Dispersion Modelling Assessment

Enterprise Drive, Chesterfield

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Executive Summary

Redmore Environmental Ltd was commissioned by EHS Projects Ltd to undertake a Dispersion Modelling Assessment in support of an Environmental Permit Application for the CBE+ facility, Enterprise Drive, Chesterfield.

Operations at the CBE+ facility comprise multiple chemical and electrochemical plating lines, including several treatment vats with a combined volume greater than thirty cubic metres. As this exceeds the regulatory threshold under the Environmental Permitting (England and Wales) Regulations (2016) for surface treatment of metals and plastics, the site requires an Environmental Permit from the Environment Agency to regulate emissions to air and other environmental impacts associated with these activities.

An H1 Assessment has been undertaken in order to assess the impact of emissions from the facility on air quality. This predicted exceedences of relevant screening criteria for nickel concentrations. As such, a Dispersion Modelling Assessment was undertaken in order to further evaluate potential effects.

Dispersion modelling was undertaken in order to predict nickel concentrations at receptor locations as a result of emissions from the facility. The results indicated that impacts were not predicted to be significant at any 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 EHS Projects Ltd to undertake a Dispersion Modelling Assessment in support of an Environmental Permit Application for the CBE+ facility, Enterprise Drive, Chesterfield.

1.2 Site Location and Context

1.2.1 The site is located at the CBE+ facility, off Enterprise Drive, Chesterfield, at National Grid Reference (NGR): 442632, 366552. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The CBE+ facility undertakes a range of activities including pre-production design and material sourcing, machining, specialist metal finishing through multiple plating processes, as well as heat treatment, testing, painting and final inspection and packaging. A key part of operations is the use of multiple chemical and electrochemical plating lines, comprising 37 treatment vats with a combined volume greater than 30m³. As this exceeds the regulatory threshold under the Environmental Permitting (England and Wales) Regulations 2016 (Schedule 1, Chapter 2, Section 2.3, Part A(1)(a)) for surface treatment of metals and plastics, the site requires an Environmental Permit to regulate emissions to air and other environmental impacts associated with these activities.

1.2.3 An H1 Assessment has been undertaken by the Applicant in order to assess the impact of emissions from the facility on air quality. This predicted exceedences of the Environment Agency (EA) screening criteria for nickel (Ni) concentrations. As such, a Dispersion Modelling Assessment was undertaken in order to further evaulate potential effects. The results are summarised in the following report.

2.0 AIR QUALITY STANDARDS

2.1 Air Quality Limit Values, Objectives and Target Values

2.1.1 The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for seven pollutants. None of these are of relevance to this assessment. Air Quality Target Values (AQTVs) were also provided for an additional five pollutants. Table 1 presents the AQTV for the pollutant considered within this assessment.

Table 1 Air Quality Target Value

Pollutant	Air Quality Target Value	
	Concentration (µg/m^3)	Averaging Period
Ni	0.02	Annual mean

2.2 Environmental Assessment Levels

2.2.1 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.

2.2.2 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

2.2.3 The EAL for the pollutant considered in this assessment is summarised in Table 2.

Table 2 Environmental Assessment Level

Pollutant	Environmental Assessment Level	
	Concentration (µg/m³)	Averaging Period
Ni	0.7	1-hour

3.0 METHODOLOGY

3.1 Introduction

3.1.1 Emissions from the facility have the potential to affect pollutant concentrations in the vicinity of the site. These have been quantified through dispersion modelling in accordance with the methodology outlined in the following Sections.

3.2 Dispersion Model

3.2.1 Dispersion modelling was undertaken using ADMS-6.0 (v6.0.2.5), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-6 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

3.2.2 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.

3.3 Modelling Scenarios

3.3.1 The scenarios considered in the modelling assessment are summarised in Table 3.

Table 3 Modelling Scenarios

Parameter	Modelled As	
	Short Term	Long Term
Ni	100th percentile (%ile) 1-hour mean	Annual mean

3.3.2 Predicted pollutant concentrations were summarised in the following formats:

- Process Contribution (PC) - Predicted pollutant concentration as a result of emissions from the facility; and,
- Predicted Environmental Concentration (PEC) - Total predicted pollutant concentration as a result of emissions from the facility and the relevant background concentration.

3.3.3 Predicted pollutant concentrations were compared with the relevant AQTV and EAL. These criteria are collectively referred to as Environmental Quality Standards (EQSs).

3.4 Assessment Area

3.4.1 The assessment area was defined based on the site location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 441925, 365785 to 443425, 367285. 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.

3.4.2 Reference should be made to Figure 2 for a graphical representation of the assessment grid extents.

3.4.3 A desk-top study was undertaken in order to identify any discrete receptor locations in the vicinity of the site that required specific consideration during the assessment. These are summarised in in Table 4.

Table 4 Discrete Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Mansfield Road	442237.0	367208.8
R2	Residential - Birkin Lane	442082.4	367160.0
R3	Residential - Caister Drive	442259.8	366708.7
R4	Residential - Caister Drive	442316.7	366596.0
R5	Residential - Caister Drive	442285.0	366527.9
R6	Residential - Caister Drive	442363.9	366506.3

Receptor		NGR (m)	
		X	Y
R7	Residential - Caister Drive	442349.9	366328.3
R8	Residential - Caister Drive	442389.6	366250.6
R9	Residential - Park Road	442456.2	366210.0
R10	Residential - Park Road	442521.9	366238.0
R11	Residential - Shakespeare Street	442584.8	366141.1
R12	Residential - Shakespeare Street	442669.0	366193.2
R13	Residential - Shakespeare Street	442764.9	366181.7
R14	Residential - Shakespeare Street	442865.5	366175.5
R15	Residential - Rosebud Way	442991.9	366170.0
R16	Residential - Colliers Way	443106.6	366122.4

3.4.4 Reference should be made to Figure 3 for a map of the discrete receptor locations.

3.5 Process Conditions and Emissions

3.5.1 A summary of the model inputs for each stack with associated Ni emissions is provided in Table 5. These were obtained from an LEV Testing report[1] and emissions monitoring reports[2] [3], as well as information provided by the Applicant.

Table 5 Process Conditions and Emissions

Parameter	Unit	A2	A3	A4	S2
Stack height[(a)]	m	8.12	8.12	8.12	3.5
Stack diameter	m	0.7	0.8	0.8	0.35
Exhaust gas temperature[(b)]	°C	19.0	19.0	19.0	19.0

1 Report for the Thorough Examination and Testing of the LEV Systems at CBE Plus Limited on the 19 November 2025 - 20 November 2025, Synergy Environmental Solutions, 2025.

2 Monitoring of Hydrogen Chloride, Ammonia and Ni Emissions, Plating Line 1, CES Environmental Instruments Ltd, 2025.

3 Monitoring of Hydrogen Chloride, Ammonia and Ni Emissions, Plating Line 2A, CES Environmental Instruments Ltd, 2025.

Parameter	Unit	A2	A3	A4	S2
Exhaust gas flow rate	m^3/hr	28,128.9	14,978.9	29,080.6	5,091.5
Exhaust gas efflux velocity	m/s	20.3	8.3	16.1	14.7
Ni emission concentration(c)	$mg/Nm^{3(d)}$	0.0022	0.0022	0.0022	0.0022
Ni emission rate(e)	g/s	0.000017	0.000009	0.000018	0.0000031

Note: (a) Above ground level.
(b) Average value of monitored temperature.
(c) Monitoring undertaken at the facility indicated Ni concentrations of 0.0022mg/Nm^3 and 0.0001 mg/Nm^3 for plating lines A2 and A4, respectively. In order to provide a robust assessment, the highest value was applied to all sources.
(d) Standard pressure, 0˚C.
(e) Emission rate derived from the emission concentration and actual flow rate unadjusted for temperature to provide a robust assessment.

3.5.2 The metal plating lines serving the stacks operate between 6am and 3pm Monday to Thursday and 6am and 12pm on a Friday. However, in order to provide a worst-case assessment scenario, emissions were assumed to be constant, with the facility in operation for 24-hours per day, 365-days per year.

3.5.3 Reference should be made to Figure 2 for a map of the stack locations.

3.6 Building Effects

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

3.6.2 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 6.

Table 6 Building Geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
	X	Y				
CBE+ Building	442680.8	366522.4	10.3	113.0	60.5	119
Yearsley Logistics Building 1	442698.8	366570.9	19.0	119.4	27.1	119
Yearsley Logistics Building 2	442685.8	366607.1	19.0	47.0	23.5	119

3.6.3 Reference should be made to Figure 3 for a map of the building locations.

3.7 Meteorological Data

3.7.1 Meteorological data used in the assessment was taken from Nottingham Watnall meteorological station over the period 1st January 2020 to 31st December 2024 (inclusive). This observation station is located at NGR: 450431, 345004, which is approximately 22.7km south-east of the site. 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.

3.7.2 All meteorological files used in the assessment were provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 4 for wind roses of utilised meteorological records.

3.8 Roughness Length

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

3.9 Monin-Obukhov Length

3.9.1 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'.

3.9.2 A minimum Monin-Obukhov length of 10m 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 'small towns < 50,000'.

3.10 Terrain Data

3.10.1 Ordinance 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[4].

3.11 Background Concentrations

3.11.1 An annual mean Ni concentration of 0.0014µg/m^3 recorded at the Chesterfield Loundsley Green urban background monitor (NGR: 436470, 372039) in 2024 was utilised in order to represent baseline levels throughout the modelling extents. The facility is located 8.1km south-east of the survey location on the edge of Chesterfield, similar to the monitoring position, and is therefore considered to provide a reasonable representation of background conditions within the vicinity of the site.

3.11.2 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'[5], which advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum predicted short-term concentration due to emissions from the source to twice the annual mean baseline concentration. This approach was adopted throughout the assessment.

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

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

3.12 Assessment Criteria

3.12.1 EA guidance 'Air emissions risk assessment for your environmental permit'[6] 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.

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

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

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

3.13 Modelling Uncertainty

3.13.1 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.

3.13.2 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:

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

- 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;
- Operating conditions - Operational parameters were obtained from monitoring undertaken at the facility and information provided by the Applicant. As such, these are considered to be representative of operating conditions;
- Emission rates - Emission rates were derived from monitoring results for the metal plating lines. Releases were assumed to be constant throughout the modelling period, which does not account for non-operational hours. This assumption is likely to overestimate actual emissions and therefore result in a worst-case assessment;
- Background concentrations - The background pollutant concentration was obtained from monitoring data. This is considered representative of baseline levels at receptor locations within the vicinity of the site;
- Receptor locations - A Cartesian Grid was included in the model in order to provide suitable data for contour plotting. Receptor points were also included at discrete locations to provide additional consideration of these areas; and,
- Variability - All model inputs were as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

3.13.3 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.

4.0 RESULTS

4.1 Introduction

4.1.1 Dispersion modelling was undertaken with the inputs described in Section 3.0. The results are outlined in the following Sections.

4.1.2 Reference should be made to Figure 5 and Figure 6 for graphical representations of predicted concentrations, 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 Ni concentration was predicted using the 2020 meteorological data set. As such, the contours shown in Figure 6 were produced from the 2020 model outputs.

4.2 Maximum Pollutant Concentrations

4.2.1 Maximum predicted Ni concentrations for any meteorological data set are summarised in Table 7.

Table 7 Maximum Predicted Nickel Concentrations

Pollutant	Averaging Period	EQS (µg/m³)	PC (µg/m³)	PC Proportion of EQS (%)	PEC (µg/m³)	PEC Proportion of EQS (%)
Ni	Annual	0.02	0.01	37.25	0.01	44.25
	100th %ile 1-hour	0.70	0.06	9.20	0.07	9.60

4.2.2 As shown in Table 7, there were no predicted exceedences of the relevant EQSs at any location within the vicinity of the site.

4.3 Modelling Results

4.3.1 Predicted annual mean Ni concentrations at the receptors, inclusive of background levels, are summarised in Table 8.

Table 8 Predicted Annual Mean Ni Concentrations

Receptor		Predicted Annual Mean Ni PEC (µg/m³)				
		2020	2021	2022	2023	2024
R1	Residential - Mansfield Road	0.00141	0.00141	0.00142	0.00141	0.00141
R2	Residential - Birkin Lane	0.00141	0.00141	0.00141	0.00141	0.00141
R3	Residential - Caister Drive	0.00143	0.00144	0.00144	0.00144	0.00144
R4	Residential - Caister Drive	0.00144	0.00147	0.00147	0.00146	0.00146
R5	Residential - Caister Drive	0.00145	0.00148	0.00148	0.00147	0.00147
R6	Residential - Caister Drive	0.00149	0.00153	0.00152	0.00152	0.00151
R7	Residential - Caister Drive	0.00149	0.00152	0.00149	0.00151	0.00149
R8	Residential - Caister Drive	0.00148	0.00151	0.00148	0.00149	0.00149
R9	Residential - Park Road	0.00147	0.00149	0.00146	0.00148	0.00149
R10	Residential - Park Road	0.00148	0.00151	0.00146	0.00149	0.00150
R11	Residential - Shakespeare Street	0.00144	0.00146	0.00143	0.00146	0.00146
R12	Residential - Shakespeare Street	0.00145	0.00147	0.00145	0.00147	0.00147
R13	Residential - Shakespeare Street	0.00145	0.00146	0.00145	0.00145	0.00146
R14	Residential - Shakespeare Street	0.00144	0.00145	0.00145	0.00144	0.00145
R15	Residential - Rosebud Way	0.00144	0.00145	0.00145	0.00143	0.00144
R16	Residential - Colliers Way	0.00143	0.00144	0.00144	0.00143	0.00143

4.3.2 As indicated in Table 8, annual mean Ni concentrations were below the EQS of 0.02µg/m³ at all receptors for all meteorological data sets.

4.3.3 Reference should be made to Figure 5 for a graphical representation of predicted annual mean Ni concentrations throughout the assessment extents.

4.3.4 The significance of predicted impacts on annual mean Ni concentrations at the receptors are summarised in Table 9. These consider the maximum predicted change in concentration from the five meteorological datasets as a worst-case.

Table 9 Predicted Impacts on Annual Mean Ni Concentrations

Receptor		Maximum Predicted Annual Mean Ni Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Mansfield Road	0.00002	0.00142	0.08	7.08
R2	Residential - Birkin Lane	0.00001	0.00141	0.06	7.06
R3	Residential - Caister Drive	0.00004	0.00144	0.22	7.22
R4	Residential - Caister Drive	0.00007	0.00147	0.37	7.37
R5	Residential - Caister Drive	0.00008	0.00148	0.39	7.39
R6	Residential - Caister Drive	0.00013	0.00153	0.65	7.65
R7	Residential - Caister Drive	0.00012	0.00152	0.60	7.60
R8	Residential - Caister Drive	0.00011	0.00151	0.53	7.53
R9	Residential - Park Road	0.00009	0.00149	0.47	7.47
R10	Residential - Park Road	0.00011	0.00151	0.53	7.53
R11	Residential - Shakespeare Street	0.00006	0.00146	0.32	7.32
R12	Residential - Shakespeare Street	0.00007	0.00147	0.36	7.36
R13	Residential - Shakespeare Street	0.00006	0.00146	0.30	7.30
R14	Residential - Shakespeare Street	0.00005	0.00145	0.25	7.25
R15	Residential - Rosebud Way	0.00005	0.00145	0.24	7.24
R16	Residential - Colliers Way	0.00004	0.00144	0.20	7.20

4.3.5 As indicated in Table 9, PCs were below 1% of the EQS at all receptors. As such, predicted effects on annual mean Ni concentrations are not considered to be significant, in accordance with the stated criteria.

4.3.6 Predicted 100th %ile 1-hour mean Ni concentrations at the receptors, inclusive of background levels, are summarised in Table 10.

Table 10 Predicted 100th %ile 1-hour Mean Ni Concentrations

Receptor		Predicted 100th %ile 1-hour Mean Ni PEC (µg/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Mansfield Road	0.0041	0.0039	0.0039	0.0039	0.0038
R2	Residential - Birkin Lane	0.0037	0.0038	0.0037	0.0037	0.0037
R3	Residential - Caister Drive	0.0053	0.0054	0.0053	0.0053	0.0053
R4	Residential - Caister Drive	0.0057	0.0059	0.0061	0.0061	0.0060
R5	Residential - Caister Drive	0.0051	0.0056	0.0057	0.0057	0.0057
R6	Residential - Caister Drive	0.0060	0.0066	0.0068	0.0066	0.0068
R7	Residential - Caister Drive	0.0054	0.0057	0.0057	0.0059	0.0060
R8	Residential - Caister Drive	0.0049	0.0054	0.0056	0.0054	0.0056
R9	Residential - Park Road	0.0048	0.0054	0.0055	0.0055	0.0054
R10	Residential - Park Road	0.0052	0.0060	0.0058	0.0057	0.0057
R11	Residential - Shakespeare Street	0.0051	0.0052	0.0052	0.0052	0.0051
R12	Residential - Shakespeare Street	0.0058	0.0057	0.0058	0.0059	0.0058
R13	Residential - Shakespeare Street	0.0057	0.0057	0.0057	0.0058	0.0056
R14	Residential - Shakespeare Street	0.0053	0.0053	0.0053	0.0052	0.0053
R15	Residential - Rosebud Way	0.0049	0.0049	0.0049	0.0049	0.0049
R16	Residential - Colliers Way	0.0044	0.0045	0.0045	0.0044	0.0044

4.3.7 As indicated in Table 10, 1-hour mean Ni concentrations were below the EQS of 0.7µg/m³ at all receptors for all meteorological data sets.

4.3.8 Reference should be made to Figure 6 for a graphical representation of predicted 100th %ile 1-hour mean Ni concentrations throughout the assessment extents.

4.3.9 Maximum predicted 100th %ile 1-hour mean Ni concentrations at the receptor locations are summarised in Table 11.

Table 11 Predicted Impacts on 100th %ile 1-hour Mean Ni Concentrations

Receptor		Maximum Predicted 100th %ile 1-hour Mean Ni Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Mansfield Road	0.0013	0.0041	0.18	0.18
R2	Residential - Birkin Lane	0.0010	0.0038	0.14	0.14
R3	Residential - Caister Drive	0.0026	0.0054	0.37	0.37
R4	Residential - Caister Drive	0.0033	0.0061	0.48	0.48
R5	Residential - Caister Drive	0.0029	0.0057	0.42	0.42
R6	Residential - Caister Drive	0.0040	0.0068	0.57	0.57
R7	Residential - Caister Drive	0.0032	0.0060	0.46	0.46
R8	Residential - Caister Drive	0.0028	0.0056	0.40	0.40
R9	Residential - Park Road	0.0027	0.0055	0.39	0.39
R10	Residential - Park Road	0.0032	0.0060	0.45	0.46
R11	Residential - Shakespeare Street	0.0024	0.0052	0.34	0.34
R12	Residential - Shakespeare Street	0.0031	0.0059	0.44	0.44
R13	Residential - Shakespeare Street	0.0030	0.0058	0.43	0.43
R14	Residential - Shakespeare Street	0.0025	0.0053	0.36	0.37
R15	Residential - Rosebud Way	0.0021	0.0049	0.30	0.31
R16	Residential - Colliers Way	0.0017	0.0045	0.24	0.24

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

4.3.10 As shown in in Table 11, PCs were below 10% of the EQS at all receptors. As such, predicted effects on 1-hour mean Ni concentrations are not considered to be significant, in accordance with the stated criteria.

4.4 Sensitivity Analysis

4.4.1 Dispersion model outputs can be affected by a number of variables, including:

- Meteorological data;

- Emission parameters;
- Receptor grid resolution;
- Treatment of terrain and buildings; and,
- Special model treatments.

4.4.2 As shown previously, maximum Ni concentrations at the receptors were below the relevant EQSs. The results indicate a significant difference between the predictions and the values required to result in an impact at the relevant receptors. As such, there is sufficient headroom to account for model uncertainty without affecting the assessment conclusions. Further Sensitivity Analysis of specific variables is therefore not warranted for the project.

5.0 CONCLUSION

5.1.1 Redmore Environmental Ltd was commissioned by EHS Projects Ltd to undertake a Dispersion Modelling Assessment in support of an Environmental Permit Application for the CBE+ facility, Enterprise Drive, Chesterfield.

5.1.2 An H1 Assessment has been undertaken in order to assess the impact of emissions from the facility on air quality. This predicted exceedences of the EA screening criteria for Ni concentrations. As such, a Dispersion Modelling Assessment was undertaken in order to further evaulate potential effects.

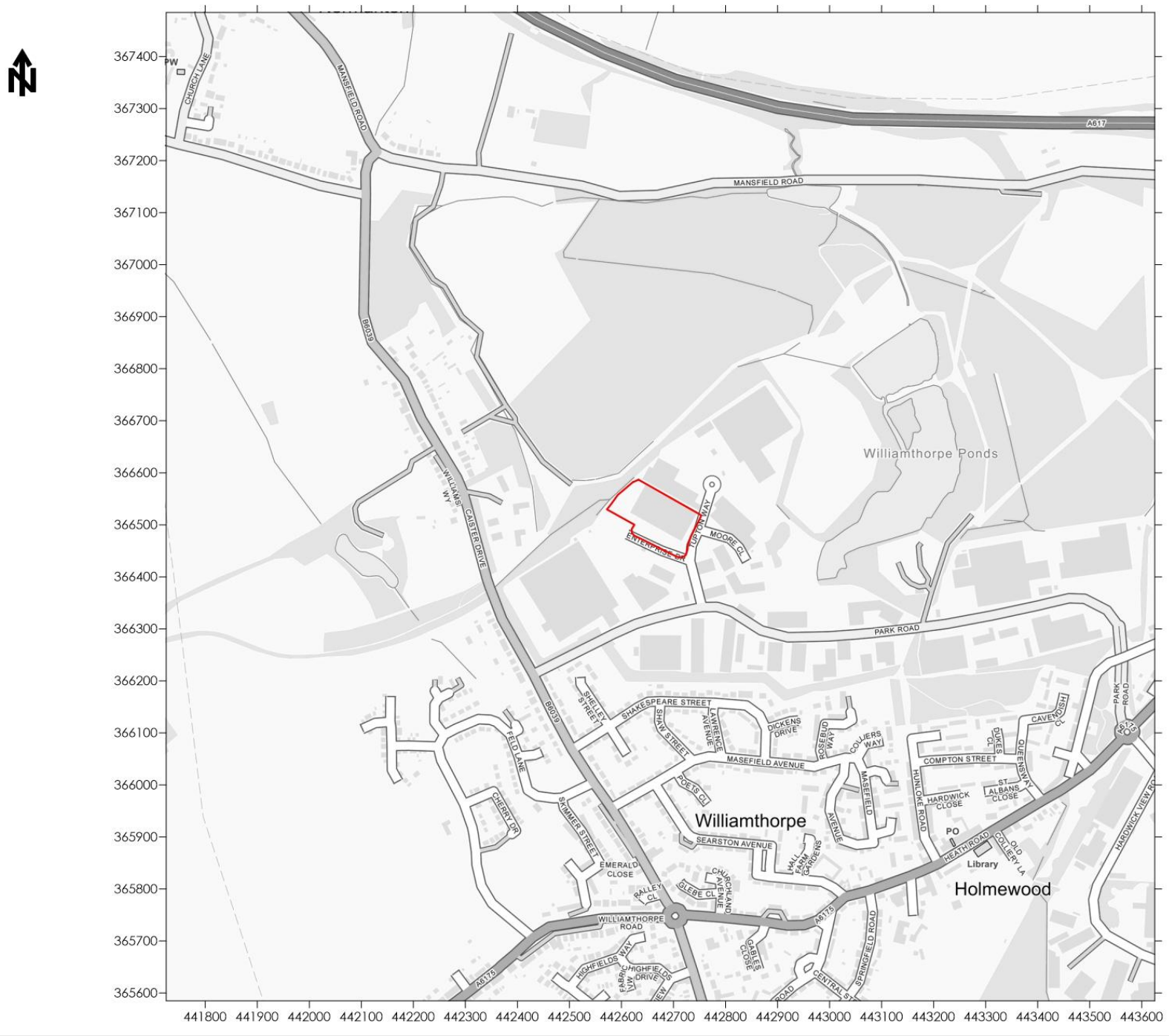
5.1.3 Dispersion modelling was undertaken using ADMS-6 in order to predict annual mean and 1-hour mean Ni concentrations at receptor locations as a result of emissions from the facility.

5.1.4 The results indicated that operation of the facility is not predicted to result in exceedences of the relevant EQSs at any location within the vicinity of the site. Impacts were classified as not significant in accordance with the relevant methodology.

6.0 ABBREVIATIONS

AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQTV	Air Quality Target Value
CERC	Cambridge Environmental Research Consultants
EA	Environment Agency
NGR	National Grid Reference
Ni	Nickel
PC	Process Contribution
PEC	Predicted Environmental Concentration
z_0	Roughness length
%ile	Percentile

Figures



Legend

Title
Figure 1 - Site Location Plan

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Project Reference
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Legend

- Site Boundary
- Stack
- Building
- Output Grid

Title
Figure 2 - ADMS-6 Inputs

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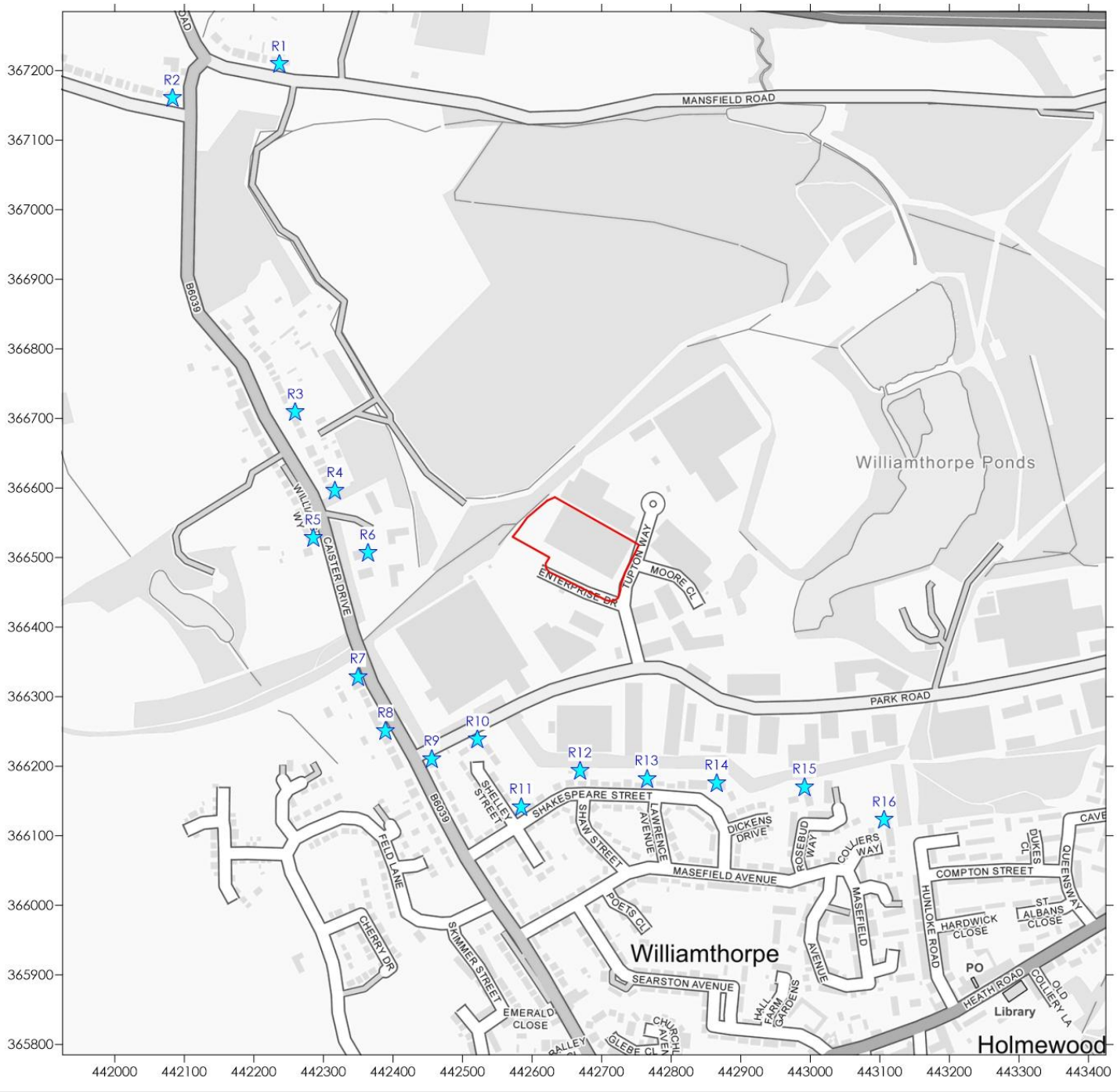

Legend

Site Boundary

Receptor

Title
Figure 3 - Discrete Receptor Locations

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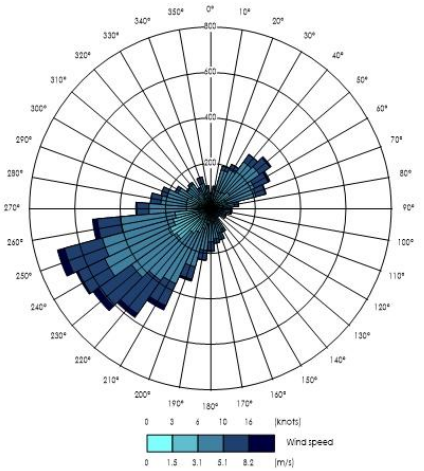
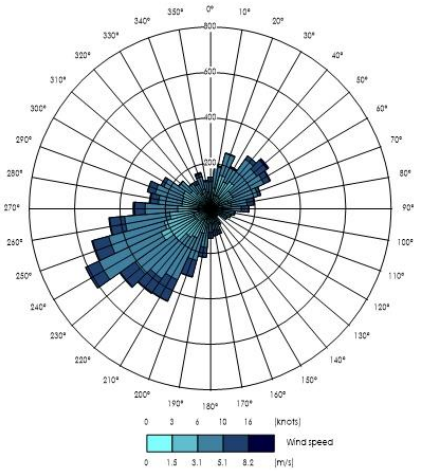
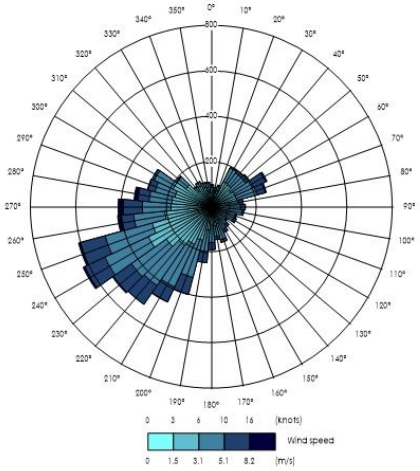


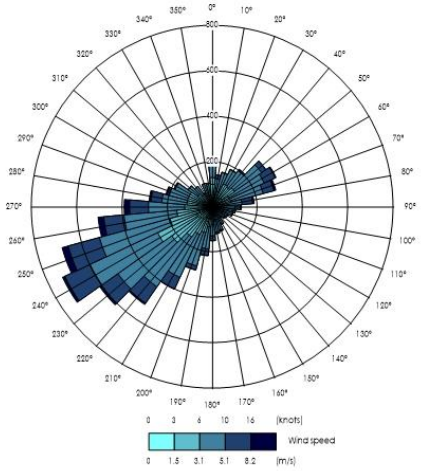
2020 Meteorological Data



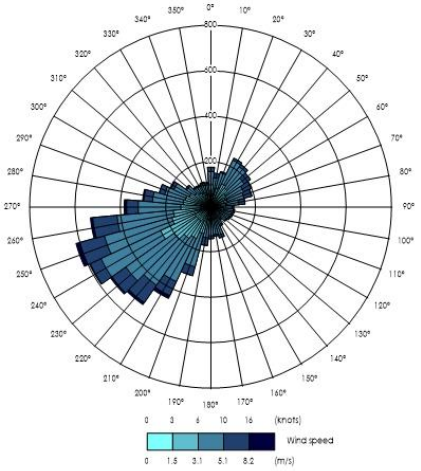
2021 Meteorological Data



2022 Meteorological Data



2023 Meteorological Data



2024 Meteorological Data

Legend

Title
Figure 4 - Wind Roses of 2020 to 2024 Nottingham Watnall Meteorological Data

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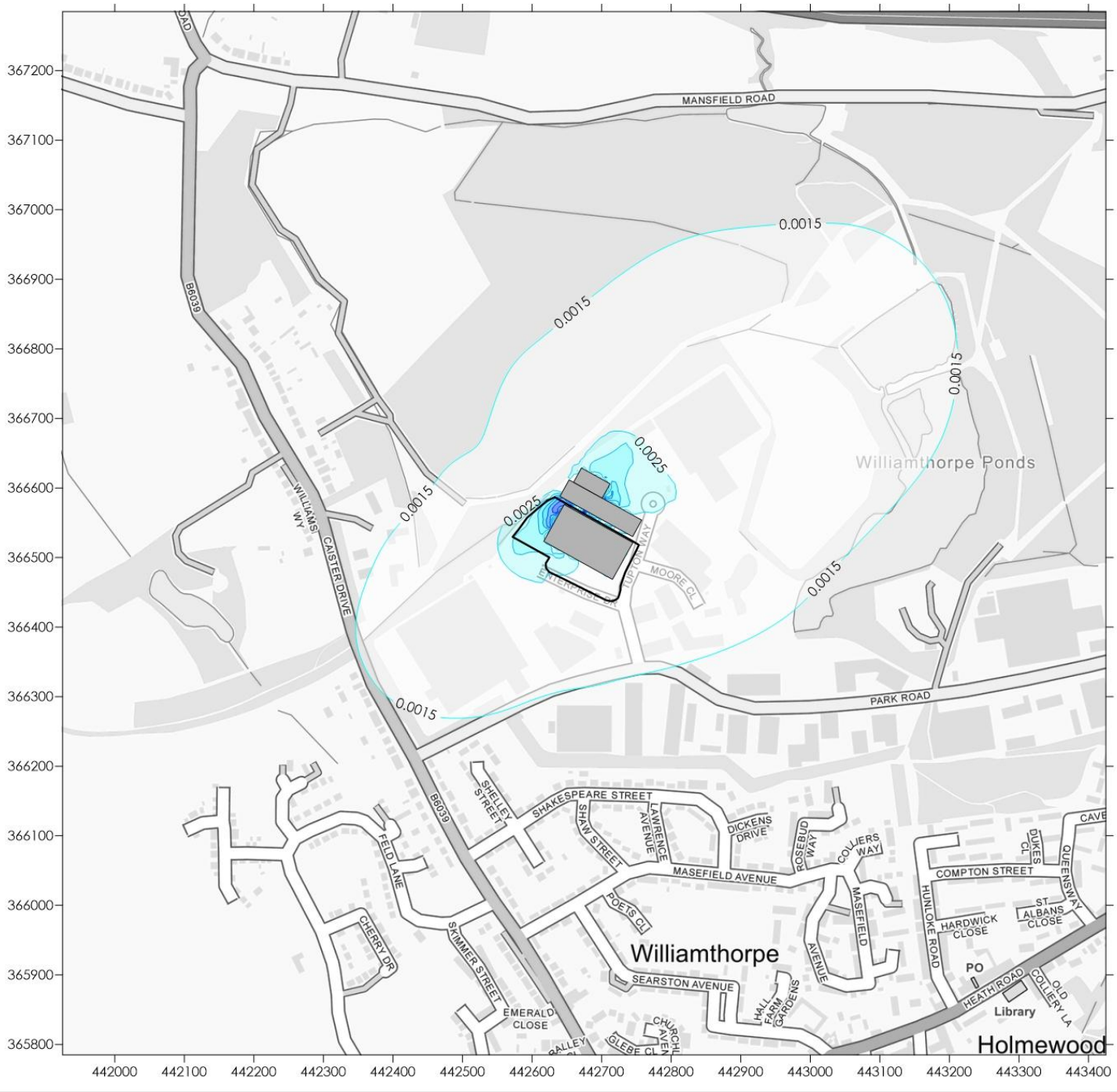

Legend

Site Boundary

Predicted Annual Mean Ni Concentration (µg/m³)

0.0085
0.0075
0.0065
0.0055
0.0045
0.0035
0.0025
0.0015

Title

Figure 5 - Predicted Annual Mean Ni Concentrations (µg/m³) 2020 Meteorological Data

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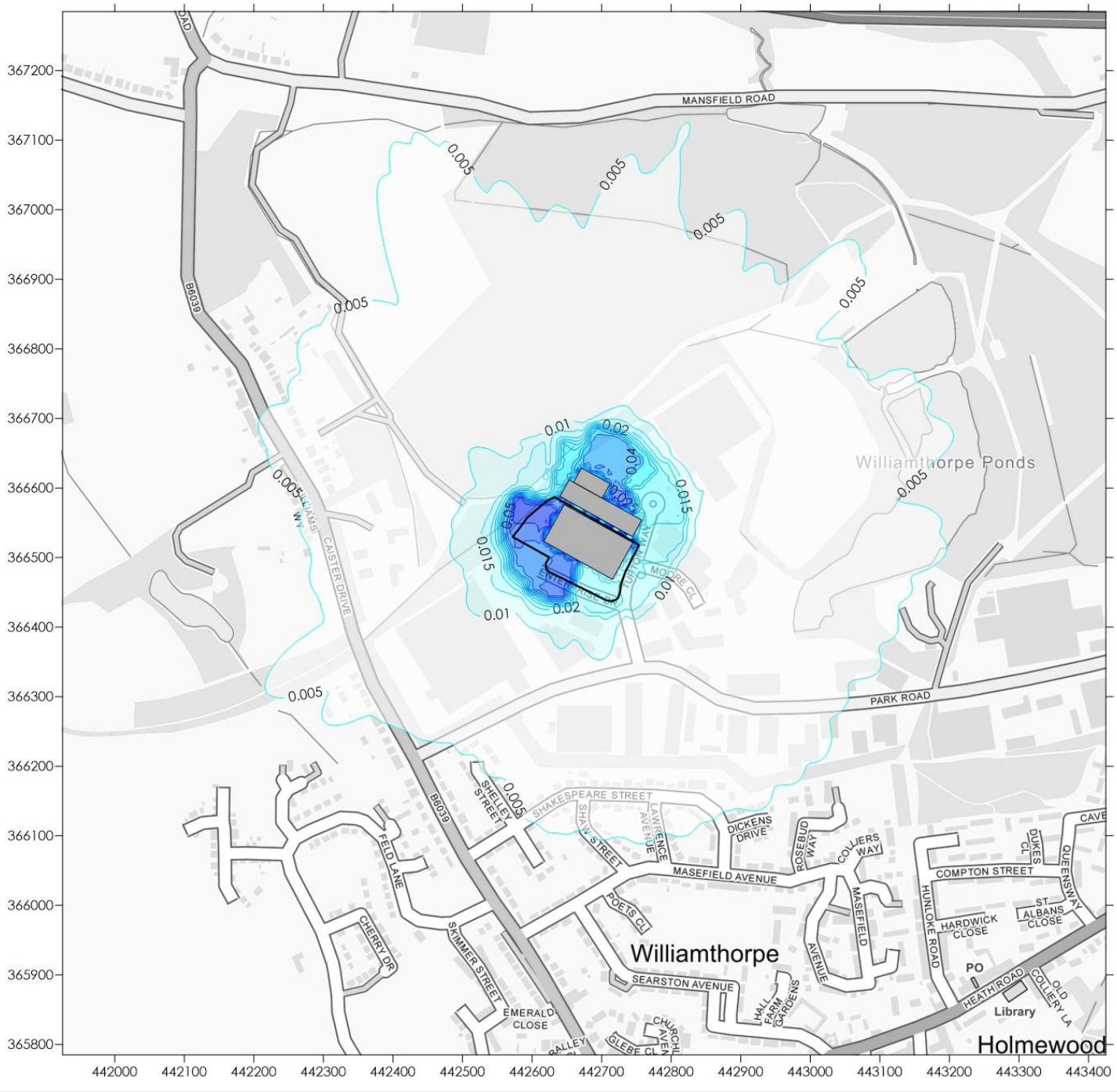

Legend

Site Boundary

Predicted 100th %ile 1-hour Mean Ni Concentration (µg/m³)

0.07
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005

Title

Figure 6 - Predicted 100th %ile 1-hour Mean Ni Concentrations (µg/m³) 2020 Meteorological Data

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