	0.19	0.19
R17	Residential - Squirrel Lane	0.11	4.81	0.07	0.07
R18	Residential - Squirrel Lane	0.14	4.84	0.09	0.09

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

5.4.49 As indicated in Table 52, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 100th %tile 1-hour mean HF concentrations are not considered to be significant, in accordance with the EA criteria.

Carbon Monoxide

5.4.50 Predicted 100th %tile 8-hour rolling mean CO PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 53.

Table 53 Predicted 100th %tile 8-hour Rolling Mean CO Concentrations

Receptor		Predicted 100th %tile 8-hour Rolling Mean CO PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	415.84	415.55	416.28	415.32	415.03
R2	Education Facility - Eco Park Road	415.33	415.98	416.19	415.71	416.07
R3	Medical Facility - Eco Park Road	414.60	413.63	414.03	415.06	414.33
R4	Residential - Sheet Road	413.71	413.70	413.68	413.91	414.17
R5	Residential - Parys Road	414.24	415.13	414.87	414.50	415.40
R6	Residential - Honey Meadow	415.18	416.09	416.10	415.60	416.06
R7	Residential - Langford Close	416.52	417.58	417.13	417.57	416.81
R8	Residential - Langford Close	417.34	417.20	416.68	417.72	418.31
R9	Residential - Blashfield Road	420.61	421.38	422.02	422.35	420.08
R10	Residential - Blashfield Road	416.04	416.25	416.36	417.20	417.09
R11	Residential - Shearman Road	415.45	415.56	416.21	414.67	415.18
R12	Residential - James Close	415.80	415.52	414.98	414.51	414.82
R13	Residential - Ballard Close	414.35	414.20	414.91	413.92	414.18
R14	Residential - Ballard Close	414.07	413.54	413.95	413.48	414.75
R15	Residential - Baker Close	415.17	414.10	414.32	414.51	414.84
R16	Residential - Baker Close	415.91	414.91	416.02	415.48	415.47
R17	Residential - Squirrel Lane	413.55	413.24	413.35	413.38	413.27

Receptor		Predicted 100th %tile 8-hour Rolling Mean CO PEC (µg/m³)				
		2017	2018	2019	2020	2021
R18	Residential - Squirrel Lane	413.70	413.90	413.83	413.50	413.75

5.4.51 As indicated in Table 53, 100th %tile 8-hour rolling mean CO PECs were below the EQS of 10,000µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.52 Maximum predicted 100th %tile 8-hour rolling mean CO concentrations at the sensitive receptor locations are summarised in Table 54. Reference should be made to Figure 18 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 54 Maximum Predicted 100th %tile 8-hour Rolling Mean CO Concentrations

Receptor		Maximum Predicted 100th %tile 8-hour Rolling Mean CO Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	4.28	416.28	0.04	0.04
R2	Education Facility - Eco Park Road	4.19	416.19	0.04	0.04
R3	Medical Facility - Eco Park Road	3.06	415.06	0.03	0.03
R4	Residential - Sheet Road	2.17	414.17	0.02	0.02
R5	Residential - Parys Road	3.40	415.40	0.03	0.04
R6	Residential - Honey Meadow	4.10	416.10	0.04	0.04
R7	Residential - Langford Close	5.58	417.58	0.06	0.06
R8	Residential - Langford Close	6.31	418.31	0.06	0.07
R9	Residential - Blashfield Road	10.35	422.35	0.10	0.11
R10	Residential - Blashfield Road	5.20	417.20	0.05	0.05
R11	Residential - Shearman Road	4.21	416.21	0.04	0.04
R12	Residential - James Close	3.80	415.80	0.04	0.04

Receptor		Maximum Predicted 100th %tile 8-hour Rolling Mean CO Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R13	Residential - Ballard Close	2.91	414.91	0.03	0.03
R14	Residential - Ballard Close	2.75	414.75	0.03	0.03
R15	Residential - Baker Close	3.17	415.17	0.03	0.03
R16	Residential - Baker Close	4.02	416.02	0.04	0.04
R17	Residential - Squirrel Lane	1.55	413.55	0.02	0.02
R18	Residential - Squirrel Lane	1.90	413.90	0.02	0.02

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

5.4.53 As indicated in Table 54, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 100th %tile 8-hour rolling mean CO concentrations are not considered to be significant, in accordance with the EA criteria.

Cadmium

5.4.54 Predicted annual mean Cd PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 55.

Table 55 Predicted Annual Mean Cd Concentrations

Receptor		Predicted Annual Mean Cd PEC (ng/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	0.28	0.26	0.27	0.26	0.27
R2	Education Facility - Eco Park Road	0.28	0.26	0.27	0.26	0.27
R3	Medical Facility - Eco Park Road	0.24	0.23	0.24	0.24	0.24
R4	Residential - Sheet Road	0.23	0.24	0.23	0.23	0.24
R5	Residential - Parys Road	0.24	0.26	0.25	0.25	0.26
R6	Residential - Honey Meadow	0.25	0.28	0.26	0.26	0.28
R7	Residential - Langford Close	0.26	0.31	0.27	0.29	0.30

Receptor		Predicted Annual Mean Cd PEC (ng/m³)				
		2017	2018	2019	2020	2021
R8	Residential - Langford Close	0.28	0.35	0.30	0.34	0.35
R9	Residential - Blashfield Road	0.32	0.40	0.36	0.38	0.40
R10	Residential - Blashfield Road	0.26	0.28	0.29	0.27	0.28
R11	Residential - Shearman Road	0.25	0.27	0.27	0.25	0.26
R12	Residential - James Close	0.24	0.25	0.25	0.24	0.24
R13	Residential - Ballard Close	0.24	0.24	0.24	0.23	0.24
R14	Residential - Ballard Close	0.24	0.23	0.24	0.23	0.23
R15	Residential - Baker Close	0.24	0.24	0.24	0.24	0.24
R16	Residential - Baker Close	0.25	0.25	0.25	0.25	0.25
R17	Residential - Squirrel Lane	0.25	0.24	0.25	0.24	0.24
R18	Residential - Squirrel Lane	0.26	0.25	0.25	0.25	0.25

5.4.55 As indicated in Table 55, PECs were below the annual mean EQS of 5ng/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.56 Maximum predicted annual mean Cd concentrations at the sensitive receptor locations are summarised in Table 56. Reference should be made to Figure 19 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 56 Maximum Predicted Annual Mean Cd Concentrations

Receptor		Maximum Predicted Annual Mean Cd Concentration (ng/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Eco Park Road	0.06	0.28	1.3	5.6
R2	Education Facility - Eco Park Road	0.06	0.28	1.2	5.6
R3	Medical Facility - Eco Park Road	0.03	0.24	0.5	4.8
R4	Residential - Sheet Road	0.02	0.24	0.4	4.8
R5	Residential - Parys Road	0.04	0.26	0.8	5.2

Receptor		Maximum Predicted Annual Mean Cd Concentration (ng/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R6	Residential - Honey Meadow	0.06	0.28	1.2	5.6
R7	Residential - Langford Close	0.09	0.31	1.8	6.1
R8	Residential - Langford Close	0.14	0.35	2.7	7.1
R9	Residential - Blashfield Road	0.18	0.40	3.7	8.0
R10	Residential - Blashfield Road	0.07	0.29	1.4	5.7
R11	Residential - Shearman Road	0.05	0.27	1.1	5.4
R12	Residential - James Close	0.04	0.25	0.7	5.0
R13	Residential - Ballard Close	0.03	0.24	0.5	4.8
R14	Residential - Ballard Close	0.02	0.24	0.4	4.7
R15	Residential - Baker Close	0.03	0.24	0.6	4.9
R16	Residential - Baker Close	0.04	0.25	0.7	5.1
R17	Residential - Squirrel Lane	0.04	0.25	0.7	5.0
R18	Residential - Squirrel Lane	0.04	0.26	0.9	5.2

5.4.57 As indicated in Table 56, PECs were below 70% of the EQS at all sensitive receptor locations. As such, predicted effects on annual mean Cd concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.58 Predicted 100th %ile 24-hour mean Cd PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 57.

Table 57 Predicted 100th %ile 24-hour Mean Cd Concentrations

Receptor		Predicted 100th %ile 24-hour Mean Cd PEC (ng/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	0.81	0.79	0.83	0.76	0.83
R2	Education Facility - Eco Park Road	0.92	0.84	0.95	0.84	1.04

Receptor		Predicted 100th %ile 24-hour Mean Cd PEC (ng/m³)				
		2017	2018	2019	2020	2021
R3	Medical Facility - Eco Park Road	0.63	0.64	0.66	0.75	0.73
R4	Residential - Sheet Road	0.68	0.63	0.71	0.65	0.73
R5	Residential - Parys Road	0.79	0.91	0.89	0.85	0.96
R6	Residential - Honey Meadow	0.91	1.08	0.99	1.00	1.13
R7	Residential - Langford Close	0.96	1.37	1.22	1.15	1.29
R8	Residential - Langford Close	1.21	1.26	1.01	1.42	1.54
R9	Residential - Blashfield Road	1.42	1.71	1.84	1.77	1.69
R10	Residential - Blashfield Road	0.91	1.00	0.91	1.04	0.98
R11	Residential - Shearman Road	0.94	0.80	0.81	0.77	0.79
R12	Residential - James Close	0.77	0.78	0.68	0.70	0.70
R13	Residential - Ballard Close	0.71	0.71	0.65	0.62	0.68
R14	Residential - Ballard Close	0.65	0.64	0.62	0.57	0.64
R15	Residential - Baker Close	0.70	0.68	0.67	0.71	0.79
R16	Residential - Baker Close	0.77	0.81	0.73	0.78	0.87
R17	Residential - Squirrel Lane	0.57	0.56	0.56	0.60	0.54
R18	Residential - Squirrel Lane	0.65	0.61	0.59	0.64	0.60

5.4.59 As indicated in Table 57, 100th %tile 24-hour mean Cd PECs were below the EQS of 30ng/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.60 Maximum predicted 100th %ile 24-hour mean Cd concentrations at the sensitive receptor locations are summarised in Table 58. Reference should be made to Figure 20 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 58 Maximum Predicted 100th %ile 24-hour Mean Cd Concentrations

Receptor		Maximum Predicted 100th %ile 24-hour Mean Cd Concentration (ng/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	0.40	0.83	1.3	2.8
R2	Education Facility - Eco Park Road	0.61	1.04	2.0	3.5
R3	Medical Facility - Eco Park Road	0.32	0.75	1.1	2.5
R4	Residential - Sheet Road	0.30	0.73	1.0	2.4
R5	Residential - Parys Road	0.52	0.96	1.7	3.2
R6	Residential - Honey Meadow	0.69	1.13	2.3	3.8
R7	Residential - Langford Close	0.93	1.37	3.1	4.6
R8	Residential - Langford Close	1.10	1.54	3.7	5.1
R9	Residential - Blashfield Road	1.41	1.84	4.7	6.1
R10	Residential - Blashfield Road	0.61	1.04	2.0	3.5
R11	Residential - Shearman Road	0.51	0.94	1.7	3.1
R12	Residential - James Close	0.35	0.78	1.2	2.6
R13	Residential - Ballard Close	0.28	0.71	0.9	2.4
R14	Residential - Ballard Close	0.22	0.65	0.7	2.2
R15	Residential - Baker Close	0.36	0.79	1.2	2.6
R16	Residential - Baker Close	0.44	0.87	1.5	2.9
R17	Residential - Squirrel Lane	0.16	0.60	0.5	2.0
R18	Residential - Squirrel Lane	0.22	0.65	0.7	2.2

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

5.4.61 As indicated in Table 58, the PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 100th %tile 24-hour mean Cd concentrations are not considered to be significant, in accordance with the EA criteria.

Mercury

5.4.62 Predicted 100th %ile 24-hour mean Hg PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 59.

Table 59 Predicted 100th %ile 24-hour Mean Hg Concentrations

Receptor		Predicted 100th %ile 24-hour Mean Hg PEC (ng/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	4.07	4.03	4.12	3.97	4.10
R2	Education Facility - Eco Park Road	4.30	4.12	4.35	4.12	4.53
R3	Medical Facility - Eco Park Road	3.72	3.73	3.78	3.95	3.90
R4	Residential - Sheet Road	3.81	3.71	3.87	3.76	3.91
R5	Residential - Parys Road	4.03	4.27	4.23	4.16	4.37
R6	Residential - Honey Meadow	4.28	4.61	4.42	4.45	4.70
R7	Residential - Langford Close	4.38	5.18	4.89	4.75	5.04
R8	Residential - Langford Close	4.88	4.97	4.48	5.30	5.52
R9	Residential - Blashfield Road	5.30	5.87	6.14	6.00	5.84
R10	Residential - Blashfield Road	4.27	4.45	4.28	4.54	4.42
R11	Residential - Shearman Road	4.34	4.04	4.08	4.00	4.04
R12	Residential - James Close	4.00	4.02	3.81	3.85	3.85
R13	Residential - Ballard Close	3.88	3.87	3.75	3.70	3.81
R14	Residential - Ballard Close	3.75	3.72	3.69	3.59	3.74
R15	Residential - Baker Close	3.85	3.82	3.78	3.86	4.04
R16	Residential - Baker Close	4.00	4.07	3.92	4.01	4.19
R17	Residential - Squirrel Lane	3.60	3.58	3.57	3.64	3.54
R18	Residential - Squirrel Lane	3.75	3.67	3.64	3.73	3.65

5.4.63 As indicated in Table 59, 100th %tile 24-hour mean Hg PECs were below the EQS of 60ng/m³ at all sensitive receptor locations for all meteorological data sets.

5.4.64 Maximum predicted 100th %ile 24-hour mean Hg concentrations at the sensitive receptor locations are summarised in Table 60. Reference should be made to Figure 21 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 60 Maximum Predicted 100th %ile 24-hour Mean Hg Concentrations

Receptor		Maximum Predicted 100th %ile 24-hour Mean Hg Concentration (ng/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	0.80	4.12	1.3	1.4
R2	Education Facility - Eco Park Road	1.22	4.53	2.0	2.1
R3	Medical Facility - Eco Park Road	0.64	3.95	1.1	1.1
R4	Residential - Sheet Road	0.59	3.91	1.0	1.0
R5	Residential - Parys Road	1.05	4.37	1.7	1.9
R6	Residential - Honey Meadow	1.39	4.70	2.3	2.4
R7	Residential - Langford Close	1.87	5.18	3.1	3.3
R8	Residential - Langford Close	2.21	5.52	3.7	3.9
R9	Residential - Blashfield Road	2.82	6.14	4.7	5.0
R10	Residential - Blashfield Road	1.22	4.54	2.0	2.2
R11	Residential - Shearman Road	1.02	4.34	1.7	1.8
R12	Residential - James Close	0.70	4.02	1.2	1.2
R13	Residential - Ballard Close	0.56	3.88	0.9	1.0
R14	Residential - Ballard Close	0.43	3.75	0.7	0.8
R15	Residential - Baker Close	0.72	4.04	1.2	1.3
R16	Residential - Baker Close	0.88	4.19	1.5	1.6
R17	Residential - Squirrel Lane	0.33	3.64	0.5	0.6
R18	Residential - Squirrel Lane	0.43	3.75	0.7	0.8

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

5.4.65 As indicated in Table 60, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 100th %tile 24-hour mean Hg concentrations are not considered to be significant, in accordance with the EA criteria.

5.4.66 Predicted 100th %ile 1-hour mean Hg PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 61.

Table 61 Predicted 100th %ile 1-hour Mean Hg Concentrations

Receptor		Predicted 100th %ile 1-hour Mean Hg PEC (µg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	5.69	5.73	5.70	5.71	5.63
R2	Education Facility - Eco Park Road	6.18	6.08	6.18	6.14	6.08
R3	Medical Facility - Eco Park Road	5.34	5.50	5.53	5.42	5.49
R4	Residential - Sheet Road	5.00	4.96	5.08	5.08	5.21
R5	Residential - Parys Road	5.64	5.63	5.48	5.79	5.64
R6	Residential - Honey Meadow	6.04	6.38	6.26	6.31	6.37
R7	Residential - Langford Close	6.72	6.87	6.64	6.91	6.77
R8	Residential - Langford Close	8.15	7.77	9.86	7.92	8.86
R9	Residential - Blashfield Road	10.78	10.80	10.77	10.54	10.03
R10	Residential - Blashfield Road	6.65	7.07	7.29	7.29	7.25
R11	Residential - Shearman Road	6.54	6.51	6.46	6.42	6.25
R12	Residential - James Close	6.35	6.29	6.30	6.31	6.34
R13	Residential - Ballard Close	5.72	6.03	6.04	5.69	6.02
R14	Residential - Ballard Close	5.90	5.72	5.89	5.57	5.54
R15	Residential - Baker Close	6.23	6.11	6.20	6.36	5.96
R16	Residential - Baker Close	6.65	6.65	6.63	6.55	6.55
R17	Residential - Squirrel Lane	4.53	4.56	4.56	4.59	4.49
R18	Residential - Squirrel Lane	4.83	4.82	4.83	4.84	4.71

5.4.67 As indicated in Table 61, 100th %tile 1-hour mean Hg PECs were below the EQS of 600ng/m3 at all sensitive receptor locations for all meteorological data sets.

5.4.68 Maximum predicted 100th %ile 1-hour mean Hg concentrations at the sensitive receptor locations are summarised in Table 62. Reference should be made to Figure 22 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 62 Maximum Predicted 100th %ile 1-hour Mean Hg Concentrations

Receptor		Maximum Predicted 100th %ile 1-hour Mean Hg Concentration (µg/m3)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Eco Park Road	2.41	5.73	0.4	0.4
R2	Education Facility - Eco Park Road	2.87	6.18	0.5	0.5
R3	Medical Facility - Eco Park Road	2.21	5.53	0.4	0.4
R4	Residential - Sheet Road	1.90	5.21	0.3	0.3
R5	Residential - Parys Road	2.48	5.79	0.4	0.4
R6	Residential - Honey Meadow	3.06	6.38	0.5	0.5
R7	Residential - Langford Close	3.59	6.91	0.6	0.6
R8	Residential - Langford Close	6.55	9.86	1.1	1.1
R9	Residential - Blashfield Road	7.49	10.80	1.2	1.3
R10	Residential - Blashfield Road	3.97	7.29	0.7	0.7
R11	Residential - Shearman Road	3.22	6.54	0.5	0.5
R12	Residential - James Close	3.03	6.35	0.5	0.5
R13	Residential - Ballard Close	2.72	6.04	0.5	0.5
R14	Residential - Ballard Close	2.58	5.90	0.4	0.4
R15	Residential - Baker Close	3.05	6.36	0.5	0.5
R16	Residential - Baker Close	3.33	6.65	0.6	0.6
R17	Residential - Squirrel Lane	1.28	4.59	0.2	0.2

Receptor		Maximum Predicted 100th %ile 1-hour Mean Hg Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R18	Residential - Squirrel Lane	1.53	4.84	0.3	0.3

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

5.4.69 As indicated in Table 62, PCs were below 10% of the EQS at all sensitive receptor locations. As such, predicted effects on 100th %tile 1-hour mean Hg concentrations are not considered to be significant, in accordance with the EA guidance.

Dioxins and Furans

5.4.70 Predicted annual mean PCDD/Fs PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 63.

Table 63 Predicted Annual Mean PCDD/F Concentrations

Receptor		Predicted Annual Mean PCDD/F PEC (fg/m³)				
		2017	2018	2019	2020	2021
R1	Residential - Eco Park Road	12.69	12.61	12.65	12.59	12.65
R2	Education Facility - Eco Park Road	12.68	12.61	12.64	12.61	12.66
R3	Medical Facility - Eco Park Road	12.51	12.48	12.49	12.49	12.51
R4	Residential - Sheet Road	12.46	12.49	12.48	12.47	12.50
R5	Residential - Parys Road	12.50	12.58	12.55	12.54	12.59
R6	Residential - Honey Meadow	12.53	12.68	12.60	12.61	12.67
R7	Residential - Langford Close	12.58	12.81	12.66	12.72	12.79
R8	Residential - Langford Close	12.70	13.00	12.76	12.94	13.01
R9	Residential - Blashfield Road	12.87	13.22	13.06	13.12	13.21
R10	Residential - Blashfield Road	12.62	12.70	12.71	12.64	12.70
R11	Residential - Shearman Road	12.57	12.63	12.63	12.55	12.58
R12	Residential - James Close	12.52	12.56	12.56	12.50	12.51

Receptor		Predicted Annual Mean PCDD/F PEC (fg/m³)				
		2017	2018	2019	2020	2021
R13	Residential - Ballard Close	12.49	12.51	12.51	12.48	12.49
R14	Residential - Ballard Close	12.49	12.48	12.49	12.47	12.48
R15	Residential - Baker Close	12.53	12.52	12.53	12.50	12.51
R16	Residential - Baker Close	12.57	12.56	12.56	12.54	12.54
R17	Residential - Squirrel Lane	12.56	12.52	12.53	12.53	12.52
R18	Residential - Squirrel Lane	12.60	12.54	12.56	12.55	12.55

5.5 Sensitive Ecological Receptors

5.5.1 Predicted concentrations of each pollutant at the sensitive ecological receptor locations identified in Table 11 are summarised in the following Sections.

Nitrogen Oxides

5.5.2 Predicted annual mean NO_x PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 64.

Table 64 Predicted Annual Mean NO_x Concentrations

Receptor		Predicted Annual Mean NO_x PEC (µg/m³)				
		2017	2018	2019	2020	2021
E1	River Teme SSSI	6.16	6.23	6.17	6.22	6.24
E2	River Teme SSSI	6.14	6.20	6.19	6.19	6.21
E3	River Teme SSSI	5.02	5.05	5.03	5.04	5.05
E4	Downton Gorge SAC	3.87	3.87	3.87	3.87	3.87
E5	Downton Gorge SAC	3.87	3.87	3.87	3.87	3.87
E6	Ploughnhill Wood AW	4.36	4.35	4.36	4.35	4.36
E7	Ploughnhill Wood AW	4.34	4.34	4.34	4.34	4.34
E8	Tinkershill Wood AW	4.42	4.42	4.42	4.42	4.43

Receptor		Predicted Annual Mean NO_x PEC (µg/m³)				
		2017	2018	2019	2020	2021
E9	Tinkershill Wood AW	4.42	4.42	4.42	4.42	4.42
E10	Ledwyche Brook LWS	4.80	4.75	4.77	4.76	4.75
E11	Ledwyche Brook LWS	4.63	4.61	4.62	4.63	4.61
E12	Ledwyche Brook LWS	4.97	4.84	4.90	4.85	4.88
E13	Whitcliffe Common Reserve LWS	6.08	6.11	6.10	6.10	6.11
E14	Meadows below Caynham Camp LWS	4.22	4.20	4.21	4.20	4.21

5.5.3 As indicated in Table 64, annual mean NO_x PECs were below the EQS of 30µg/m³ at all sensitive receptor locations.

5.5.4 Maximum predicted annual mean NO_x concentrations at the sensitive receptor locations are summarised in Table 65.

Table 65 Maximum Predicted Annual Mean NO_x Concentrations

Receptor		Maximum Predicted Annual Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	River Teme SSSI	0.14	6.24	0.5	20.8
E2	River Teme SSSI	0.17	6.21	0.6	20.7
E3	River Teme SSSI	0.06	5.05	0.2	16.8
E4	Downton Gorge SAC	0.00	3.87	0.0	12.9
E5	Downton Gorge SAC	0.00	3.87	0.0	12.9
E6	Ploughnhill Wood AW	0.04	4.36	0.1	14.5
E7	Ploughnhill Wood AW	0.02	4.34	0.1	14.5
E8	Tinkershill Wood AW	0.02	4.43	0.1	14.8
E9	Tinkershill Wood AW	0.01	4.42	0.0	14.7
E10	Ledwyche Brook LWS	0.19	4.80	0.6	16.0

Receptor		Maximum Predicted Annual Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E11	Ledwyche Brook LWS	0.12	4.63	0.4	15.4
E12	Ledwyche Brook LWS	0.36	4.97	1.2	16.6
E13	Whitcliffe Common Reserve LWS	0.07	6.11	0.2	20.4
E14	Meadows below Caynham Camp LWS	0.05	4.22	0.159	14.1

5.5.5 As shown in Table 65, PCs were below 100% of the EQS at all local designations. PCs were also below 1% of the EQS at the SAC and SSSI receptors As such, predicted effects on annual mean NO_x concentrations are considered to be not significant, in accordance with the EA criteria.

5.5.6 Predicted 24-hour mean NO_x PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 66.

Table 66 Predicted 24-hour Mean NO_x Concentrations

Receptor		Predicted 24-hour Mean NO_x PEC (µg/m³)				
		2017	2018	2019	2020	2021
E1	River Teme SSSI	13.69	14.40	13.51	14.78	14.91
E2	River Teme SSSI	14.66	14.86	15.67	15.40	15.18
E3	River Teme SSSI	10.63	11.69	11.02	11.18	11.14
E4	Downton Gorge SAC	7.81	7.83	7.79	7.82	7.83
E5	Downton Gorge SAC	7.81	7.82	7.80	7.82	7.82
E6	Ploughnhill Wood AW	9.32	9.28	9.48	9.15	9.52
E7	Ploughnhill Wood AW	9.01	9.08	9.05	9.15	9.26
E8	Tinkershill Wood AW	9.34	9.13	9.23	9.08	9.34
E9	Tinkershill Wood AW	9.05	9.07	9.14	9.10	9.17
E10	Ledwyche Brook LWS	10.52	10.63	10.55	10.75	10.24

Receptor		Predicted 24-hour Mean NO_x PEC (µg/m³)				
		2017	2018	2019	2020	2021
E11	Ledwyche Brook LWS	10.04	10.05	10.11	10.10	10.19
E12	Ledwyche Brook LWS	12.71	12.05	12.10	12.20	12.13
E13	Whitcliffe Common Reserve LWS	13.28	13.33	13.68	13.62	13.36
E14	Meadows below Caynham Camp LWS	8.90	8.89	8.80	8.76	8.90

5.5.7 As indicated in Table 66, 24-hour mean NO_x PECs were below the EQS of 75µg/m³ at all sensitive receptor locations.

5.5.8 Maximum predicted 24-hour mean NO_x concentrations at the sensitive receptor locations are summarised in Table 67.

Table 67 Maximum Predicted 24-hour Mean NO_x Concentrations

Receptor		Maximum Predicted 24-hour Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	River Teme SSSI	2.71	14.91	3.6	19.9
E2	River Teme SSSI	3.59	15.67	4.8	20.9
E3	River Teme SSSI	1.71	11.69	2.3	15.6
E4	Downton Gorge SAC	0.09	7.83	0.1	10.4
E5	Downton Gorge SAC	0.08	7.82	0.1	10.4
E6	Ploughnhill Wood AW	0.88	9.52	1.2	12.7
E7	Ploughnhill Wood AW	0.62	9.26	0.8	12.3
E8	Tinkershill Wood AW	0.52	9.34	0.7	12.5
E9	Tinkershill Wood AW	0.35	9.17	0.5	12.2
E10	Ledwyche Brook LWS	1.53	10.75	2.0	14.3
E11	Ledwyche Brook LWS	1.17	10.19	1.6	13.6
E12	Ledwyche Brook LWS	3.49	12.71	4.7	16.9

Receptor		Maximum Predicted 24-hour Mean NO_x Concentration ($\mu g/m^3$)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E13	Whitcliffe Common Reserve LWS	1.60	13.68	2.1	18.2
E14	Meadows below Caynham Camp LWS	0.56	8.90	0.8	11.9

5.5.9 As shown in Table 67, PCs were below 100% of the EQS at all local designations and below 10% of the EQS at the SAC and SSSI receptors. As such, predicted effects on 24-hour mean NO_x concentrations are considered to be not significant, in accordance with the EA criteria.

Hydrogen Fluoride

5.5.10 Predicted weekly mean HF PCs at the sensitive receptors are summarised in Table 68.

Table 68 Predicted Weekly Mean HF Concentrations

Receptor		Predicted Weekly Mean HF PC ($\mu g/m^3$)				
		2017	2018	2019	2020	2021
E1	River Teme SSSI	0.002	0.003	0.001	0.003	0.005
E2	River Teme SSSI	0.003	0.003	0.003	0.004	0.004
E3	River Teme SSSI	0.001	0.001	0.001	0.002	0.002
E4	Downton Gorge SAC	0.000	0.000	0.000	0.000	0.000
E5	Downton Gorge SAC	0.000	0.000	0.000	0.000	0.000
E6	Ploughnhill Wood AW	0.001	0.001	0.001	0.001	0.000
E7	Ploughnhill Wood AW	0.001	0.000	0.000	0.001	0.000
E8	Tinkershill Wood AW	0.000	0.000	0.000	0.000	0.000
E9	Tinkershill Wood AW	0.000	0.000	0.000	0.000	0.000
E10	Ledwyche Brook LWS	0.002	0.002	0.002	0.002	0.001
E11	Ledwyche Brook LWS	0.001	0.001	0.002	0.001	0.001
E12	Ledwyche Brook LWS	0.004	0.003	0.004	0.003	0.004

Receptor		Predicted Weekly Mean HF PC (µg/m³)				
		2017	2018	2019	2020	2021
E13	Whitcliffe Common Reserve LWS	0.001	0.001	0.001	0.001	0.002
E14	Meadows below Caynham Camp LWS	0.001	0.001	0.001	0.000	0.000

5.5.11 Maximum predicted weekly mean HF concentrations at the sensitive receptor locations are summarised Table 69.

Table 69 Maximum Predicted Weekly Mean HF Concentrations

Receptor		Maximum Predicted Weekly Mean HF PC (µg/m³)	PC Proportion of EQS (%)
E1	River Teme SSSI	0.005	0.9
E2	River Teme SSSI	0.004	0.8
E3	River Teme SSSI	0.002	0.4
E4	Downton Gorge SAC	0.000	0.0
E5	Downton Gorge SAC	0.000	0.0
E6	Ploughnhill Wood AW	0.001	0.2
E7	Ploughnhill Wood AW	0.001	0.1
E8	Tinkershill Wood AW	0.000	0.1
E9	Tinkershill Wood AW	0.000	0.1
E10	Ledwyche Brook LWS	0.002	0.4
E11	Ledwyche Brook LWS	0.002	0.3
E12	Ledwyche Brook LWS	0.004	0.8
E13	Whitcliffe Common Reserve LWS	0.002	0.4
E14	Meadows below Caynham Camp LWS	0.001	0.2

5.5.12 As shown in Table 69, PCs were below 100% of the EQS at all local designations and below 10% of the EQS at the SAC and SSSI receptors. As such, predicted effects on weekly mean HF concentrations are considered to be not significant, in accordance with the EA criteria.

5.5.13 Predicted daily mean HF PCs at the sensitive receptors are summarised in Table 70.

Table 70 Predicted Daily Mean HF Concentrations

Receptor		Predicted Daily Mean HF PC (µg/m³)				
		2017	2018	2019	2020	2021
E1	River Teme SSSI	0.004	0.006	0.003	0.007	0.007
E2	River Teme SSSI	0.007	0.007	0.009	0.009	0.008
E3	River Teme SSSI	0.002	0.004	0.003	0.003	0.003
E4	Downton Gorge SAC	0.000	0.000	0.000	0.000	0.000
E5	Downton Gorge SAC	0.000	0.000	0.000	0.000	0.000
E6	Ploughnhill Wood AW	0.002	0.002	0.002	0.001	0.002
E7	Ploughnhill Wood AW	0.001	0.001	0.001	0.001	0.002
E8	Tinkershill Wood AW	0.001	0.001	0.001	0.001	0.001
E9	Tinkershill Wood AW	0.001	0.001	0.001	0.001	0.001
E10	Ledwyche Brook LWS	0.003	0.004	0.004	0.004	0.003
E11	Ledwyche Brook LWS	0.003	0.003	0.003	0.003	0.003
E12	Ledwyche Brook LWS	0.009	0.007	0.008	0.008	0.008
E13	Whitcliffe Common Reserve LWS	0.003	0.003	0.004	0.004	0.003
E14	Meadows below Caynham Camp LWS	0.001	0.001	0.001	0.001	0.001

5.5.14 Maximum predicted daily mean HF concentrations at the sensitive receptor locations are summarised in Table 71.

Table 71 Maximum Predicted Daily Mean HF Concentrations

Receptor		Maximum Predicted Daily Mean HF PC (µg/m³)	PC Proportion of EQS (%)
E1	River Teme SSSI	0.007	0.1
E2	River Teme SSSI	0.009	0.2
E3	River Teme SSSI	0.004	0.1
E4	Downton Gorge SAC	0.000	0.0

Receptor		Maximum Predicted Daily Mean HF PC (µg/m³)	PC Proportion of EQS (%)
E5	Downton Gorge SAC	0.000	0.0
E6	Ploughnhill Wood AW	0.002	0.0
E7	Ploughnhill Wood AW	0.002	0.0
E8	Tinkershill Wood AW	0.001	0.0
E9	Tinkershill Wood AW	0.001	0.0
E10	Ledwyche Brook LWS	0.004	0.1
E11	Ledwyche Brook LWS	0.003	0.1
E12	Ledwyche Brook LWS	0.009	0.2
E13	Whitcliffe Common Reserve LWS	0.004	0.1
E14	Meadows below Caynham Camp LWS	0.001	0.0

5.5.15 As shown in Table 71, PCs were below 100% of the EQS at all local designations and below 10% of the EQS at the SAC and SSSI receptors. As such, predicted effects on daily mean HF concentrations are considered to be not significant, in accordance with the EA criteria.

Sulphur dioxide

5.5.16 Predicted annual mean SO_2 PECs at the sensitive receptors, inclusive of background levels, are summarised in Table 72.

Table 72 Predicted Annual Mean SO_2 Concentrations

Receptor		Predicted Annual Mean SO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
E1	River Teme SSSI	1.30	1.32	1.31	1.32	1.32
E2	River Teme SSSI	1.17	1.19	1.19	1.19	1.19
E3	River Teme SSSI	0.77	0.78	0.77	0.77	0.78
E4	Downton Gorge SAC	0.63	0.63	0.63	0.63	0.63

Receptor		Predicted Annual Mean SO_2 PEC (µg/m³)				
		2017	2018	2019	2020	2021
E5	Downton Gorge SAC	0.63	0.63	0.63	0.63	0.63
E6	Ploughnhill Wood AW	0.74	0.74	0.74	0.74	0.74
E7	Ploughnhill Wood AW	0.74	0.73	0.73	0.73	0.74
E8	Tinkershill Wood AW	0.70	0.70	0.70	0.70	0.70
E9	Tinkershill Wood AW	0.70	0.70	0.70	0.70	0.70
E10	Ledwyche Brook LWS	0.87	0.85	0.86	0.86	0.85
E11	Ledwyche Brook LWS	0.83	0.82	0.83	0.83	0.82
E12	Ledwyche Brook LWS	0.91	0.88	0.89	0.88	0.89
E13	Whitcliffe Common Reserve LWS	1.16	1.17	1.17	1.16	1.17
E14	Meadows below Caynham Camp LWS	0.73	0.73	0.73	0.73	0.73

5.5.17 As indicated in Table 72, annual mean SO_2 PECs were below the EQS of 10µg/m³ at all sensitive receptor locations.

5.5.18 Maximum predicted annual mean SO_2 concentrations at the sensitive receptor locations are summarised in Table 73.

Table 73 Maximum Predicted Annual Mean SO_2 Concentrations

Receptor		Maximum Predicted Annual Mean SO_2 Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	River Teme SSSI	0.03	1.32	0.3	13.2
E2	River Teme SSSI	0.04	1.19	0.4	11.9
E3	River Teme SSSI	0.02	0.78	0.2	7.8
E4	Downton Gorge SAC	0.00	0.63	0.0	6.3
E5	Downton Gorge SAC	0.00	0.63	0.0	6.3
E6	Ploughnhill Wood AW	0.01	0.74	0.1	7.4

Receptor		Maximum Predicted Annual Mean SO_2 Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E7	Ploughnhill Wood AW	0.01	0.74	0.1	7.4
E8	Tinkershill Wood AW	0.00	0.70	0.0	7.0
E9	Tinkershill Wood AW	0.00	0.70	0.0	7.0
E10	Ledwyche Brook LWS	0.05	0.87	0.5	8.7
E11	Ledwyche Brook LWS	0.03	0.83	0.3	8.3
E12	Ledwyche Brook LWS	0.09	0.91	0.9	9.1
E13	Whitcliffe Common Reserve LWS	0.02	1.17	0.2	11.7
E14	Meadows below Caynham Camp LWS	0.01	0.73	0.1	7.3

5.5.19 As shown in Table 73, PCs were below 100% of the EQS at all local designations. PCs were also below 1% of the EQS at the SAC and SSSI receptors. As such, predicted effects on annual mean SO_2 concentrations are considered to be not significant, in accordance with the EA criteria.

Nitrogen Deposition

5.5.20 Predicted annual nitrogen PC deposition rates at the sensitive receptors are summarised in Table 74.

Table 74 Predicted Annual Nitrogen Deposition Rates

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
		2017	2018	2019	2020	2021
E1	River Teme SSSI	0.012	0.026	0.014	0.023	0.028
E2	River Teme SSSI	0.020	0.033	0.030	0.029	0.035
E3	River Teme SSSI	0.005	0.013	0.008	0.010	0.013
E4	Downton Gorge SAC	0.001	0.001	0.001	0.001	0.001
E5	Downton Gorge SAC	0.001	0.001	0.001	0.001	0.001

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
		2017	2018	2019	2020	2021
E6	Ploughnhill Wood AW	0.008	0.007	0.007	0.007	0.008
E7	Ploughnhill Wood AW	0.004	0.003	0.004	0.004	0.005
E8	Tinkershill Wood AW	0.003	0.002	0.003	0.002	0.003
E9	Tinkershill Wood AW	0.002	0.002	0.002	0.002	0.003
E10	Ledwyche Brook LWS	0.038	0.028	0.032	0.031	0.028
E11	Ledwyche Brook LWS	0.024	0.020	0.021	0.024	0.020
E12	Ledwyche Brook LWS	0.073	0.047	0.059	0.049	0.055
E13	Whitcliffe Common Reserve LWS	0.008	0.013	0.013	0.012	0.014
E14	Meadows below Caynham Camp LWS	0.005	0.003	0.004	0.003	0.004

5.5.21 Maximum predicted annual nitrogen deposition rates at the sensitive receptor locations are summarised in Table 75.

Table 75 Maximum Predicted Annual Nitrogen Deposition Rates

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)	PC Proportion of EQS (%)	
			Low EQS	High EQS
E1	River Teme SSSI	0.028	-	-
E2	River Teme SSSI	0.035	-	-
E3	River Teme SSSI	0.013	-	-
E4	Downton Gorge SAC	0.001	0.01	0.00
E5	Downton Gorge SAC	0.001	0.01	0.00
E6	Ploughnhill Wood AW	0.008	0.08	0.06
E7	Ploughnhill Wood AW	0.005	0.05	0.03
E8	Tinkershill Wood AW	0.003	0.03	0.02
E9	Tinkershill Wood AW	0.003	0.03	0.02
E10	Ledwyche Brook LWS	0.038	0.38	0.25

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)	PC Proportion of EQS (%)	
			Low EQS	High EQS
E11	Ledwyche Brook LWS	0.024	0.24	0.16
E12	Ledwyche Brook LWS	0.073	0.73	0.49
E13	Whitcliffe Common Reserve LWS	0.014	0.14	0.09
E14	Meadows below Caynham Camp LWS	0.005	0.10	0.05

5.5.22 As shown in Table 75, PCs were below 100% of the EQS at all local designations and below 1% of the EQS at Downton Gorge SAC. As such, predicted effects on annual nitrogen deposition are considered to be not significant, in accordance with the EA criteria.

Acid Deposition

5.5.23 Predicted annual acid PC deposition rates at the sensitive receptors are summarised in Table 76.

Table 76 Predicted Annual PC Acid Deposition Rates

Receptor		Predicted Annual PC Acid Deposition Rate (keq/ha/yr)				
		2017	2018	2019	2020	2021
E1	River Teme SSSI	0.0044	0.0098	0.0052	0.0086	0.0102
E2	River Teme SSSI	0.0143	0.0242	0.0222	0.0215	0.0253
E3	River Teme SSSI	0.0037	0.0095	0.0058	0.0073	0.0092
E4	Downton Gorge SAC	0.0005	0.0005	0.0006	0.0004	0.0006
E5	Downton Gorge SAC	0.0004	0.0005	0.0006	0.0004	0.0006
E6	Ploughnhill Wood AW	0.0062	0.0050	0.0053	0.0048	0.0058
E7	Ploughnhill Wood AW	0.0032	0.0024	0.0026	0.0027	0.0034
E8	Tinkershill Wood AW	0.0019	0.0017	0.0020	0.0015	0.0022
E9	Tinkershill Wood AW	0.0011	0.0017	0.0016	0.0013	0.0019
E10	Ledwyche Brook LWS	0.0141	0.0104	0.0117	0.0113	0.0102

Receptor		Predicted Annual PC Acid Deposition Rate (keq/ha/yr)				
		2017	2018	2019	2020	2021
E11	Ledwyche Brook LWS	0.0091	0.0073	0.0079	0.0090	0.0073
E12	Ledwyche Brook LWS	0.0271	0.0174	0.0218	0.0181	0.0204
E13	Whitcliffe Common Reserve LWS	0.0061	0.0098	0.0095	0.0087	0.0102
E14	Meadows below Caynham Camp LWS	0.0032	0.0020	0.0026	0.0018	0.0026

5.5.24 Maximum predicted annual acid deposition rates at the sensitive receptor locations are summarised in Table 77.

Table 77 Predicted Annual Acid Deposition Rates

Receptor		Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)	PC Proportion of EQS (%)
E1	River Teme SSSI	0.010	-
E2	River Teme SSSI	0.025	-
E3	River Teme SSSI	0.010	-
E4	Downton Gorge SAC	0.001	0.04
E5	Downton Gorge SAC	0.001	0.04
E6	Ploughnhill Wood AW	0.006	0.38
E7	Ploughnhill Wood AW	0.003	0.20
E8	Tinkershill Wood AW	0.002	0.14
E9	Tinkershill Wood AW	0.002	0.12
E10	Ledwyche Brook LWS	0.014	0.86
E11	Ledwyche Brook LWS	0.009	0.54
E12	Ledwyche Brook LWS	0.027	1.65
E13	Whitcliffe Common Reserve LWS	0.010	0.62
E14	Meadows below Caynham Camp LWS	0.003	0.07

5.5.25 As shown in Table 77, PCs were below 100% of the EQS at all local designations and below 1% of the EQS at Downton Gorge SAC. As such, predicted effects on annual acid deposition are considered to be not significant, in accordance with the EA criteria.

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Shropshire Council to undertake an Air Quality Assessment in support of a proposed pyrolysis plant off Coder Lane, Ludlow.

6.1.2 Atmsopheric emissions from the proposed plant have the potential to cause air quality impacts during normal operation. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and consider potential effects.

6.1.3 Dispersion modelling was undertaken 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.

6.1.4 The results indicated that impacts on pollutant concentrations were not predicted to be significant at any human or ecological receptor location in the vicinity of the site.

6.1.5 It should be noted that the assessment utilises maximum permissible emission limits for incineration plants. Pyrolysis plants thermally treat fuels, gasifying material and subsequently combusting the evolved gas. Pyrolysis plants do not combust waste, other than the emitted gases. As such, PM and metal emission predictions are likely to have been overestimated.

7.0 ABBREVIATIONS

APIS	Air Pollution Information System
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
As	Arsenic
AW	Ancient Woodland
CERC	Cambridge Environmental Research Consultants
Cd	Cadmium
CO	Carbon Monoxide
Cr	Chromium
Cu	Copper
C_6H_6	Benzene
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EQS	Environmental Quality Standard
EPAQS	Expert Panel on Air Quality Standards
HC	Herefordshire Council
HCl	Hydrogen chloride
HF	Hydrogen fluoride
Hg	Mercury
LAQM	Local Air Quality Management
LWS	Local Wildlife Site
MAGIC	Multi-Agency Geographic Information for the Countryside
Mn	Manganese
NGR	National Grid Reference
Ni	Nickel
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
Pb	Lead
PC	Process Contribution
PCCD	Polychlorinated dibenzodioxin
PCCF	Polychlorinated dibenzofuran

PEC	Predicted Environmental Concentration
PM	Particulate matter
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 10µm
RDF	Refuse Derived Fuel
SAC	Special Area of Conservation
Sb	Antimony
SC	Shropshire Council
SPA	Special Protection Area
SO_2	Sulphur dioxide
SWIP	Small Waste Incineration Plant
SSSI	Sites of Special Scientific Interest
Tl	Thallium
UKEAP	UK Eutrophying and Acidifying Pollutants
V	Vanadium
VOC	Volatile Organic Compound
z_0	Roughness length
%ile	Percentile

Figures

Legend

Site Boundary

Title
Figure 1 - Site Location

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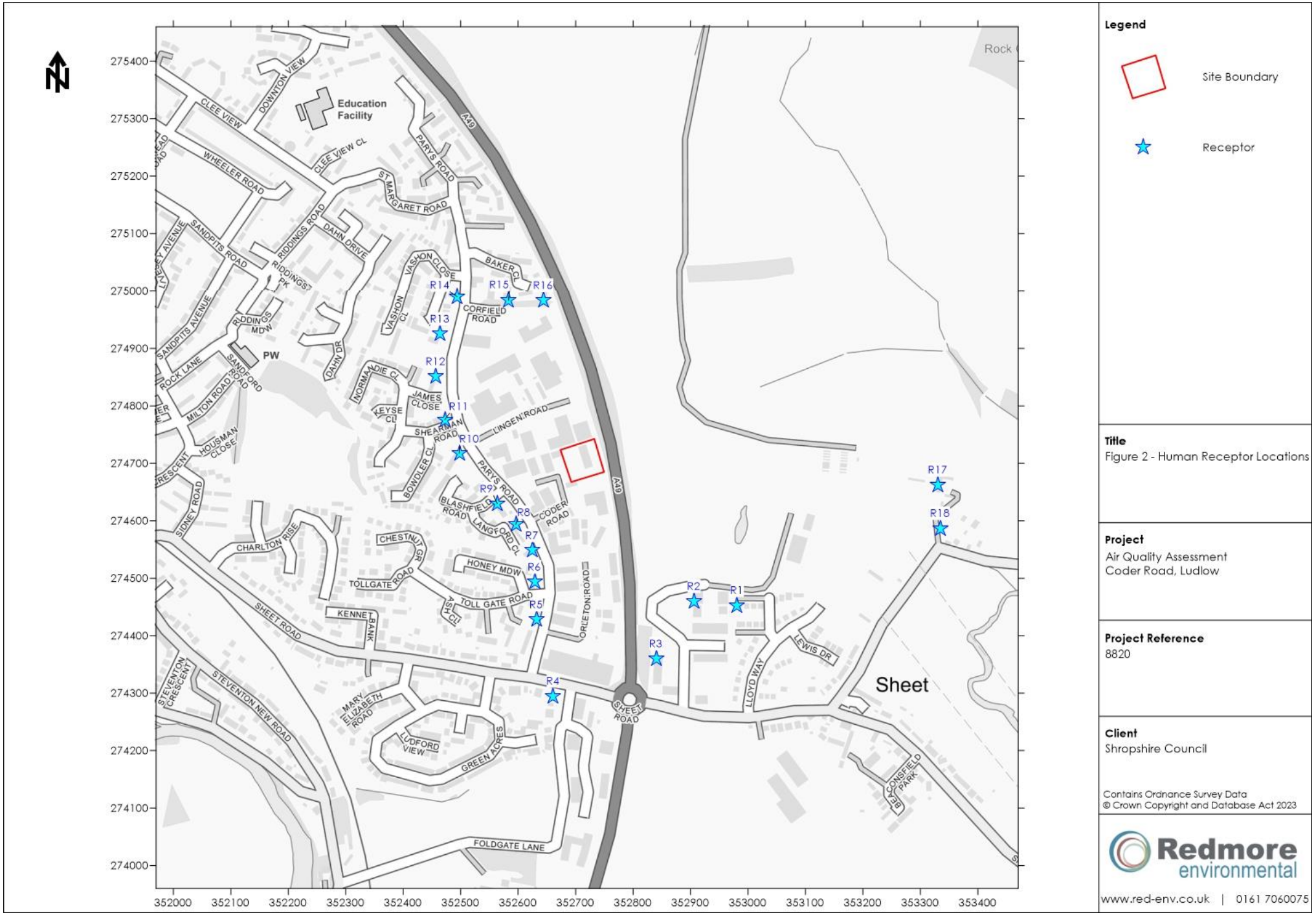

Legend

Site Boundary

Receptor

Title
Figure 2 - Human Receptor Locations

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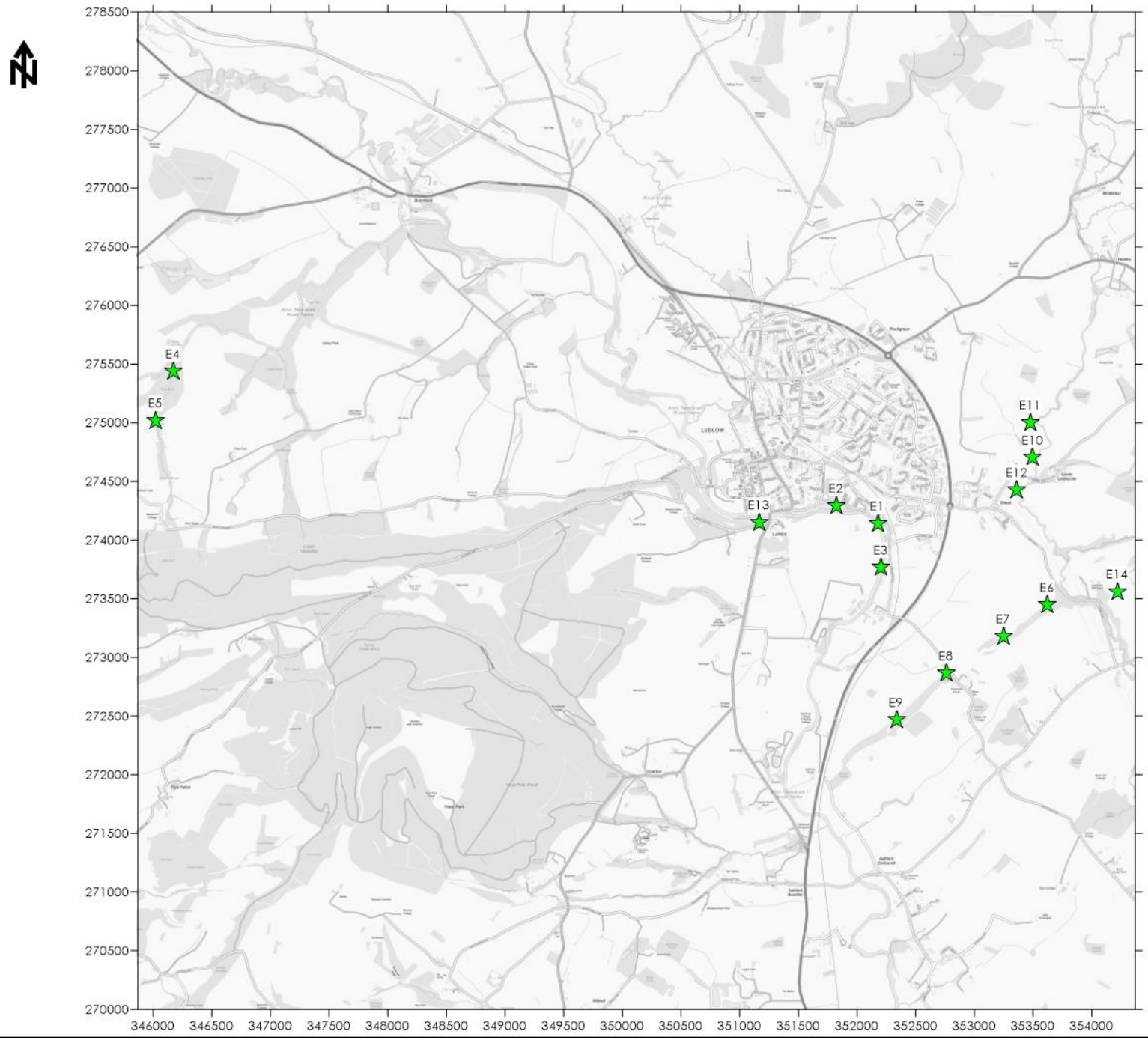

Legend

Site Boundary

Receptor

Title
Figure 3 - Ecological Receptor Locations

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Legend

- Site Boundary
- Stack
- Building
- Output Grid

Title
Figure 4 - ADMS-6 Inputs

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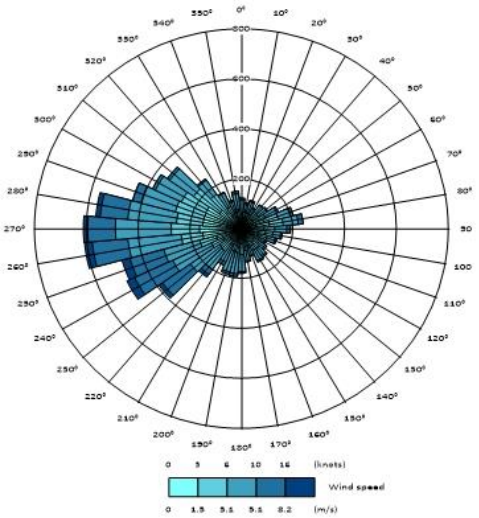
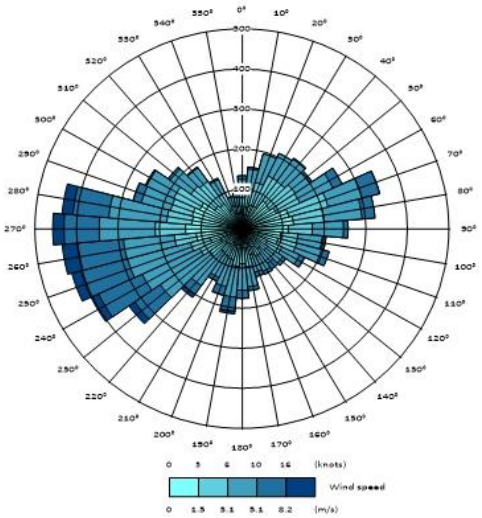
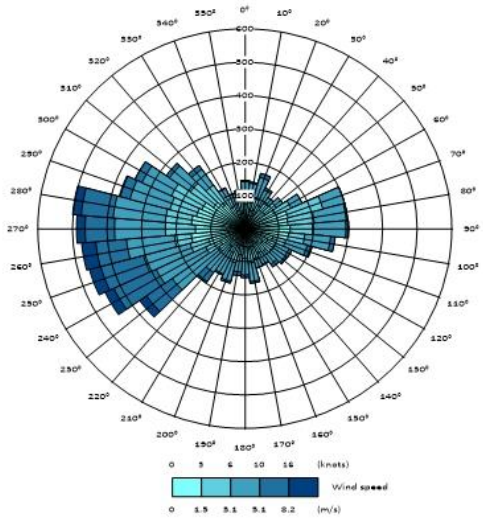


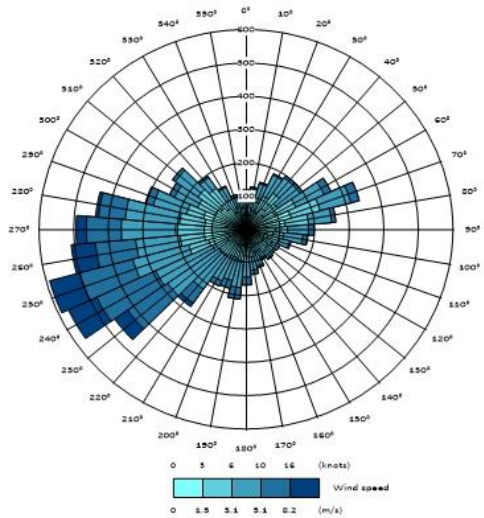
2017 Meteorological Data



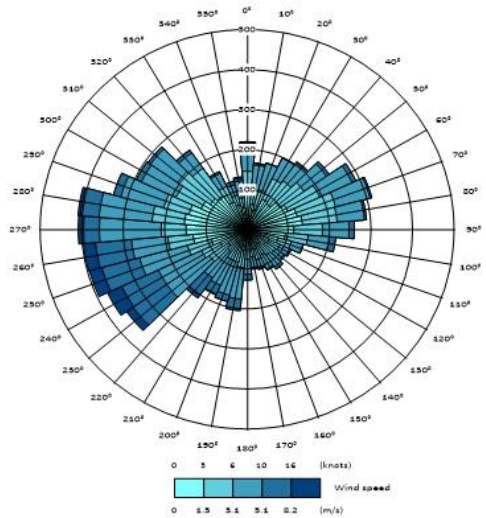
2018 Meteorological Data



2019 Meteorological Data



2020 Meteorological Data



2021 Meteorological Data

Legend

Title
Figure 5 - Wind Roses of 2017 to 2021 Shobdon Airfield Meteorological Station Data

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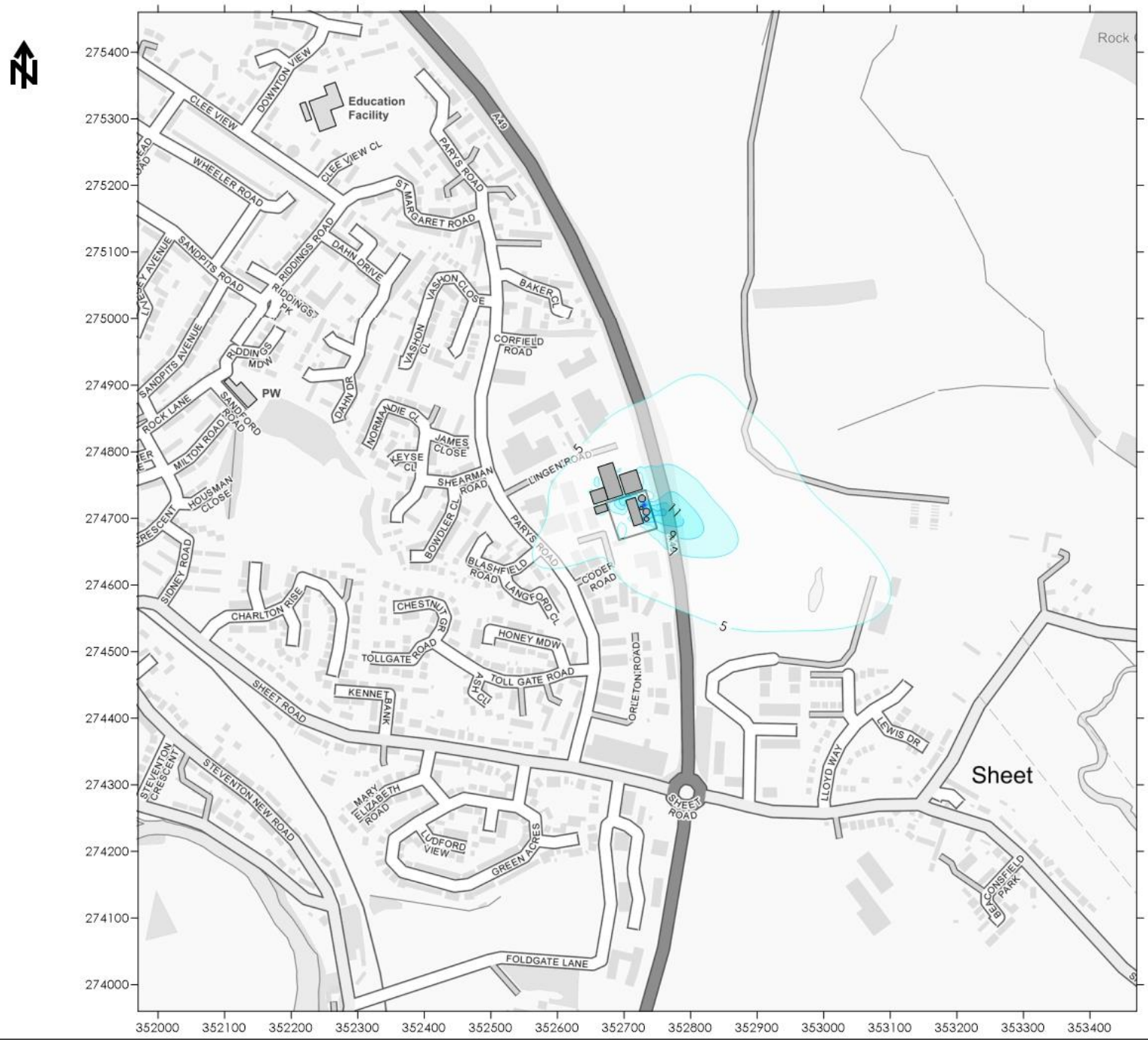

Legend

Site Boundary

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

21
19
17
15
13
11
9
7
5

EQS: 40µg/m³

Title

Figure 6 - Predicted Annual Mean NO_2 Concentrations ($\mu g/m^3$) 2017 Meteorological Data

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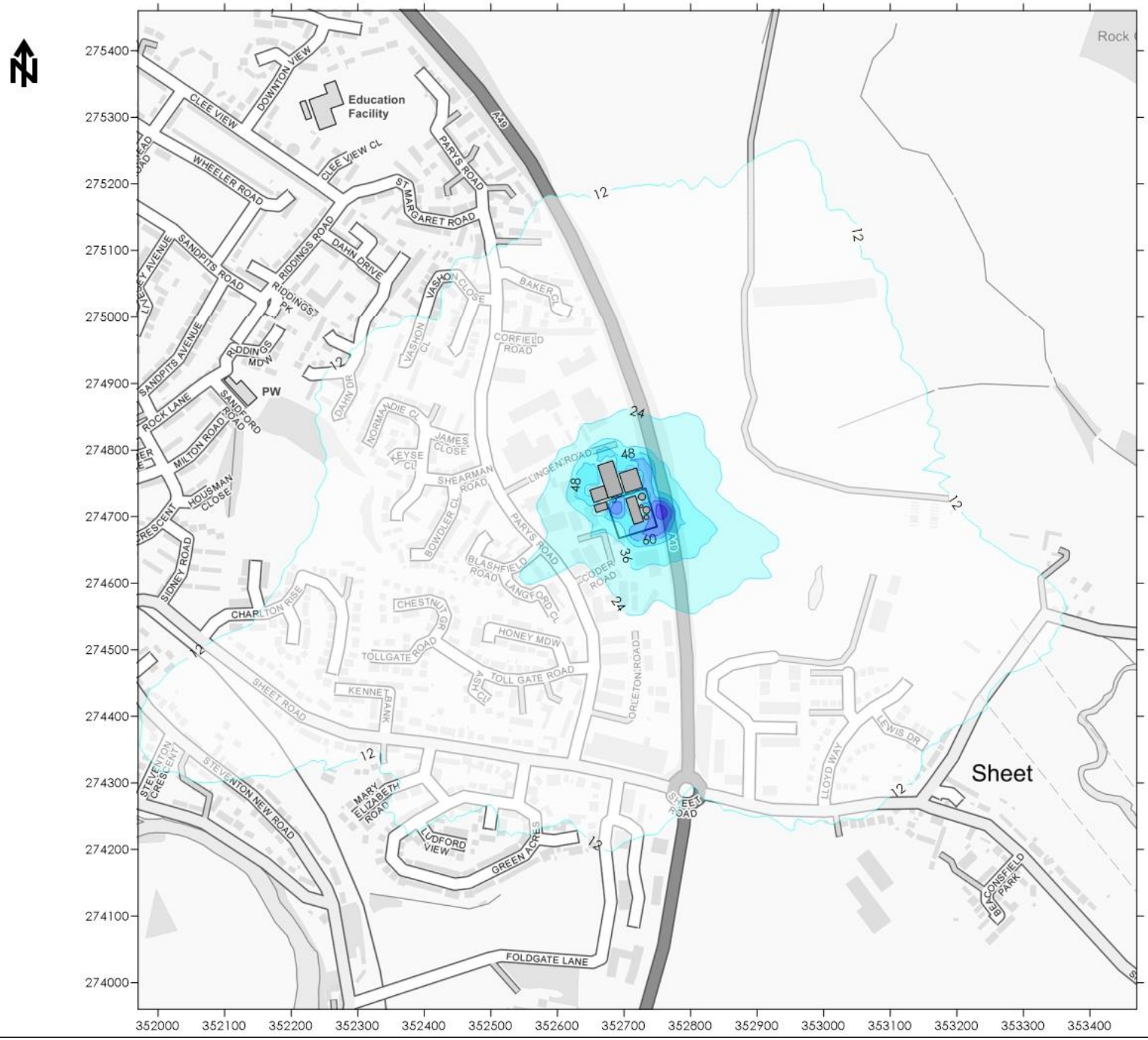

Legend

Site Boundary

99.8th %tile 1-hour Mean NO_2 Concentration ($\mu g/m^3$)

84
72
60
48
36
24
12

EQS: 200µg/m³

Title

Figure 7 - Predicted 99.8th %tile 1-hour Mean NO_2 Concentrations ($\mu g/m^3$)
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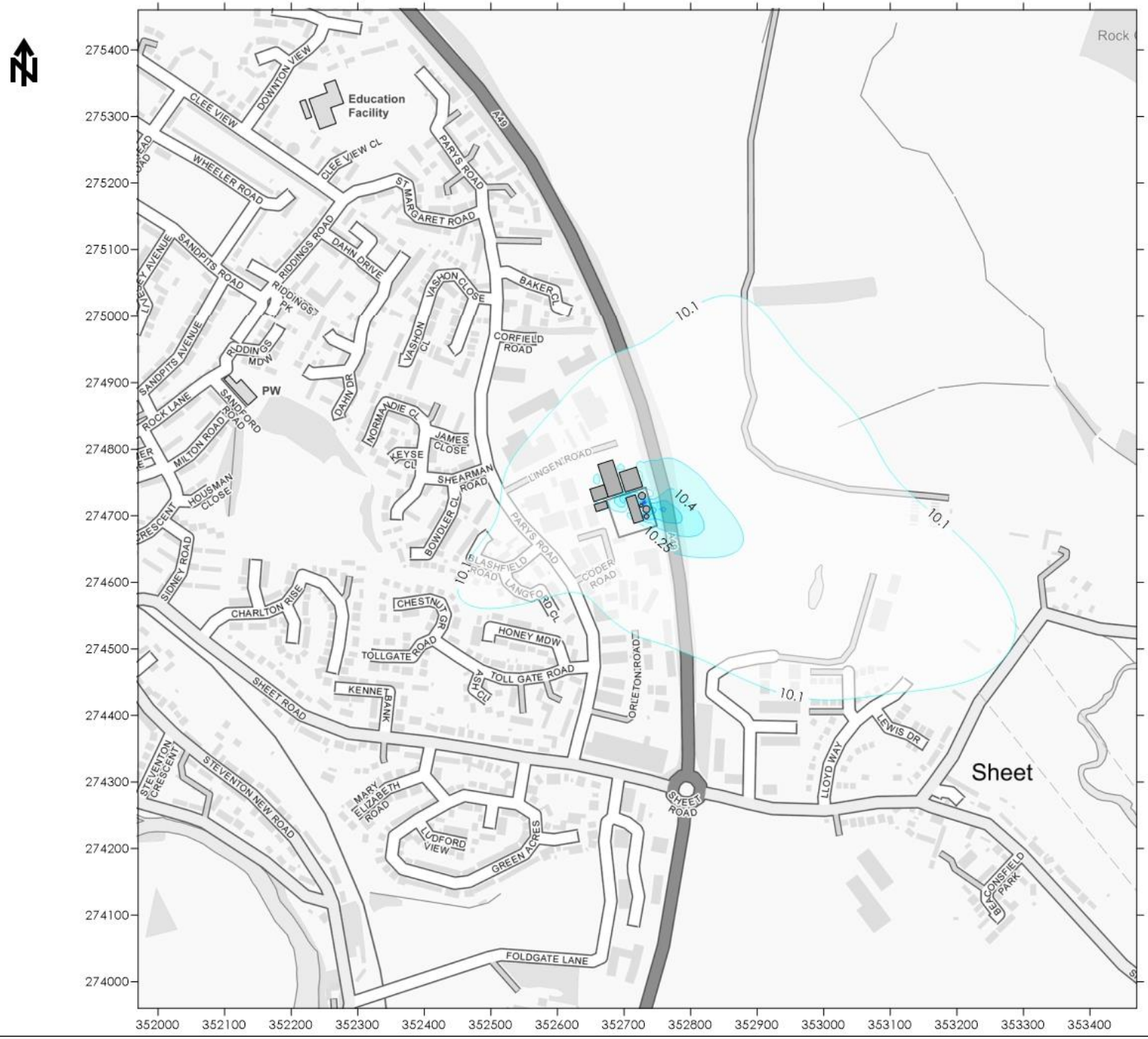

Legend

Site Boundary

Annual Mean PM_{10} Concentration ($\mu g/m^3$)

11.3
11.15
11
10.85
10.7
10.55
10.4
10.25
10.1

EQS: 40µg/m³

Title

Figure 8 - Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$) 2017 Meteorological Data

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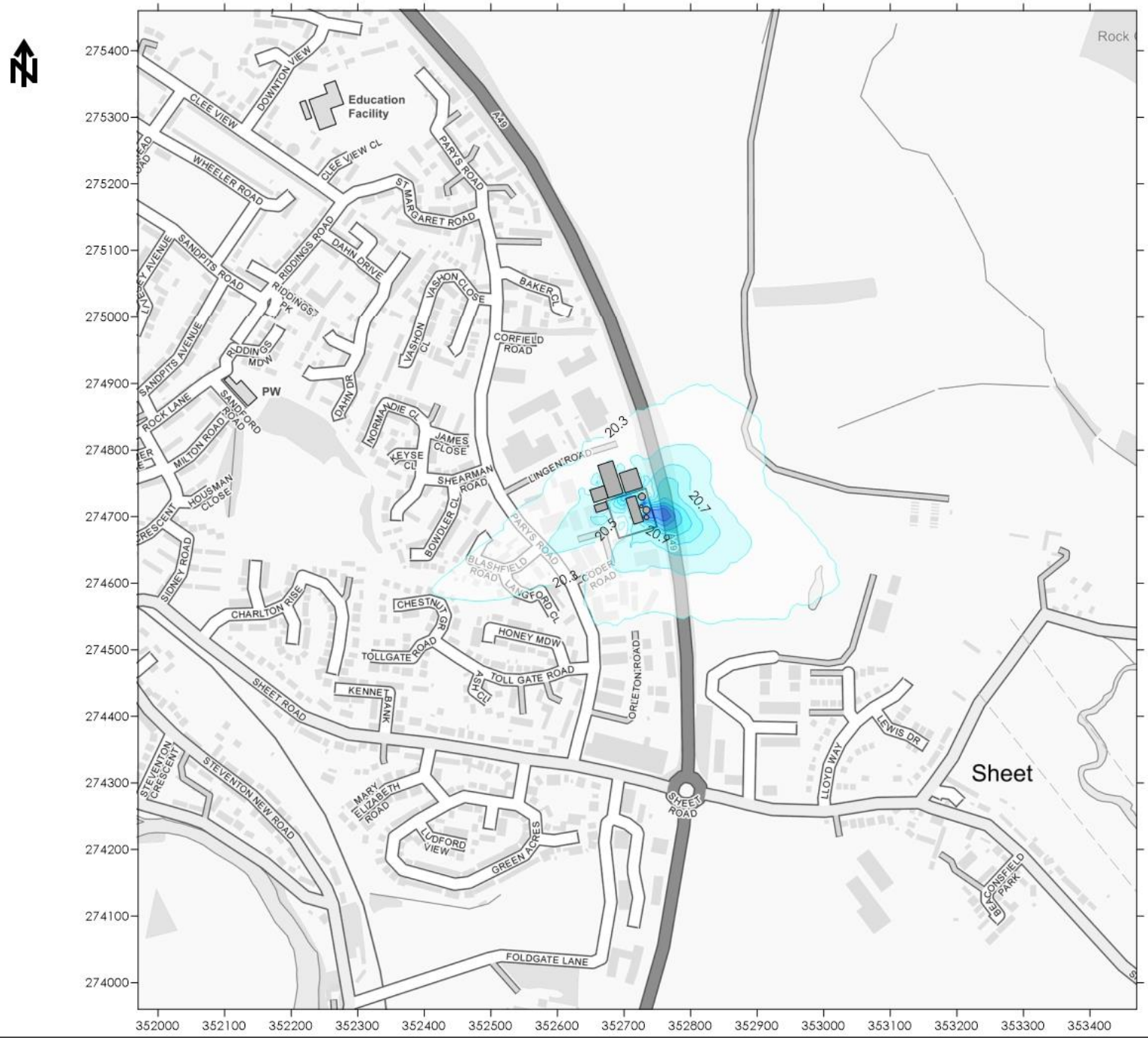

Legend

Site Boundary

22.1
21.9
21.7
21.5
21.3
21.1
20.9
20.7
20.5
20.3

90.4th %tile 24-hour Mean PM_{10} Concentration (µg/m³)

EQS: 50µg/m³

Title

Figure 9 - Predicted 90.4th %tile 24-hour Mean PM_{10} Concentrations (µg/m³)
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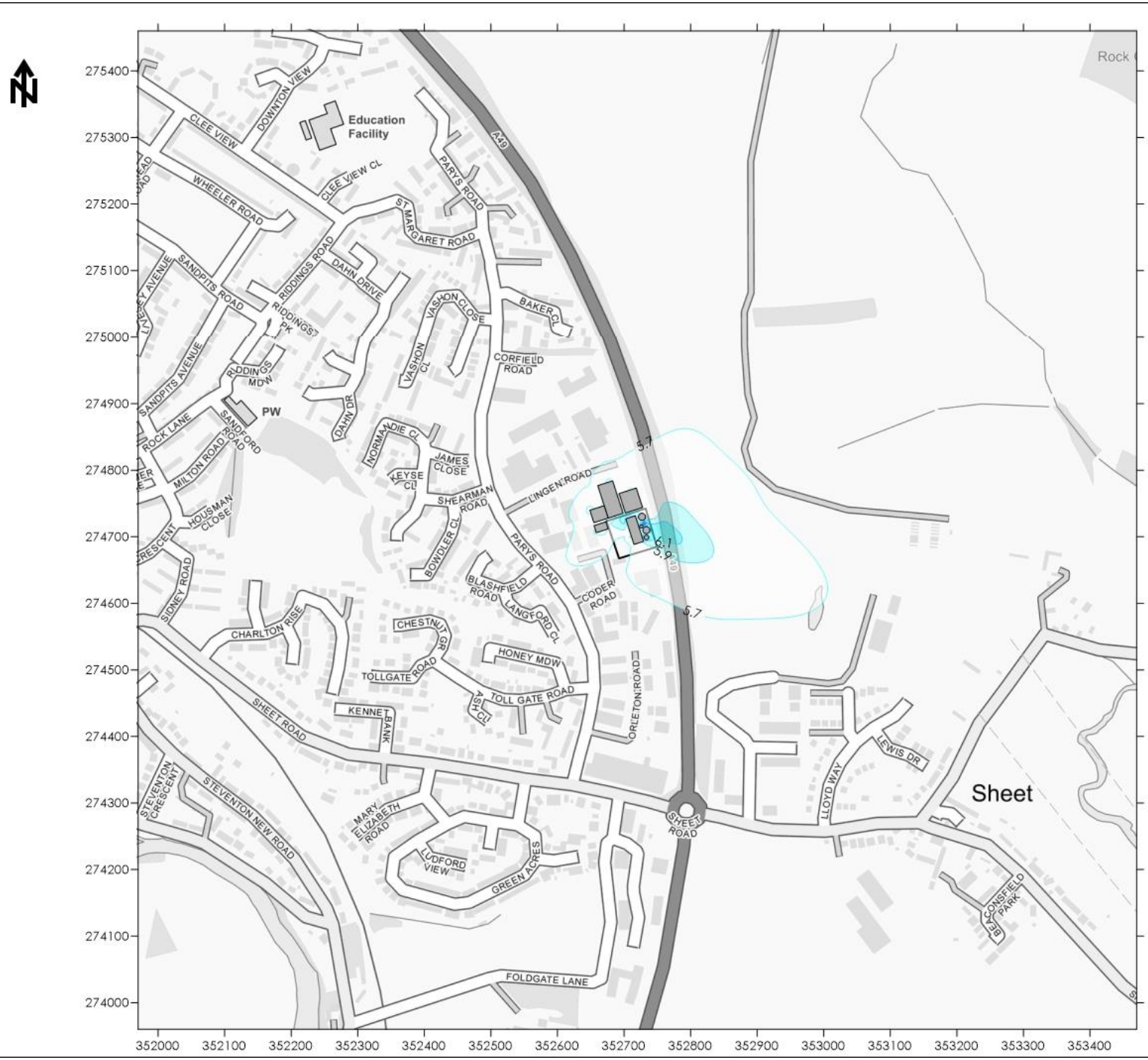

Legend

Site Boundary

Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)

6.9
6.7
6.5
6.3
6.1
5.9
5.7

EQS: 10$\mu g/m^3$

Title

Figure 10 - Predicted Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$) 2017 Meteorological Data

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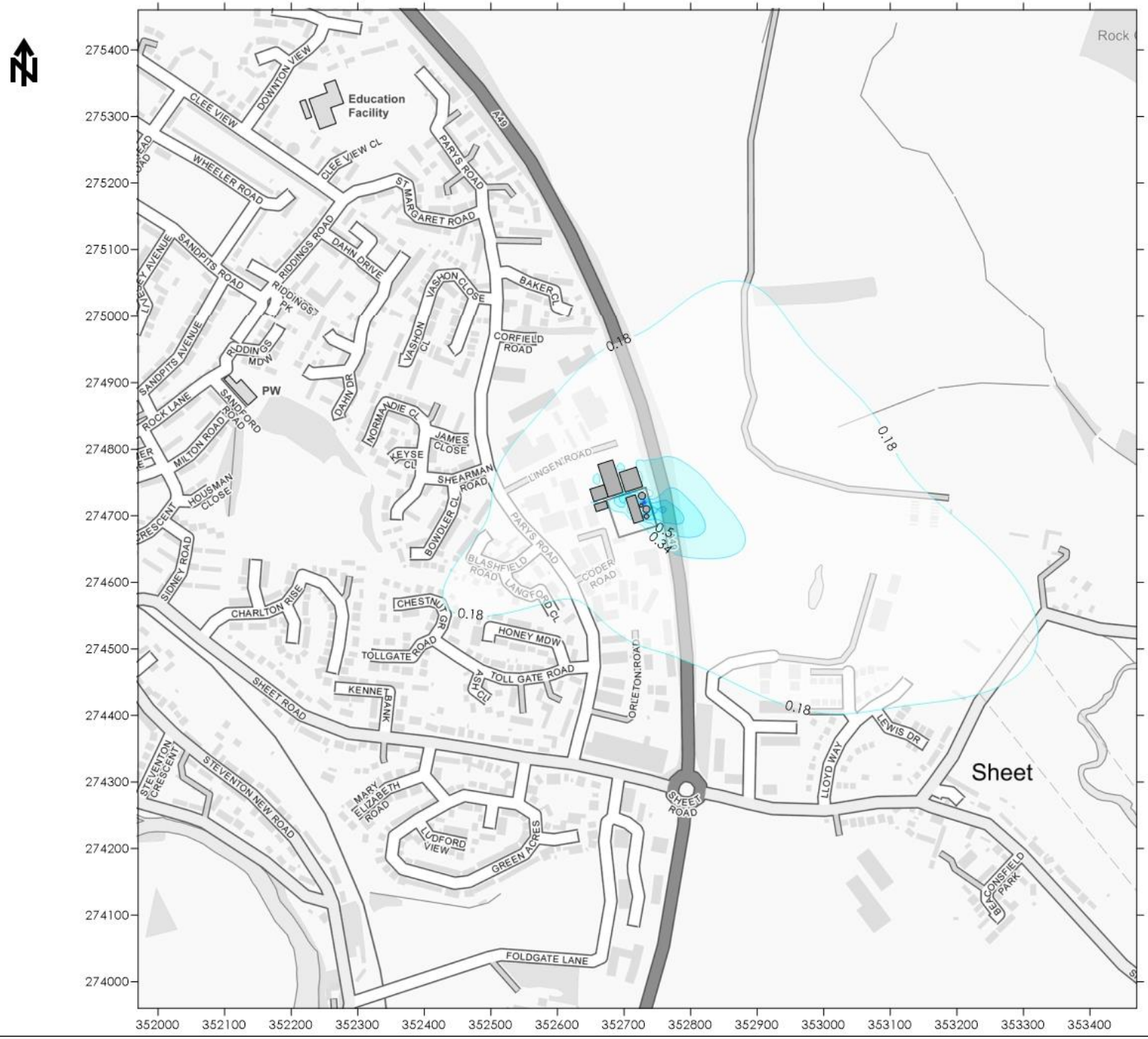

Legend

Site Boundary

Annual Mean C_6H_6 Concentration ($\mu g/m^3$)

1.46
1.3
1.14
0.98
0.82
0.66
0.5
0.34
0.18

EQS: 5$\mu g/m^3$

Title

Figure 11 - Predicted Annual Mean C_6H_6 Concentrations ($\mu g/m^3$) 2017 Meteorological Data

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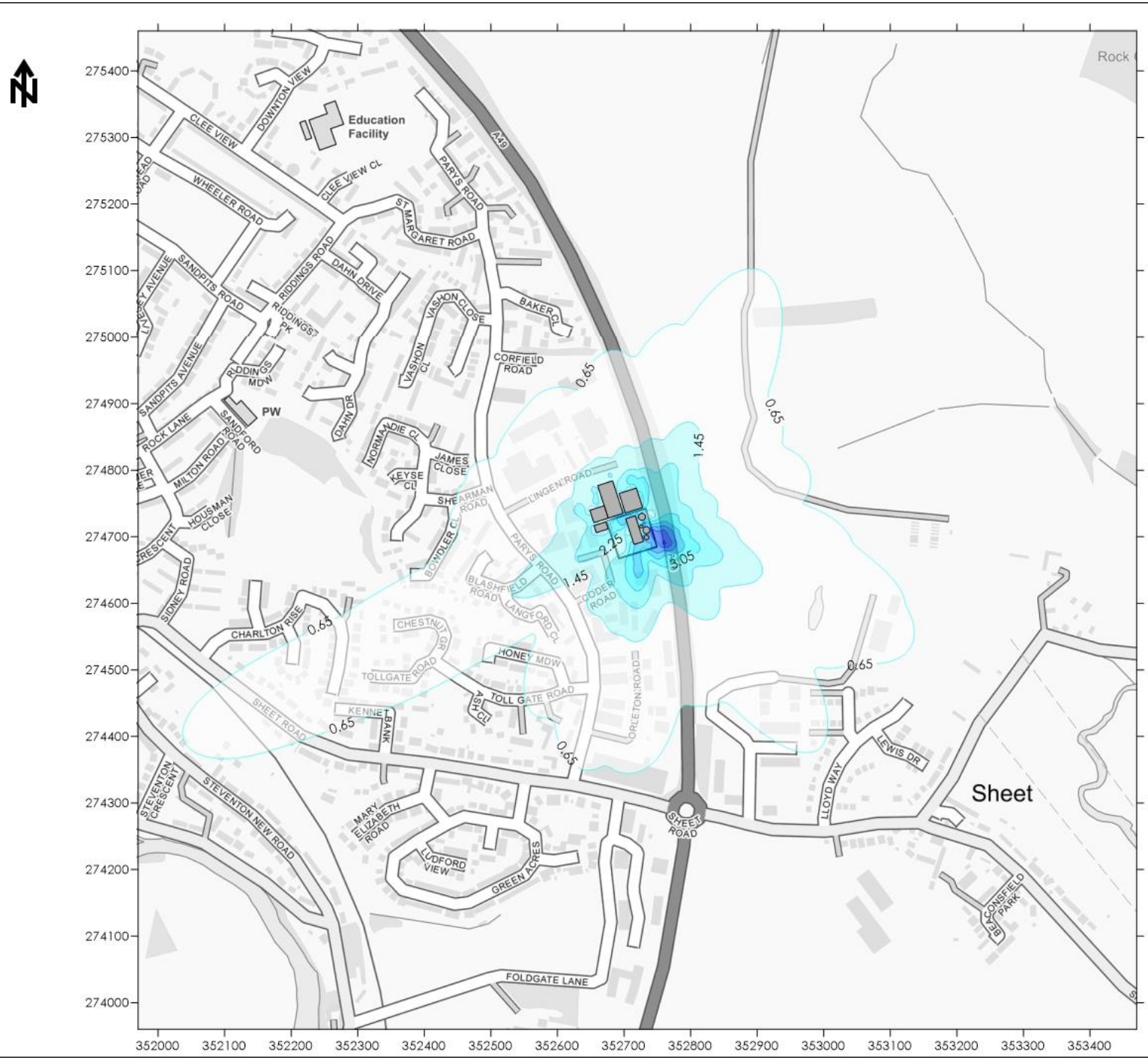

Legend

Site Boundary

6.25
5.45
4.65
3.85
3.05
2.25
1.45
0.65

100th %tile 24-hour Mean C_6H_6 Concentration ($\mu g/m^3$)

EQS: 30µg/m³

Title

Figure 12 - Predicted 100th %tile 24-hour Mean C_6H_6 Concentrations ($\mu g/m^3$)
2019 Meteorological Data

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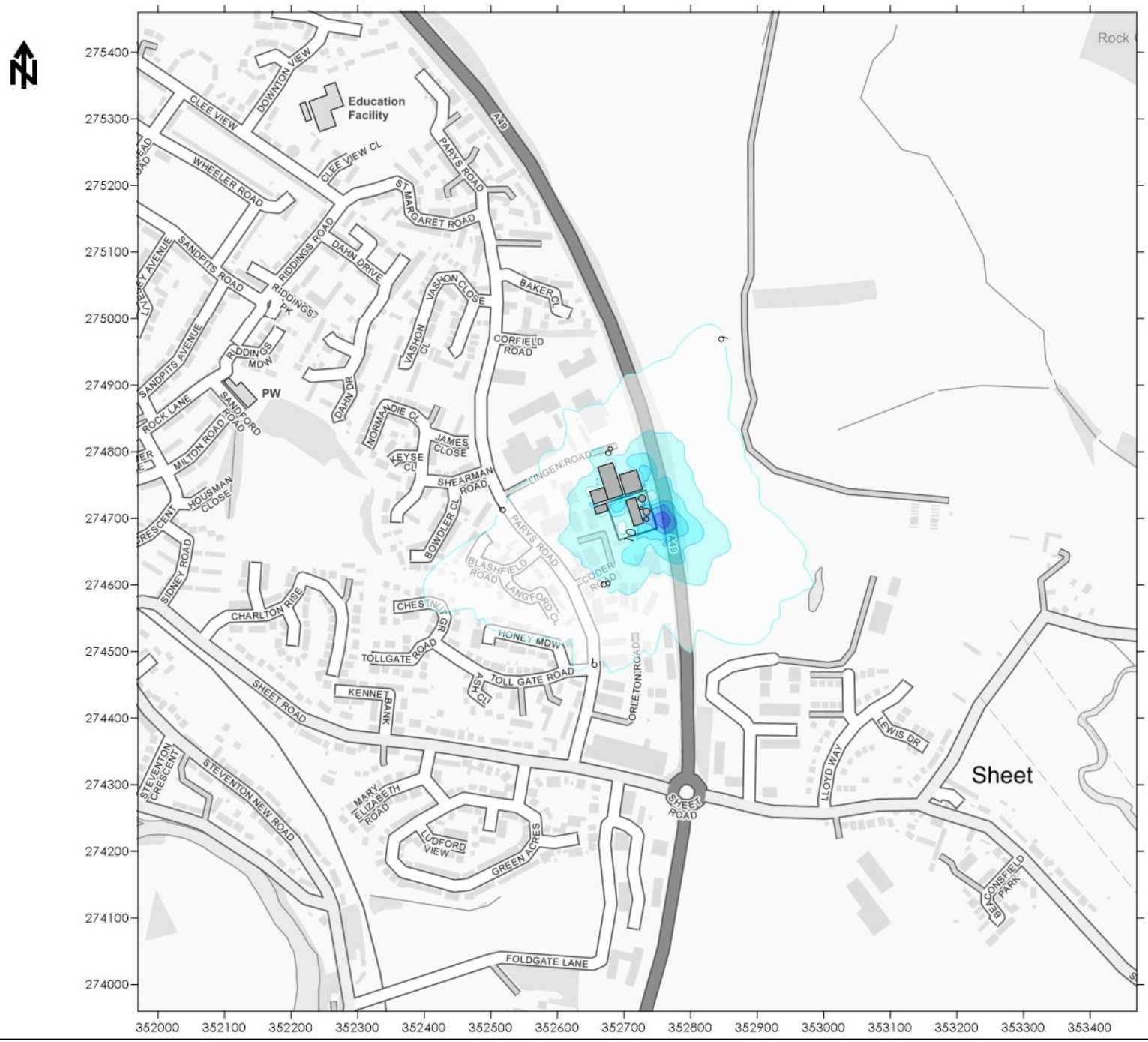

Legend

Site Boundary

18
16
14
12
10
8
6

99.2nd %tile 24-hour Mean SO_2 Concentration ($\mu g/m^3$)

EQS: 125µg/m³

Title

Figure 13 - Predicted 99.2nd %tile 24-hour Mean SO_2 Concentrations ($\mu g/m^3$)
2018 Meteorological Data

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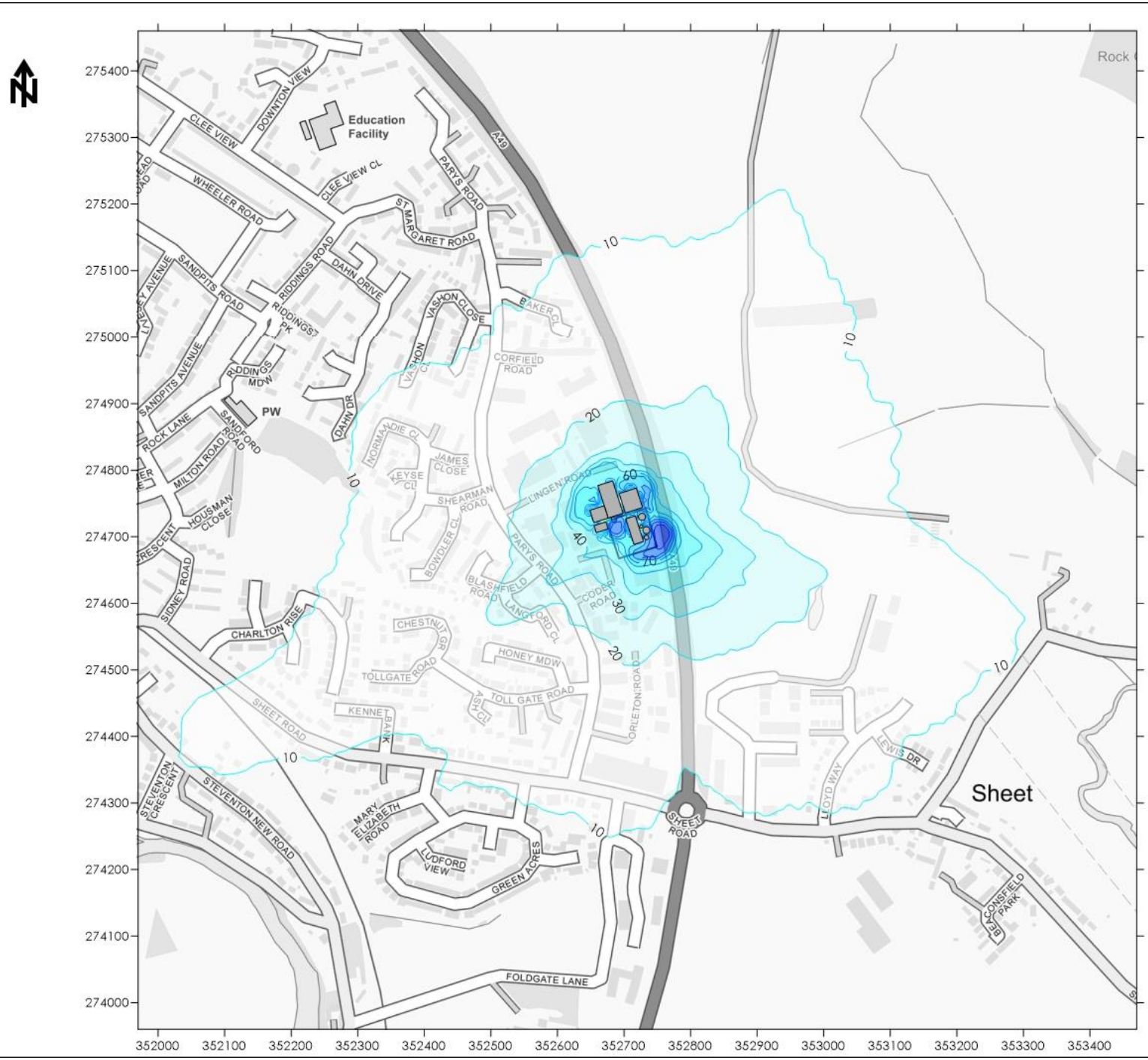

Legend

Site Boundary

110
100
90
80
70
60
50
40
30
20
10

99.7th %ile 1-Hour Mean SO_2 Concentration (µg/m³)

EQS: 350µg/m³

Title

Figure 14 - Predicted 99.7th %ile 1-Hour Mean SO_2 Concentrations (µg/m³)
2018 Meteorological Data

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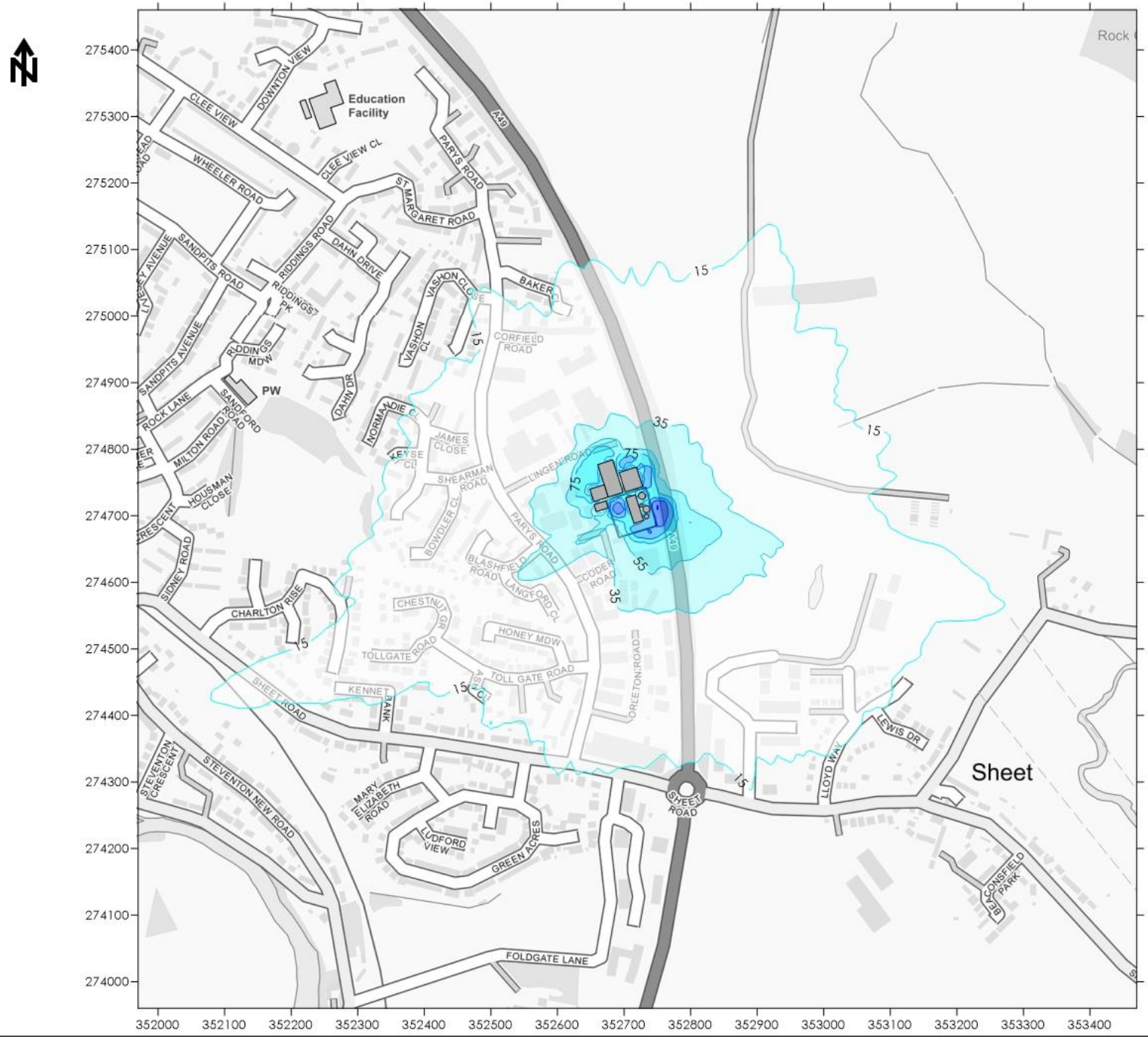

Legend

Site Boundary

99.9th %ile 15-Minute Mean SO_2 Concentration ($\mu g/m^3$)

135
115
95
75
55
35
15

EQS: 266$\mu g/m^3$

Title

Figure 15 - Predicted 99.9th %ile 15-Minute Mean SO_2 Concentrations ($\mu g/m^3$) 2021 Meteorological Data

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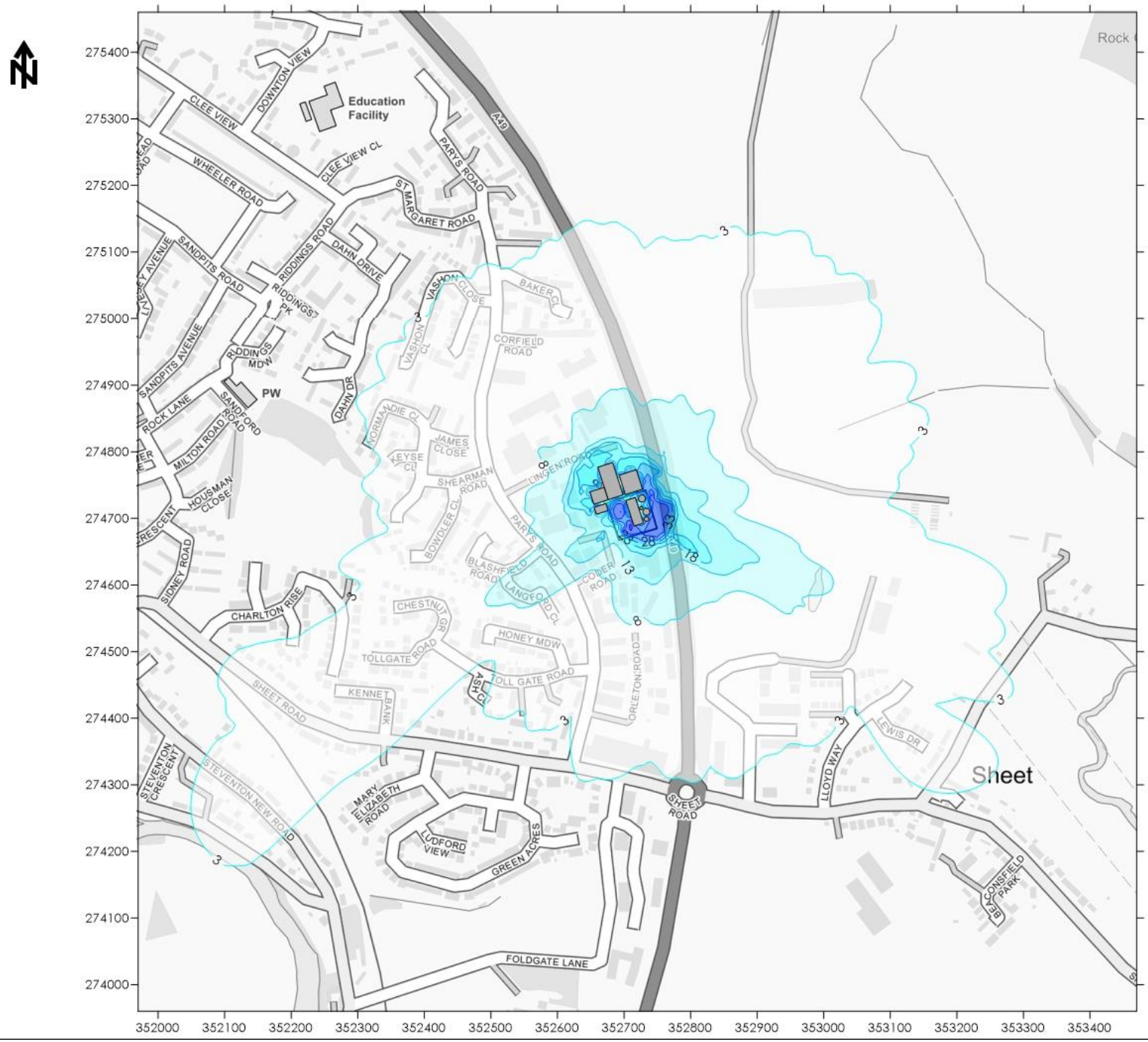

Legend

Site Boundary

100th %tile 1-Hour Mean HCl Concentration (µg/m³)

EQS: 750µg/m³

Title

Figure 16 - Predicted 100th %tile 1-Hour Mean HCl Concentrations (µg/m³)
2019 Meteorological Data

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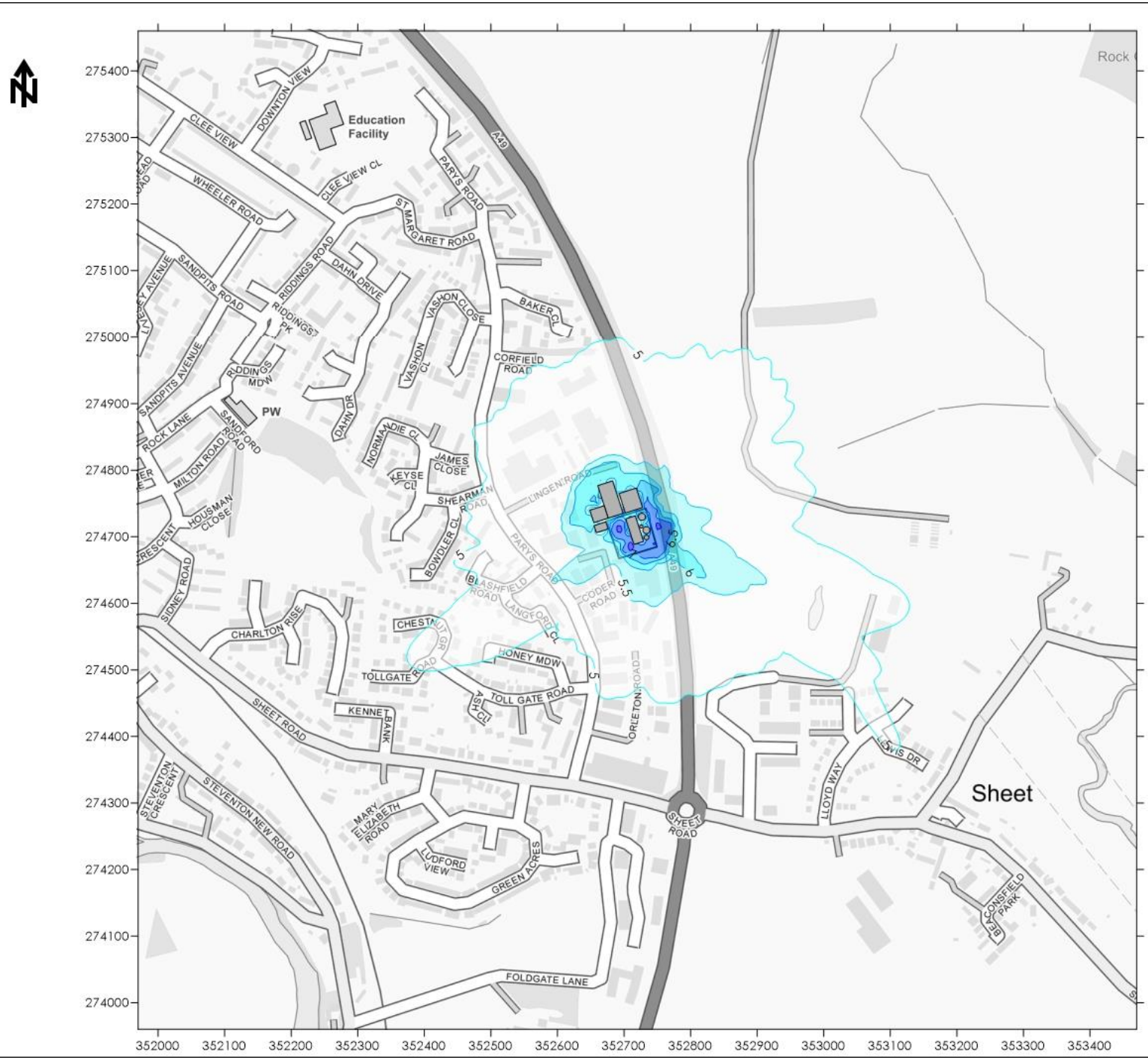

Legend

Site Boundary

100th %tile 1-Hour Mean HF Concentration (µg/m³)

7.5
7
6.5
6
5.5
5

EQS: 160µg/m³

Title

Figure 17 - Predicted 100th %tile 1-Hour Mean HF Concentrations (µg/m³)
2019 Meteorological Data

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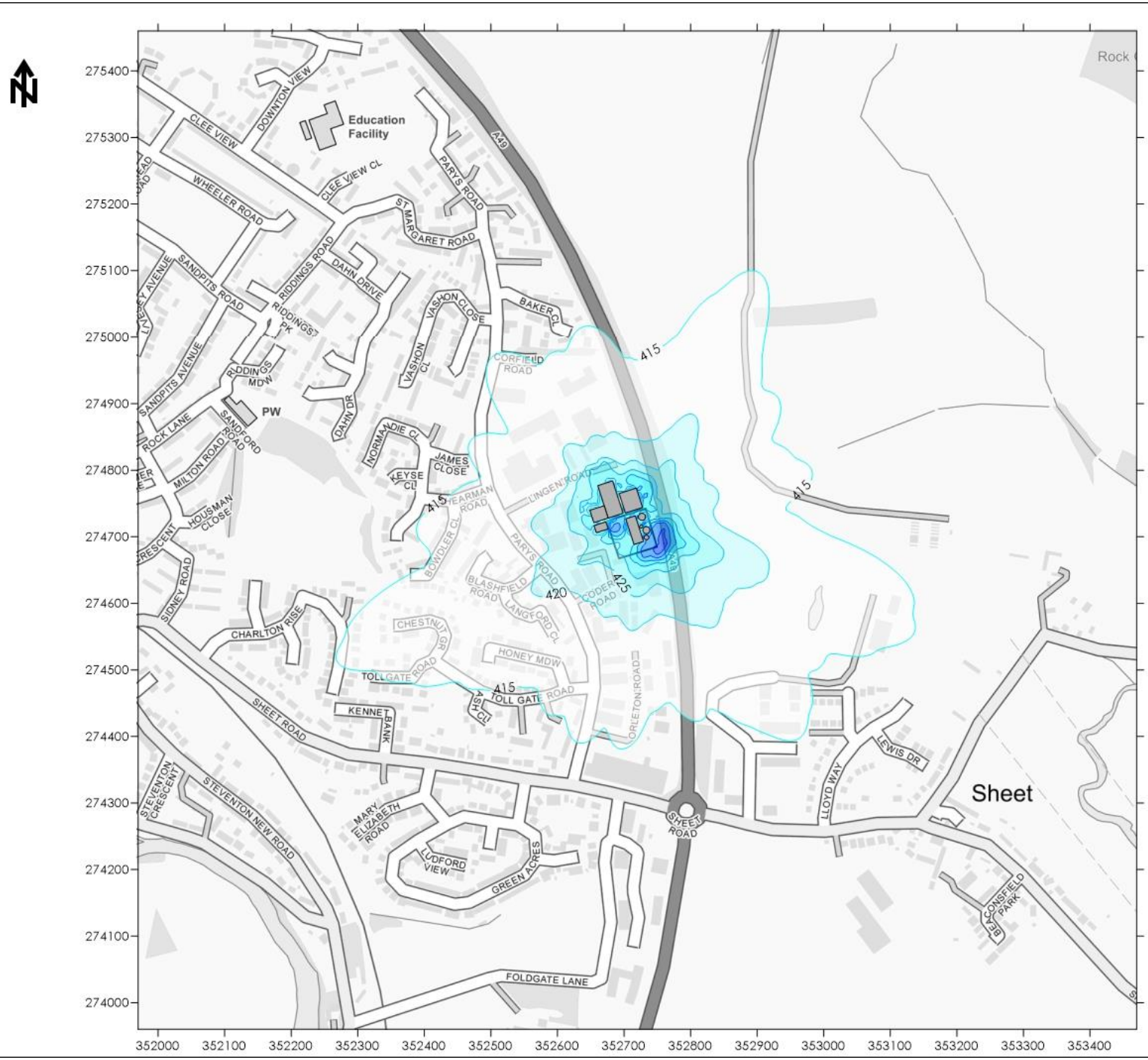

Legend

Site Boundary

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

455
450
445
440
435
430
425
420
415

EQS: 10,000µg/m³

Title

Figure 18 - Predicted 8-Hour Mean Rolling CO Concentrations (µg/m³) 2021 Meteorological Data

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Legend

Site Boundary

Annual Mean Cd Concentration (ng/m³)

3.5
3
2.5
2
1.5
1
0.5

EQS: 5ng/m³

Title

Figure 19 - Predicted Annual Mean Cd Concentrations (ng/m³) 2017 Meteorological Data

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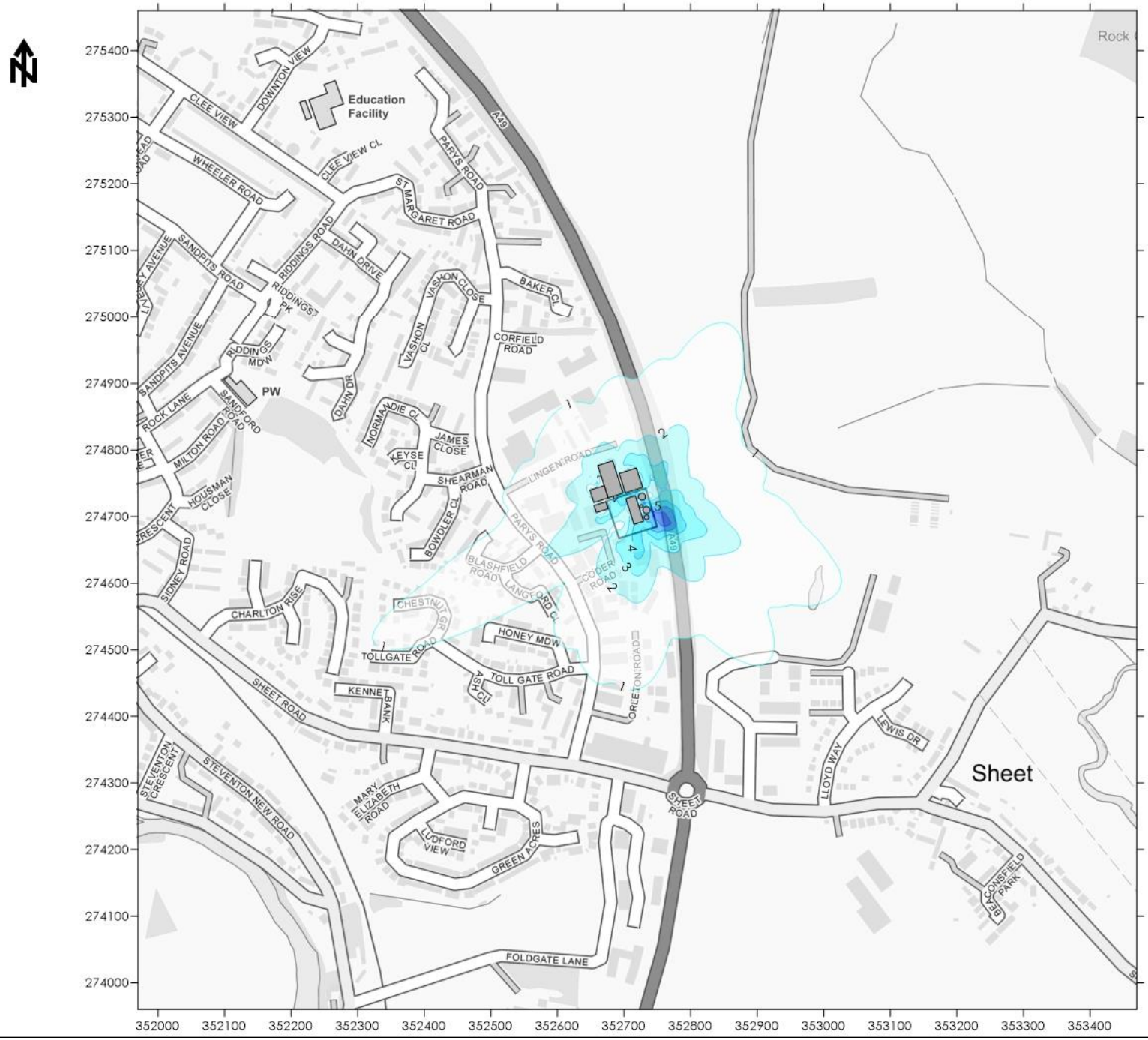

Legend

Site Boundary

100th %tile 24-hour Mean Cd Concentration (ng/m³)

7
6
5
4
3
2
1

EQS: 30ng/m³

Title

Figure 20 - Predicted 100th %tile 24-hour Mean Cd Concentrations (ng/m³)
2019 Meteorological Data

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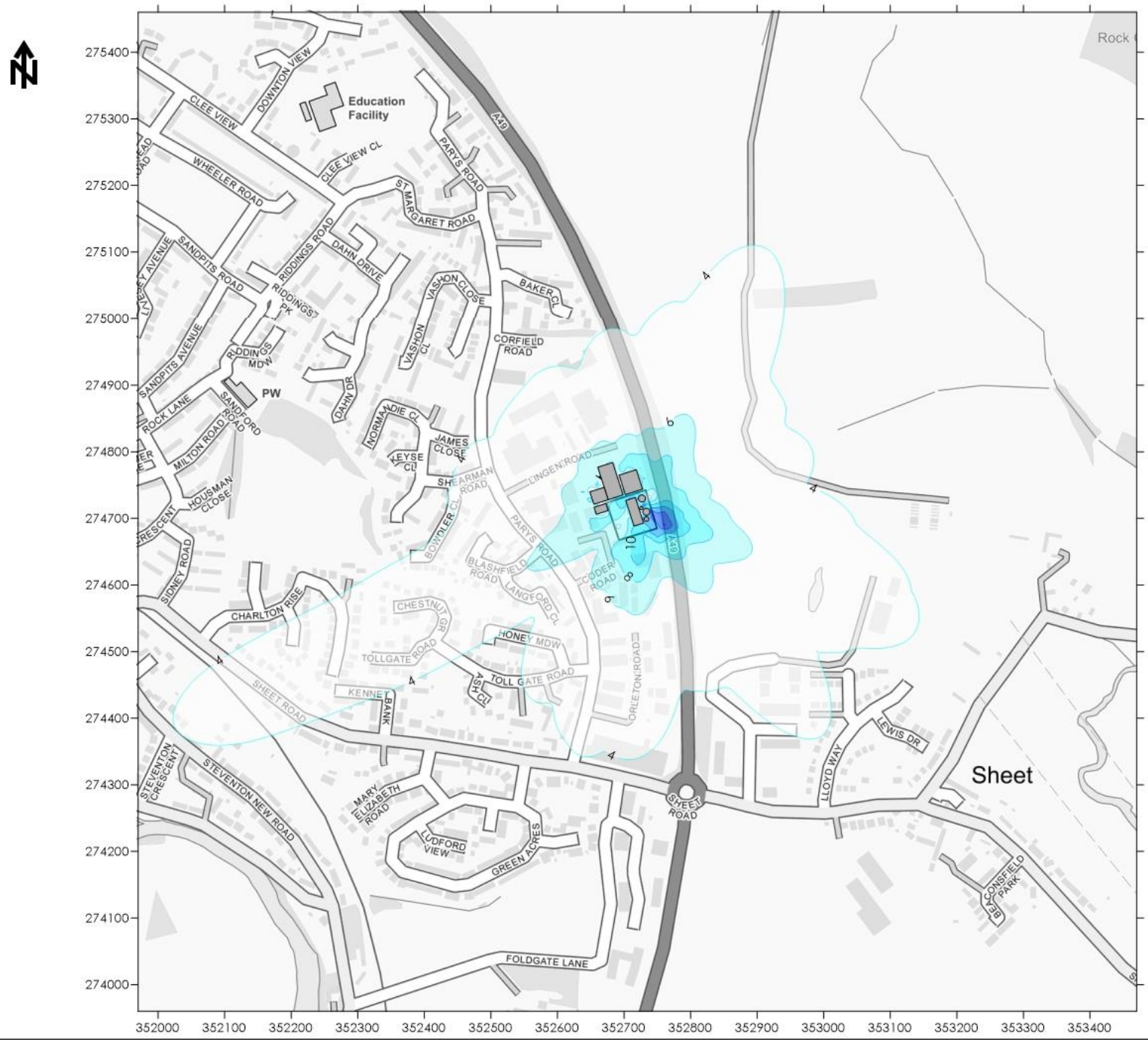

Legend

Site Boundary

16
14
12
10
8
6
4

100th %tile 24-hour Mean Hg Concentration (ng/m³)

EQS: 60ng/m³

Title

Figure 21 - Predicted 100th %tile 24-hour Mean Hg Concentrations (ng/m³)
2019 Meteorological Data

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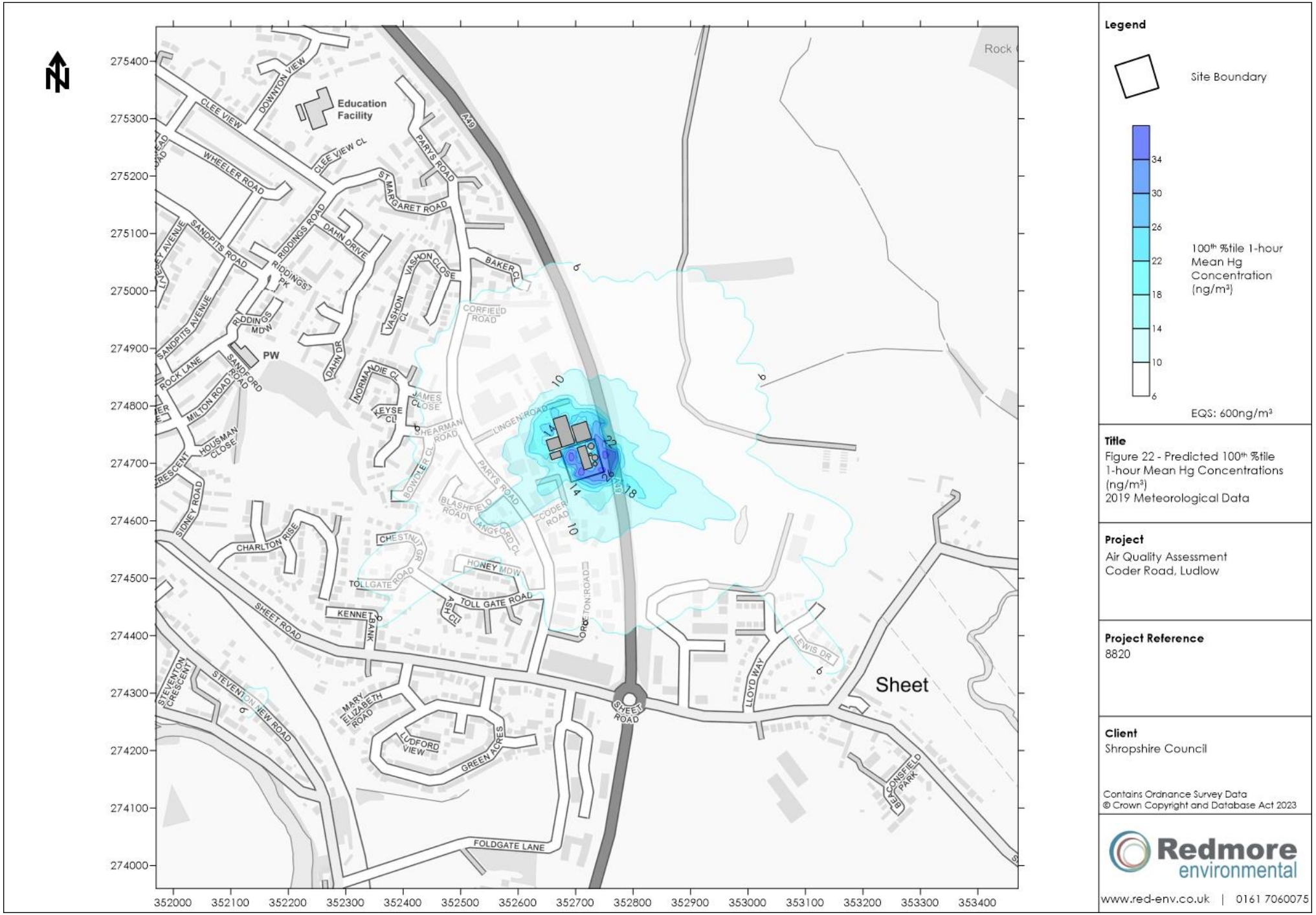

Legend

Site Boundary

34
30
26
22
18
14
10
6

100th %tile 1-hour Mean Hg Concentration (ng/m³)

EQS: 600ng/m³

Title

Figure 22 - Predicted 100th %tile 1-hour Mean Hg Concentrations (ng/m³)
2019 Meteorological Data

Project

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Legend

Site Boundary

Annual Mean Cr (VI) PC (ng/m³)

0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001

EQS: 0.25ng/m³

Title

Figure 23 - Predicted Annual Mean Cr (VI) PCs (ng/m³)
2017 Meteorological Data

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