EMISSIONS MODELLING ASSESSMENT

Waste Treatment and Packaging Facility, St Michaels Close. Aylesford

Elliot Environmental Drainage Ltd

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1.0	01/07/2024	DY		Draft for client comment
1.1	06/08/2024	DY		Amendment to Appendix I
1.2	19/03/2026	DY		Amendment in response to Schedule 5 Notice

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1 Introduction

1.1 Background and Context of Assessment

1.1.1 An emissions modelling assessment has been undertaken in support of an Environmental Permit (EP) Application being submitted for a waste treatment and packaging facility being installed at St Michaels Close, Aylesford, Kent. The assessment has been undertaken to predict the potential air quality impacts at sensitive receptor locations as a result of residual emissions from the plant.

1.1.2 The assessment has been revised as part of response to Schedule 5 Notice.

1.2 Site Location

1.2.1 Reference should be made to Appendix I for a site location plan. The site is located on land within an established industrial estate. The approximate National Grid Reference for the site is 574503, 159085.

1.3 Proposed Activities and Environmental Context

1.3.1 The proposals are for the installation of a specialist waste treatment and packaging facility. The facility will accept and manage hazardous and non-hazardous wastes, predominantly including liquid based wastes and sludges which will be subject to various physical and physico-chemical treatment processes.

1.3.2 An EP is required for the operation under the Environmental Permitting (England and Wales) Regulations 2016 (“the regulations”).

1.3.3 The operation of the processes will have the potential to create airborne emissions and subsequent impacts upon the surrounding environment. Potential long and short-term air quality impacts associated with point source emissions from the process have been quantified within this report through prediction of resulting ground level pollutant concentrations which have been compared to the relevant Air Quality Limit Values (AQLVs), Environmental Assessment Levels (EALs), critical levels and loads.

2 Air Quality Standards, Environmental Assessment Levels, Critical Levels and Loads

2.1 Air Quality Limit Values

2.1.1 Table 2.1 contains the AQLVs which are relevant to this assessment. These have been obtained from the Air Quality Standards Regulations 2010 (as amended) and government permitting risk assessment guidance website.

Table 2.1 - Air Quality Limit Values

Pollutant	Measured As	Purpose	Air Quality Limit Values
Benzene	Annual mean	Protection of human health	5µg.m^{-3}

2.2 Environmental Assessment Levels

2.2.1 A list of long and short-term EALs relevant to this assessment are presented in the table below. These have been obtained from the government permitting risk assessment guidance website[1].

Table 2.2 - Environmental Assessment Levels

Substance	Environmental Assessment Levels			
	Annual Mean (µg.m^{-3})	Monthly Mean (µg.m^{-3})	24-Hour Mean (µg.m^{-3})	1-Hour Mean (µg.m^{-3})
Benzene	-	-	30	-
Hydrogen Chloride (HCL)	-	-	-	750
Hydrogen Sulphide	140	-	150	-
Ammonia	180	-	-	2,500
Mercury	-	-	0.06	0.6

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

2.3 Critical Levels and Loads for Protection of Vegetation and Ecosystems

2.3.1 The table below outlines critical levels for the protection of vegetation at nature conservation sites which are relevant to this assessment.

Table 2.3 - Critical Levels for the Protection of Vegetation

Pollutant	Critical Levels	
	Concentration ($\mu g.m^{-3}$)	Measured As
Ammonia	1-3 (lower end of range applies when lichens or bryophytes are present)	Annual mean

2.3.2 Critical loads are assigned for nitrogen and acid deposition at sensitive ecological sites, above which, harmful effects on vegetation may occur. In accordance with the relevant guidance[2], this assessment has considered potential impacts at any Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar sites within 10km of the site and any Sites of Special Scientific Interest (SSSI), ancient woodland areas, Local Nature Reserves (LNRs) and Local Wildlife Sites (LWS) within 2km of the site.

2.3.3 For statutory sites, reference has been made to the APIS website[3] to determine site specific critical loads. There are no receptor specific critical loads assigned for local nature sites.

2.3.4 For any LWS, LNRs or ancient woodland areas within 2km of the site, a precautionary assumption has been made for critical loads, in lieu of site specific information for such sites. For nitrogen deposition, a precautionary assumption of 5 kg $N.ha^{-1}.Year^{-1}$ has been made. For acid deposition, the critical loads specified within the grid square containing each sensitive site have been obtained, based on estimates from the APIS website, having consideration to the type of receptor.

2.3.5 The tables below outline critical loads which have been assigned within this assessment.

[2] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit
[3] https://www.apis.ac.uk/srcl.

Table 2.4 – Critical Load Ranges for Nitrogen Deposition

Receptor Identifier	Site	Worst Case Critical Loads for Nitrogen Deposition (Kg $N.ha^{-1}.Year^{-1}$)
R25	North Downs Woodlands SAC/Wouldham to Detling Escarpment SSSI	10
R26	Peters Pit SAC	10
R27	Queendown Warren SAC	10
R28 to R45	All Ancient Woodland Receptors	5
R46	Boxley Warren LNR	5
R47	Cuckoo Wood, Sandling LWS	5
R48	Blue Bell Hill Banks and Verges LWS	5

Table 2.5 – Worst Case Critical Loads for Acid Deposition

Receptor Identifier	Site	Critical Loads for Acid Deposition ($keq.ha^{-1}.Year^{-1}$), MinCLMaxN
R25	North Downs Woodlands SAC/Wouldham to Detling Escarpment SSSI	1.983
R26	Peters Pit SAC	4.856
R27	Queendown Warren SAC	2.076
R28	Ancient woodland	3.028
R29	Ancient woodland	3.028
R30	Ancient woodland	0.963
R31	Ancient woodland	3.028
R32	Ancient woodland	3.028
R33	Ancient woodland	3.028
R34	Ancient woodland	11.056
R35	Ancient woodland	1.983

Receptor Identifier	Site	Critical Loads for Acid Deposition (keq.ha^{-1}.Year^{-1}), MinCLMaxN
R36	Ancient woodland	4.363
R37	Ancient woodland	2.078
R38	Ancient woodland	2.078
R39	Ancient woodland	3.055
R40	Ancient woodland	3.055
R41	Ancient woodland	0.963
R42	Ancient woodland	0.963
R43	Ancient woodland	0.963
R44	Ancient woodland	0.963
R45	Ancient woodland	2.814
R46	Boxley Warren LNR	1.983
R47	Cuckoo Wood, Sandling LWS	0.989
R48	Blue Bell Hill Banks and Verges LWS	4.856

3 Baseline Position

3.1 Sensitive Receptors

3.1.1 A baseline assessment has been undertaken to identify receptors sensitive to potential emissions from the plant. This includes human and ecological receptors.

3.1.2 The search criteria for ecological receptors was outlined in the previous section.

3.1.3 Local Air Quality Management (LAQM) Technical Guidance Note (TG) 2022 states that Air Quality Standards are relevant at human receptor locations as follows:

- **Annual mean concentrations** - relevant at all locations where members of the public might be regularly exposed. Includes building façades of residential properties, schools, hospitals and care homes.
- **24-hour mean concentrations** - relevant at all locations where the annual mean objectives apply together with hotels and gardens of residential properties. These exclude kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be shorter than either the 24-hour or 8-hour relevant mean.
- **1-hour mean concentrations -** relevant at any location where public might reasonably expect to spend one hour or longer.

3.1.4 In accordance with the above guidance, the human receptor locations identified are representative of worst case exposure locations for annual mean and 24-hour mean concentrations. In order to determine worst case impacts on short term Air Quality Standards at human receptor locations (1-hour mean concentrations), the maximum modelled pollutant concentrations surrounding the plant have been assessed. This ensures a precautionary assessment.

3.1.5 The table below outlines receptors considered within this assessment. Receptor locations are graphically represented in Appendix II.

Table 3.1 – Sensitive Receptors

Receptor Identifier	Receptor Description	National Grid Reference (m)	
		X	Y
R1	Residential property on Pratling Street	574051.3	159315.7
R2	Residential property on Pratling Street	574096.7	159329.6
R3	Residential property on Pratling Street	574128.2	159335.8
R4	Residential property on Pratling Street	574164.7	159358.3
R5	Residential property on Pratling Street	574200.1	159381.5
R6	Residential property on Pratling Street	574268	159392.6
R7	Residential property on Pratling Street	574314.5	159430.4
R8	The Oast House	574625	159594.3
R9	Residential property on Grey Wethers	575231.6	159595.4
R10	Residential property on Tolgate Way	575229.8	159565.5
R11	Residential property on Tolgate Way	575237.9	159506.9
R12	Residential property on Tolgate Way	575229.9	159439.7
R13	Residential property on Tolgate Way	575229.3	159421.2
R14	Residential property on Chatham Road	575291.7	159223.8
R15	Residential property on Chatham Road	575315.8	159147.6
R16	Residential property on Chatham Road	575333.1	159032.3
R17	Residential property on Chatham Road	575393.5	158933.3
R18	Residential property on Chatham Road	575389.6	158870.4
R19	Cobtree Manor	574711.5	158687.1
R20	Residential property off Forstal Road	573957	158818.2
R21	Residential property off Rochester Road	573286.2	159052.2
R22	Residential property off Rochester Road	573319.7	159098.9
R23	Residential property off Rochester Road	573381.7	159155.6
R24	Residential property off Rochester Road	573511.5	159331.6
R25	North Downs Woodlands SAC/Wouldham to Detling Escarpment SSSI	575309	160256
R26	Peters Pit SAC	571816	162567
R27	Queendown Warren SAC	582109	162750
R28	Ancient woodland	574537	159044
R29	Ancient woodland	574564	159195

Receptor Identifier	Receptor Description	National Grid Reference (m)	
		X	Y
R30	Ancient woodland	574603	158964
R31	Ancient woodland	574636	159354
R32	Ancient woodland	574876	159307
R33	Ancient woodland	574946	159985
R34	Ancient woodland	574804	160002
R35	Ancient woodland	575452	160374
R36	Ancient woodland	575040	160940
R37	Ancient woodland	573890	159472
R38	Ancient woodland	573195	159607
R39	Ancient woodland	576428	158977
R40	Ancient woodland	575602	158137
R41	Ancient woodland	574506	158124
R42	Ancient woodland	574202	158365
R43	Ancient woodland	574000	158315
R44	Ancient woodland	573606	158332
R45	Ancient woodland	574960	157513
R46	Boxley Warren LNR	575309	160256
R47	Cuckoo Wood, Sandling LWS	575765	158318
R48	Blue Bell Hill Banks and Verges LWS	575151	159362

3.2 Air Quality Across Maidstone Borough

3.2.1 Maidstone Borough Council (MBC) are required to undertake a review and assessment of air quality within their area of jurisdiction under Section 82 part IV of the Environment Act (1995). Local Authorities (LAs) are obligated to prepare an Annual Status Report (ASR) each year. For areas where AQLVs are not expected to be achieved, the LA will undertake further assessment. Subsequently, if AQLVs are not predicted to be met following detailed assessment, the LA must declare an Air Quality Management Area (AQMA).

3.2.2 There is currently one AQMA declared in the MBC area of jurisdiction. However, this is not declared for any of the pollutants relevant to this assessment and has therefore not been considered further.

3.3 Air Quality Monitoring Data

3.3.1 Non-Automatic Hydrocarbon Network

3.3.1.1 The Non-Automatic Hydrocarbon Network measures ambient benzene concentrations at various sites around the United Kingdom. The closest monitoring station to the proposed site is Chatham Roadside. This is an urban traffic monitoring site located approximately 8.5km to the North-North-East of the proposed site location. Given the nature and location of this monitoring location, it was considered that it would provide a precautionary estimation of potential background benzene concentrations at the proposed site and surrounding receptor locations. Data from the most recent years of fully validated data is presented in the table below. The data was calculated from data downloaded from the DEFRA website.

3.3.1.2 It should be noted that monitoring periods are periodic (approximately two weekly collection). The annual mean concentrations presented below are based on data collection rate considerably in excess of 75% for each year and is therefore considered to be valid for use as annual mean background pollution data for benzene.

Table 3.2 - Annual Mean Benzene Concentrations at Chatham Roadside

Site	Site Type	Site NGR	Reported Annual Mean Benzene Concentrations (µg.m^{-3})									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Chatham Roadside	Urban Traffic	577437, 166993	0.79	0.78	0.76	0.61	0.63	0.54	0.57	0.55	0.58	0.52

3.3.2 Acid Gas Monitoring

3.3.2.1 The UK Acid Gases and Aerosols Monitoring Network is maintained in the UK by DEFRA and has been in operation since 1999. The network includes several sites around the UK in rural monitoring locations and includes monitoring data for HCL. No HCL data is available since 2016 for any site within this monitoring network. The table below confirms the maximum monitored annual mean HCL concentrations across all sites between 2011 and 2015, which has been calculated from available data on the DEFRA website. This has been used as a source of background data in lieu of other available recent data.

Table 3.3 – Maximum Monitored Annual Mean HCL Concentrations Between 2011 and 2015 – Sites within UK Acid Gases and Aerosols Monitoring Network

Site	Maximum Monitored Annual Mean HCL Concentration (μg.m^{-3})				
	2011	2012	2013	2014	2015
All Sites within UK Acid Gases and Aerosols Monitoring Network	0.636	0.432	0.515	0.471	0.756

3.3.3 Ammonia

3.3.3.1 Ammonia is monitored on a monthly basis at 85 sites across the UK as part of the National Ammonia Monitoring Network. With the exception of two locations, these are all rural background locations. The nearest monitoring location to the site is Detling, which is a rural background monitoring location situated approximately 5.5km to the East of the proposed site. However, data collection has been poor in recent years (<75% each year for the past five years). The single urban background monitoring location is situated in Belfast Centre and there is an urban traffic monitoring location situated at London Cromwell Road 2. Both of these monitoring sites are located a substantial distance from the site, but data is included in the table below for the most recent 5 years of available data from these sites. It was considered that this data would potentially provide a precautionary estimate of background ammonia data, in lieu of available data in the vicinity of the site.

Table 3.4 – Monitored Annual Mean Ammonia Concentrations Between 2020 and 2024

Site	Monitored Annual Mean Ammonia Concentration (μg.m^{-3})				
	2020	2021	2022	2023	2024
Belfast Centre	1.14	0.78	1.10	0.82	0.68
London Cromwell Road 2	2.92	2.76	3.70	3.40	3.39

3.3.4 Hydrogen Sulphide

3.3.4.1 Hydrogen sulphide is not routinely monitored at background locations throughout the UK.

3.3.5 Heavy Metals Monitoring

3.3.5.1 Heavy metals monitoring is undertaken at a number of locations around the country as part of the DEFRA Heavy Metals Network and Rural Heavy Metals Network, which is managed and operated on behalf of DEFRA by the National Physical Laboratory (NPL). The nearest monitoring location to the site is Detling, which is a rural background monitoring location situated approximately 5.5km to the East of the proposed site. The next nearest monitoring location is London Marylebone Road, which is an urban background monitoring location situated approximately 52km to the West-North-West. Given the nature of this monitoring location, it was considered that this would provide a more precautionary source of background data for use in this assessment compared to the closer rural monitoring location.

3.3.5.2 Monitoring was previously undertaken until 2018 at London Marylebone Road. The maximum annual mean mercury concentration from between 2013 and 2017 is presented in the table below.

Table 3.5 – Maximum Monitored Annual Mean Mercury Concentration at London Marylebone Road Between 2013 and 2017

Metal	Maximum Annual Mean Concentration at London Marylebone Road Between 2013 and 2017 ($\mu g.m^{-3}$)
Mercury	0.0037

3.4 Background Pollutant Mapping

3.4.1 DEFRA provides Pollution Climate Mapping (PCM) background data for benzene. Benzene mapping data extends to 2024. The relevant guidance advises that in the absence of any background concentration mapped estimates for years after the most recent year available, a conservative approach is to use the most recent year of PCM background concentrations for benzene.

3.4.2 Background mapping data for ammonia is also available on a 1km by 1km grid square basis across the UK. This is available as 3 year averages, the latest data available for 2020 to 2022 (midpoint 2021). This data is available on the APIS website.

3.4.3 Mapped background concentration data for benzene and ammonia for the grid square containing the site is presented in the table below.

Table 3.6 - Background Pollutant Mapping Data for Site

Pollutant	2024 Annual Mean Concentration ($\mu g.m^{-3}$) within Grid Square Containing Site (574500, 159500)
Benzene	0.47
Ammonia	1.05

3.5 Summary of Background Data Used in Assessment

3.5.1 The table below summarises the background data used within this assessment.

Table 3.7 - Summary of Background Data Used in Assessment

Pollutant	Annual Mean ($\mu g.m^{-3}$)	24-Hour Mean ($\mu g.m^{-3}$)[(a)]	1-Hour Mean ($\mu g.m^{-3}$)[(b)]	Source of Background Data
Benzene	0.79	0.93	N/A	Highest monitored concentration from recent years of available data at Chatham Roadside AURN site
HCL	0.76	N/A	1.52	Highest calculated concentration from five years of data at all sites within UK Acid Gas and Aerosol Monitoring Network
Ammonia	3.7	N/A	7.4	Highest reported concentration at London Cromwell Road 2 as part of National Ammonia Monitoring Network

Pollutant	Annual Mean ($\mu g.m^{-3}$)	24-Hour Mean ($\mu g.m^{-3}$)[a]	1-Hour Mean ($\mu g.m^{-3}$)[b]	Source of Background Data
Mercury	N/A	0.0044	0.0074	Highest annual mean concentration monitored at Marylebone Road between 2013 and 2017 as part of Heavy Metals Monitoring Network

N.B (a) 24-hour mean background concentration provided by multiplying 1-hour mean concentration by factor of 0.59 in accordance with the relevant guidance

(b) 1-hour mean background concentration assumed to be twice the annual mean background concentration in accordance with the relevant guidance

4 Modelling Methodology

4.1 Model Description

4.1.1 The potential air quality impacts associated with residual emissions arising from the process have been quantified using AERMOD, which is a steady state, next generation, dispersion model. AERMOD was developed jointly by the American Meteorological Society (AMS) and the United States (US) Environmental Protection Agency (EPA) Regulatory Model Improvement Committee. AERMOD is a development from the Industrial Source Complex (ISC) 3 dispersion model and incorporates improved dispersion algorithms and pre-processors to integrate the impact of meteorology and topography within the modelling output, and is approved for use in the UK by the EA. The version of AERMOD that has been used for this current assessment is Lakes Environmental ISC-AERMOD View Version 13.0.0. The model has been run using the most recent version of the AERMOD executable file, 24142.

4.2 Model Inputs

4.2.1 Emission Source Process Parameters

4.2.1.1 Reference should be made to Appendix I for a graphical representation of the site layout and flue location. The table below contains expected process parameters for the emission point which is based on information provided by the technology provider. The emission point modelled is the stack which will serve the odour abatement system. The restriction of the assessment to this emission point has been agreed with the EA.

Table 4.1 - Expected Emission Source Process Parameters

Process Parameter	Value
Stack (Emission Point A1) NGR	574531.12, 159104.41
Stack internal diameter (m)	0.9
Stack height (m)	12.954
Expected Exhaust efflux velocity ($m.s^{-1}$)	10.862
Expected Exhaust volumetric flowrate ($m^3.s^{-1}$)	6.91
Expected stack efflux temperature	Ambient release
Expected stack pressure (kPa)	101.3

4.2.2 Pollutant Emissions

4.2.2.1 The site will be subject to emission limits contained within Commission Implementing Decision (EU) 2018/1147 (BAT Conclusions Document)[4], which contains BAT conclusions for waste treatment installations. For processes including the treatment of water based liquid wastes and biological treatment, this document contains BAT based emission limits for HCL, Volatile Organic Compounds (VOCs) ammonia, dust and odour. In addition, the European Commission Best Available Techniques (BAT) Reference Document for Waste Treatment (BREF)[5] provides a summary of air emissions data collected from various plants treating water based liquid wastes across Europe. It should be noted that this data is based on a wide range of plants with different treatment and abatement technologies. The following sections provide a discussion of the emissions identified in the above reference documents and a discussion of their relevance to the proposed plant.

Dust

4.2.2.2 Although there is a BAT ELV for dust for biological treatment, emissions of dust are not likely to be significant from emission point A1 based on the processes, which include the treatment of predominantly water based liquid wastes. It has also been confirmed by the EA that dust will accordingly not be included as a dust emission limit within the permit. Therefore, dust emissions have not been considered within this assessment.

Sulphur Oxides (SO_x), Nitrogen Oxides (NO_x) and Carbon Monoxide (CO)

4.2.2.3 SO_x, NO_x and CO emissions may arise from industrial processes predominantly as a result of high temperature processes such as combustion, incineration or thermal oxidation. There will be no such high temperature processes used in the proposed plant, processes being

4 COMMISSION IMPLEMENTING DECISION (EU) 2018/1147 Of 10 August 2018 Establishing Best Available Techniques (BAT) Conclusions For Waste Treatment, Under Directive 2010/75/EU Of The European Parliament And Of The Council.

5 Best Available Techniques (BAT) Reference Document for Waste Treatment, European Commission, 2018.

operated at ambient temperature. As such, emissions of SO_x, NO_x and CO have not been considered in this assessment.

Hydrogen Chloride

4.2.2.4 HCL may rise from water treatment processes through emissions from high temperature combustion processes or from the use of Hydrochloric Acid in the treatment process, such as for pH adjustment. There will be no high temperature treatment used in the proposed plant. However, Hydrochloric Acid will be used in the treatment process and there is a BAT based limit for HCL within the BAT Conclusions Document. Therefore, potential impacts from HCL emissions have been considered within this assessment based on assumption of continual emission at the upper end of the BAT ELV range.

Hydrogen Fluoride

4.2.2.5 Hydrogen Fluoride emissions can arise as a result of high temperature processes such as combustion or incineration and/or from use of fluorinated compounds in industrial processes, such as Hydrofluoric Acid. There will be no high temperature processes used in the plant, no use of Hydrofluoric Acid or other fluorinated chemicals in the treatment processes. Whilst it may be possible that some of the wastes may contain fluorinated compounds, these would likely be present at very low/trace concentrations and processes will not be operated at elevated temperatures. As such, the release of HF air emissions would not be expected to be significant and therefore have not been considered further within this assessment.

Hydrogen Cyanide

4.2.2.6 Hydrogen Cyanide (HCN) can be released in industrial processes during combustion of nitrogen and carbon containing substances or cyanide containing substances. As there will be no high temperature treatment processes used in the operation and no cyanide containing chemicals used in the treatment process, emissions of HCN are not considered relevant and therefore have not been considered further within this assessment.

Hydrogen Sulphide

4.2.2.7 Hydrogen Sulphide (H_2S) emissions can occur during the decomposition of sulphur proteins in materials. The EC BREF document outlines a range in emission concentrations of 0.00005 to 20mg.Nm^{-3} from plants treating water based liquid wastes. As a precautionary approach, H_2S emissions have been modelled for the proposed plant based on the upper end of this range.

Ammonia

4.2.2.8 Ammonia emissions may arise during the treatment of water based liquid wastes and the biological treatment measures. The EC BREF document outlines a range in emission concentrations of 0.00005 to 20mg.Nm^{-3} from plants treating water based liquid wastes. The BAT Conclusions Document outlines a BAT based ELV range of 0.3 to 20mg.Nm^{-3}. The BREF document states that the average reported ammonia concentration across all plants included in the data collection was 3mg.Nm^{-3}. In order to ensure a precautionary assessment, short term impacts (1-hour means) have been based on continual emission at the upper end of the BAT ELV range and annual mean impacts have been modelled based on an average emission level of 4mg.Nm^{-3}.

Metals

4.2.2.9 The BREF document presents emissions data for metals, including vapourous mercury and cadmium and non-vaporous metals. There will be no high temperature treatment processes used, and therefore, with the exception of mercury, vaporous metal emissions are not considered relevant to the assessment. Solid metal emissions would be expected to be bound to particulate matter/dust and therefore are not considered relevant to this assessment. Mercury can become vapourous at room temperature. Therefore, emissions of vapourous mercury have been considered in this assessment. The BREF outlines an emission concentration of 0.005mg.Nm^{-3} for

4.2.2.10

4.2.2.11 mercury from plants across Europe. This has been used as basis for this assessment.

Total VOCs and Organic Compounds

4.2.2.12 Total VOC emissions have been assessed based on the upper end of the BAT ELV Level (20 $mg.Nm^{-3}$). It has been assumed that all organic compound emissions would comprise 100% benzene, in accordance with the relevant guidance.

Dioxins and Furans

4.2.2.13 Dioxin and furan emissions from industrial processes may occur as a result of high temperature combustion processes and are therefore not relevant to this assessment.

Odour

4.2.2.14 The BAT Conclusions Document contains a limit for odour, but states that either the ELV for odour or ammonia will apply. This assessment has considered impacts based on ammonia emissions. Furthermore, the modelling of odour impacts is highly theoretical. The most appropriate way to control odour is through implementation of comprehensive odour abatement and implementation of Odour Management Plan (OMP) during day to day operation of the plant. An OMP has been prepared as part of the EP application.

Summary of Emission Rates Used in Assessment

4.2.2.15 Pollutants and associated emission rates included in this assessment are summarised in the table below with equivalent emission rates presented based on the discussion above.

4.2.2.16 The emissions concentrations are based on reference conditions of 273.15K, 101.3kPa and after correction for moisture. No data was provided for expected exhaust gas moisture in the exhaust gas from the abatement system. Therefore, no normalisation of flow rates was undertaken before calculating emission rates. The normalisation of flow rate for moisture would result in a lower flow rate and hence lower emission rate for use in the model. As such, this provides a precautionary assessment.

Table 4.2 – Pollutant Emission Rates Assigned in Model (Emission Point A1)

Pollutant	Emission Concentration (Normalised to 273.15K, 101.3KPa, dry gas, (mg.Nm^{-3})	Pollutant Emission Rates (g.s^{-1})
HCL	5	0.0346
Total Volatile Organic Carbon (TVOC)	20	0.138
Ammonia (short term impacts)	4	0.0276
Ammonia (long term impacts)	20	0.138
H_2S	2	0.0138
Mercury	0.005	0.0000346

4.2.3 Building Downwash

4.2.3.1 Significant on-site buildings and structures and relevant adjacent structures were digitised within the model based on site layout and elevation information provided by the site operator and a detailed drone survey of the site. As the closest buildings to the emission point, these would be expected to have an influence on pollutant dispersion. The table below contains information on buildings/structures included within the model. Reference should be made to Appendix I for a plan showing building/structure locations and orientation. The integrated Building Profile Input Programme (BPIP) module within AERMOD was used to assess the potential impact of building downwash upon predicted dispersion characteristics. Building downwash occurs when turbulence, induced by nearby structures, causes pollutants emitted from an elevated source to be displaced and dispersed rapidly towards the ground, resulting in elevated ground level concentrations. All buildings and structures were input into the BPIP processor.

Table 4.3 - Building Inputs

Structure	Length and Width (m)	Diameter (m) of Circular Structures	Max Height (m)
Structure A	25.72 x 21.01	-	9.954
Structure B	21.12 x 10.76	-	8.00

Structure	Length and Width (m)	Diameter (m) of Circular Structures	Max Height (m)
Structure C	20.4 x 25.4		9.6
Structure D	20.4 x 25.4		9.6

4.2.4 Meteorological Data

4.2.4.1 There are no official met stations in close proximity to the site. The closest are Biggin Hill, located approximately 33km to the North-West of the site and at an elevation of 182m and Southend, located approximately 33km to the North-East at an elevation of 15m. Biggin Hill is located at a significantly higher elevation than the site and Southend is located in a coastal location. As such, it was not considered that these sites would provide suitably representative data for use in this assessment.

4.2.4.2 Given the above, Numerical Weather Prediction (NWP) data at a resolution of approximately 4km was used in the assessment, specific to the site location. NWP has advantages over the use of data from met stations for the following reasons:

- NWP data generally has less gaps, which would otherwise have to be filled in traditional observational data, or excluded from the assessment;
- Calm periods in observational records may be overrepresented since the instrumentation may not record wind speeds below 0.5m/s;
- Observing stations may have local variation from the wider area, for example due to local topology characteristics and therefore may not necessarily be broadly representative of the site being modelled; and,
- The observing station is likely to be at a different elevation to the site being modelled.

4.2.4.3 NWP data for the site was provided by ADM Ltd, ready processed to be site specific for the proposed site. The following outlines the parameters assigned for Surface Roughness, Albedo and Bowen Ratio used for processing the met data.

Table 4.4 - Parameters for Surface Roughness, Albedo and Bowen Ratio

Parameter	Directional Sector	Value
Surface Roughness	All	0.5
Albedo	All	0.2465
Bowen Ratio	All	0.980

4.2.5 Assessment Area

4.2.5.1 Two uniform cartesian receptors grid were used to define the modelling domain. This included a high resolution grid, extended over a 2010m by 2010m area with a spacing of 15m in X and Y direction, centred over the emission source location. An additional uniform Cartesian receptor grid was extended over a 20,000m by 20,000m area with a grid spacing of 200m in X and Y direction, centred over the emission source location. This ensured the maximum point of impact could be captured. In addition, the discrete receptors identified previously were included within the model as cartesian receptors. All human receptor heights were set to 1.5m, representative of average breathing height. Ecological receptors heights were set to ground level (0.0m).

4.2.6 Terrain Data

4.2.6.1 Topographical features can have a significant impact on pollutant dispersion. Given that the gradient of the land between the site and receptors exceeds a gradient of 10% in places, terrain data was included in the model, in accordance with the relevant guidance[6]. The terrain data used was Ordnance Survey Terrain 5 data, which is 1:10,000 scale data, contoured at 5m vertical intervals. The digital terrain data was processed in AERMAP, the inbuilt terrain processor within AERMOD. This then applied elevation data to all sources, buildings and receptors within the modelling domain. The proposed site is part of a larger parcel of land that was previously granted planning permission for industrial development, including a number of industrial buildings. The land has recently been relevelled as part of

[6] LAQM.TG(16), DEFRA, 2016.

the development of the sites. As such, the OS data for the site and parcel of land to the East and North-East does not accurately reflect existing and proposed site levels. The OS terrain data was therefore adjusted to take account of the existing and proposed ground levels, using information obtained from plans approved under planning.

4.2.7 Model Scenarios

4.2.7.1 The scenarios modelled are contained within Table 4.5. It was assumed that the plant will be operational for 24 hours per day, 365 days per year, therefore providing a worst case scenario.

Table 4.5 – Model Scenarios

Pollutant	Modelled Scenarios
TVOC (as benzene)	Annual means, maximum 24-hour mean concentration across five years of met data
HCL	Annual means, maximum 1-hour mean concentration across five years of met data
Ammonia	Maximum 1-hour mean concentration across five years of met data, annual means
Hydrogen Sulphide	Annual means, maximum 24-hour mean concentration across five years of met data
Mercury	Maximum 24-hour and 1-hour mean concentration across five years of met data

4.3 Assessment of Potential Impacts

4.3.1 Methodology for Assessment of Potential Impacts at Human Receptors

4.3.1.1 In order to assess potential impacts, reference has been made to the permitting air emissions risk assessment guidance on the government website.[7]

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

4.3.1.2 The government guidance indicates that potential impacts from a process can be considered insignificant if the following screening criteria are met:

- The long term process contribution (PC) is <1% of the long term environmental standard; and/or,
- The short term PC is <10% of the short term environmental standard.

4.3.1.3 The guidance also indicates that more detailed assessment of emissions (modelling) for a process may be required if the following criteria are met:

- The long term PC + background concentration is >70% of the long term environmental standard; and/or
- The short term process contribution is >20% (Short term environmental standard minus twice annual mean background concentration).

4.3.1.4 If any of the criteria above are met for both short and long term modelled concentrations, it can be concluded that potential impacts will be acceptable and no requirement for further assessment, in accordance with the relevant guidance. If the above criteria are exceeded, the Predicted Environmental Concentration (PEC) is then compared to the relevant environmental standard. If the modelling shows that the relevant standard will be met at receptor locations confidence will be high that a breach of the standard will be unlikely, especially given the conservative assumptions which have been used throughout the assessment.

4.4 Model Verification and Uncertainty

4.4.1 It was not possible to verify model results as the plant is not yet operational.

4.4.2 There can be a significant degree in uncertainty in predications made by any atmospheric dispersion model, which needs to be considered when assessing results. Such uncertainty can arise as a result of model limitations, uncertainty in input data, including emissions estimates, meteorological data used and background pollutant concentrations used in the assessment.

4.4.3 AERMOD is a commonly used model produced by the US EPA and is approved for use in the UK by the EA. The model is well validated and the US EPA present the results of the model validation exercises undertaken on their website. These verify the output of the model in comparison to observed data for a number of scenarios, to ensure predictions are as accurate as possible. The model input code is periodically updated by the US EPA to resolve bugs and errors and to improve the output to take account of latest knowledge. The latest AERMOD model executable file has been used to run the model for the purpose of this assessment.

4.4.4 In addition to the choice of model, the following methods used in the assessment ensures that confidence can be high that potential impacts have not been underestimated:

- Worst case modelled concentrations across 5 years of meteorological data used in assessment;
- Assumption that the process will be operational for 100% of each year. This will not be the case in reality since the plant will not be operational on Sundays;
- Where possible, estimation of existing background pollutant concentrations has been highly conservative and precautionary;
- Worst case assumption that TVOC emissions consist entirely of benzene; and,
- Worst case assumptions made for receptor locations.

5 Model Results

5.1 Maximum Modelled Pollutant Concentrations

5.1.1 The tables below contain the maximum modelled pollutant concentrations at sensitive receptor concentrations, with comparison to the relevant AQLVs, EALs and critical levels. Maximum modelled concentrations from the five years of sequential data have been used to undertake assessment of potential impacts.

Table 5.1 – Modelled Annual Mean Benzene Concentrations at Receptor Locations

Receptor	Modelled PC to Annual Mean Benzene Concentrations for Each Year of Meteorological Data (µg.m^{-3})					Maximum PC to AQLV (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to AQLV (%)
	2019	2020	2021	2022	2023			
R1	0.1847	0.1422	0.14927	0.19301	0.15061	3.86	0.98	19.66
R2	0.21114	0.15747	0.16515	0.22151	0.17087	4.43	1.01	20.23
R3	0.23199	0.1691	0.17816	0.24406	0.18781	4.88	1.03	20.68
R4	0.2502	0.1754	0.1897	0.2674	0.2043	5.35	1.06	21.15
R5	0.265	0.18025	0.20161	0.29002	0.21862	5.80	1.08	21.60
R6	0.31216	0.21393	0.24756	0.34862	0.25807	6.97	1.14	22.77
R7	0.31913	0.23121	0.2779	0.36264	0.26327	7.25	1.15	23.05
R8	0.29992	0.31116	0.27332	0.29153	0.26881	6.22	1.10	22.02
R9	0.13739	0.11644	0.13197	0.12475	0.13205	2.75	0.93	18.55
R10	0.14205	0.12167	0.13695	0.12739	0.13723	2.84	0.93	18.64
R11	0.14892	0.1332	0.14551	0.13042	0.14647	2.98	0.94	18.78
R12	0.14999	0.14639	0.15255	0.12961	0.15641	3.13	0.95	18.93
R13	0.14973	0.15017	0.15414	0.1296	0.15878	3.18	0.95	18.98
R14	0.11867	0.13911	0.13051	0.12227	0.13961	2.79	0.93	18.59
R15	0.10635	0.13557	0.1189	0.11236	0.12589	2.71	0.93	18.51
R16	0.1042	0.13491	0.10736	0.10468	0.11083	2.70	0.92	18.50
R17	0.09198	0.10579	0.08671	0.08694	0.0893	2.12	0.90	17.92
R18	0.09041	0.09362	0.08186	0.08295	0.08482	1.87	0.88	17.67
R19	0.2429	0.1703	0.2449	0.19636	0.16743	4.90	1.03	20.70
R20	0.13874	0.14138	0.14999	0.14434	0.12347	3.00	0.94	18.80

Receptor	Modelled PC to Annual Mean Benzene Concentrations for Each Year of Meteorological Data (μg.m^{-3})					Maximum PC to AQLV (%)	Maximum PEC (μg.m^{-3})	Contribution of PEC to AQLV (%)
	2019	2020	2021	2022	2023			
R21	0.0431	0.03592	0.03541	0.03941	0.03619	0.86	0.83	16.66
R22	0.04477	0.03731	0.03699	0.04132	0.03787	0.90	0.83	16.70
R23	0.04794	0.03998	0.04012	0.04496	0.041	0.96	0.84	16.76
R24	0.05485	0.04541	0.04811	0.05533	0.04778	1.11	0.85	16.91

Table 5.2 – Maximum Modelled 24-Hour Mean Benzene Concentrations at Receptor Locations

Receptor	Maximum Modelled PC to 24-Hour Mean Benzene Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R1	2.46689	8.22	3.40	11.32	8.49
R2	2.93539	9.78	3.87	12.88	10.10
R3	3.27718	10.92	4.21	14.02	11.27
R4	3.91887	13.06	4.85	16.16	13.48
R5	4.3008	14.34	5.23	17.44	14.79
R6	4.22916	14.10	5.16	17.20	14.55
R7	3.70268	12.34	4.63	15.44	12.74
R8	5.15208	17.17	6.08	20.27	17.72
R9	1.48145	4.94	2.41	8.04	5.10
R10	1.53068	5.10	2.46	8.20	5.27
R11	1.83847	6.13	2.77	9.23	6.32
R12	1.7655	5.89	2.70	8.99	6.07
R13	1.9927	6.64	2.92	9.74	6.85
R14	2.09891	7.00	3.03	10.10	7.22
R15	2.00514	6.68	2.94	9.78	6.90
R16	2.09062	6.97	3.02	10.07	7.19
R17	1.85397	6.18	2.78	9.28	6.38
R18	1.82695	6.09	2.76	9.19	6.28
R19	4.15765	13.86	5.09	16.96	14.30
R20	2.39447	7.98	3.32	11.08	8.24

Receptor	Maximum Modelled PC to 24-Hour Mean Benzene Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R21	0.55811	1.86	1.49	4.96	1.92
R22	0.6426	2.14	1.57	5.24	2.21
R23	0.76318	2.54	1.69	5.64	2.63
R24	1.01243	3.37	1.94	6.47	3.48

Table 5.3 – Maximum Modelled 1-Hour Mean HCL Concentrations at Receptor Locations

Receptor	Maximum Modelled PC to 1-Hour Mean HCL Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R1	3.61479	0.48	5.13	0.68	0.48
R2	3.61264	0.48	5.12	0.68	0.48
R3	3.57642	0.48	5.09	0.68	0.48
R4	4.24352	0.57	5.76	0.77	0.57
R5	4.52103	0.60	6.03	0.80	0.60
R6	5.09473	0.68	6.61	0.88	0.68
R7	5.24439	0.70	6.76	0.90	0.70
R8	5.36596	0.72	6.88	0.92	0.72
R9	2.18524	0.29	3.70	0.49	0.29
R10	2.4777	0.33	3.99	0.53	0.33
R11	3.34068	0.45	4.85	0.65	0.45
R12	2.89574	0.39	4.41	0.59	0.39
R13	3.34687	0.45	4.86	0.65	0.45
R14	4.19498	0.56	5.71	0.76	0.56
R15	4.90374	0.65	6.42	0.86	0.66
R16	4.37018	0.58	5.88	0.78	0.58
R17	4.26567	0.57	5.78	0.77	0.57
R18	3.84588	0.51	5.36	0.71	0.51
R19	7.18867	0.96	8.70	1.16	0.96
R20	2.798	0.37	4.31	0.57	0.37

Receptor	Maximum Modelled PC to 1-Hour Mean HCL Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R21	1.24304	0.17	2.76	0.37	0.17
R22	1.29609	0.17	2.81	0.37	0.17
R23	1.37044	0.18	2.88	0.38	0.18
R24	1.57673	0.21	3.09	0.41	0.21
Maximum Point of Impact	90.97464	12.13	92.49	12.33	12.15

Table 5.4 – Modelled Annual Mean Ammonia Concentrations at Human Receptor Locations

Receptor	Modelled PC to Annual Mean Ammonia Concentrations for Each Year of Meteorological Data ($\mu g.m^{-3}$)					Maximum PC to EAL (%)	Maximum PEC ($\mu g.m^{-3}$)	Contribution of PEC to EAL (%)
	2019	2020	2021	2022	2023			
R1	0.03694	0.02844	0.02985	0.0386	0.03012	0.0214	3.74	2.08
R2	0.04223	0.03149	0.03303	0.0443	0.03417	0.0246	3.74	2.08
R3	0.0464	0.03382	0.03563	0.04881	0.03756	0.0271	3.75	2.08
R4	0.05004	0.03508	0.03794	0.05348	0.04086	0.0297	3.75	2.09
R5	0.053	0.03605	0.04032	0.05801	0.04372	0.0322	3.76	2.09
R6	0.06243	0.04279	0.04951	0.06973	0.05162	0.0387	3.77	2.09
R7	0.06382	0.04624	0.05558	0.07252	0.05265	0.0403	3.77	2.10
R8	0.05998	0.06222	0.05466	0.0583	0.05376	0.0346	3.76	2.09
R9	0.02748	0.02329	0.02639	0.02495	0.02641	0.0153	3.73	2.07
R10	0.02841	0.02433	0.02739	0.02548	0.02745	0.0158	3.73	2.07
R11	0.02978	0.02664	0.0291	0.02608	0.02929	0.0165	3.73	2.07
R12	0.03	0.02928	0.03051	0.02592	0.03128	0.0174	3.73	2.07
R13	0.02995	0.03003	0.03083	0.02592	0.03176	0.0176	3.73	2.07
R14	0.02373	0.02782	0.0261	0.02445	0.02792	0.0155	3.73	2.07
R15	0.02127	0.02711	0.02378	0.02247	0.02518	0.0151	3.73	2.07
R16	0.02084	0.02698	0.02147	0.02094	0.02217	0.0150	3.73	2.07
R17	0.0184	0.02116	0.01734	0.01739	0.01786	0.0118	3.72	2.07
R18	0.01808	0.01872	0.01637	0.01659	0.01696	0.0104	3.72	2.07
R19	0.04858	0.03406	0.04898	0.03927	0.03348	0.0272	3.75	2.08

Receptor	Modelled PC to Annual Mean Ammonia Concentrations for Each Year of Meteorological Data (µg.m^{-3})					Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)
	2019	2020	2021	2022	2023			
R20	0.02775	0.02828	0.03	0.02887	0.02469	0.0167	3.73	2.07
R21	0.00862	0.00718	0.00708	0.00788	0.00724	0.0048	3.71	2.06
R22	0.00895	0.00746	0.0074	0.00826	0.00757	0.0050	3.71	2.06
R23	0.00959	0.008	0.00802	0.00899	0.0082	0.0053	3.71	2.06
R24	0.01097	0.00908	0.00962	0.01107	0.00956	0.0062	3.71	2.06

Table 5.5 – Maximum Modelled 1-Hour Mean Ammonia Concentrations at Receptor Locations

Receptor	Maximum Modelled PC to 1-Hour Mean Ammonia Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R1	14.41737	0.58	21.82	0.87	0.58
R2	14.40881	0.58	21.81	0.87	0.58
R3	14.26432	0.57	21.66	0.87	0.57
R4	16.92503	0.68	24.33	0.97	0.68
R5	18.03185	0.72	25.43	1.02	0.72
R6	20.32002	0.81	27.72	1.11	0.82
R7	20.91694	0.84	28.32	1.13	0.84
R8	21.4018	0.86	28.80	1.15	0.86
R9	8.71568	0.35	16.12	0.64	0.35
R10	9.88214	0.40	17.28	0.69	0.40
R11	13.3241	0.53	20.72	0.83	0.53
R12	11.54947	0.46	18.95	0.76	0.46
R13	13.3488	0.53	20.75	0.83	0.54
R14	16.73142	0.67	24.13	0.97	0.67
R15	19.55827	0.78	26.96	1.08	0.78
R16	17.43019	0.70	24.83	0.99	0.70
R17	17.01336	0.68	24.41	0.98	0.68
R18	15.33906	0.61	22.74	0.91	0.62
R19	28.67158	1.15	36.07	1.44	1.15
R20	11.15963	0.45	18.56	0.74	0.45
R21	4.95778	0.20	12.36	0.49	0.20

Receptor	Maximum Modelled PC to 1-Hour Mean Ammonia Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R22	5.16938	0.21	12.57	0.50	0.21
R23	5.46593	0.22	12.87	0.51	0.22
R24	6.28868	0.25	13.69	0.55	0.25
Maximum Point of Impact	362.84683	14.51	370.25	14.81	14.56

Table 5.6 – Maximum Modelled 24-Hour Mean Mercury Concentrations at Receptor Locations

Receptor	Maximum Modelled PC to 24-Hour Mean Mercury Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)
R1	0.00062	1.03	0.00502	8.37
R2	0.00074	1.23	0.00514	8.57
R3	0.00082	1.37	0.00522	8.70
R4	0.00098	1.63	0.00538	8.97
R5	0.00108	1.80	0.00548	9.13
R6	0.00106	1.77	0.00546	9.10
R7	0.00093	1.55	0.00533	8.88
R8	0.00129	2.15	0.00569	9.48
R9	0.00037	0.62	0.00477	7.95
R10	0.00038	0.63	0.00478	7.97
R11	0.00046	0.77	0.00486	8.10
R12	0.00044	0.73	0.00484	8.07
R13	0.0005	0.83	0.00490	8.17
R14	0.00053	0.88	0.00493	8.22
R15	0.0005	0.83	0.00490	8.17
R16	0.00052	0.87	0.00492	8.20
R17	0.00046	0.77	0.00486	8.10
R18	0.00046	0.77	0.00486	8.10
R19	0.00104	1.73	0.00544	9.07
R20	0.0006	1.00	0.00500	8.33

Receptor	Maximum Modelled PC to 24-Hour Mean Mercury Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)
R21	0.00014	0.23	0.00454	7.57
R22	0.00016	0.27	0.00456	7.60
R23	0.00019	0.32	0.00459	7.65
R24	0.00025	0.42	0.00465	7.75

Table 5.7 – Maximum Modelled 1-Hour Mean Mercury Concentrations at Receptor Locations

Receptor	Maximum Modelled PC to 1-Hour Mean Mercury Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R1	0.00361	0.60	0.01101	1.84	0.61
R2	0.00361	0.60	0.01101	1.84	0.61
R3	0.00358	0.60	0.01098	1.83	0.60
R4	0.00424	0.71	0.01164	1.94	0.72
R5	0.00452	0.75	0.01192	1.99	0.76
R6	0.00509	0.85	0.01249	2.08	0.86
R7	0.00524	0.87	0.01264	2.11	0.88
R8	0.00537	0.90	0.01277	2.13	0.91
R9	0.00219	0.37	0.00959	1.60	0.37
R10	0.00248	0.41	0.00988	1.65	0.42
R11	0.00334	0.56	0.01074	1.79	0.56
R12	0.0029	0.48	0.01030	1.72	0.49
R13	0.00335	0.56	0.01075	1.79	0.57
R14	0.00419	0.70	0.01159	1.93	0.71
R15	0.0049	0.82	0.01230	2.05	0.83
R16	0.00437	0.73	0.01177	1.96	0.74
R17	0.00427	0.71	0.01167	1.95	0.72
R18	0.00385	0.64	0.01125	1.88	0.65
R19	0.00719	1.20	0.01459	2.43	1.21
R20	0.0028	0.47	0.01020	1.70	0.47
R21	0.00124	0.21	0.00864	1.44	0.21

Receptor	Maximum Modelled PC to 1-Hour Mean Mercury Concentrations (µg.m^{-3})	Maximum PC to EAL (%)	Maximum PEC (µg.m^{-3})	Contribution of PEC to EAL (%)	Maximum PC As Percentage of (EAL Minus Background Concentration), %
R22	0.0013	0.22	0.00870	1.45	0.22
R23	0.00137	0.23	0.00877	1.46	0.23
R24	0.00158	0.26	0.00898	1.50	0.27
Maximum Point of Impact	0.09097	15.16	0.09837	16.40	15.35

Table 5.8 – Modelled Annual Mean Hydrogen Sulphide Concentrations at Receptor Locations

Receptor	Modelled PC to Annual Mean Hydrogen Sulphide Concentrations for Each Year of Meteorological Data (µg.m^{-3})					Maximum PC to EAL (%)
	2019	2020	2021	2022	2023	
R1	0.01847	0.01422	0.01493	0.0193	0.01506	0.014
R2	0.02111	0.01575	0.01652	0.02215	0.01709	0.016
R3	0.0232	0.01691	0.01782	0.02441	0.01878	0.017
R4	0.02502	0.01754	0.01897	0.02674	0.02043	0.019
R5	0.0265	0.01803	0.02016	0.029	0.02186	0.021
R6	0.03122	0.02139	0.02476	0.03486	0.02581	0.025
R7	0.03191	0.02312	0.02779	0.03626	0.02633	0.026
R8	0.02999	0.03111	0.02733	0.02915	0.02688	0.022
R9	0.01374	0.01164	0.0132	0.01247	0.0132	0.010
R10	0.0142	0.01217	0.01369	0.01274	0.01372	0.010
R11	0.01489	0.01332	0.01455	0.01304	0.01465	0.011
R12	0.015	0.01464	0.01525	0.01296	0.01564	0.011
R13	0.01497	0.01502	0.01541	0.01296	0.01588	0.011
R14	0.01187	0.01391	0.01305	0.01223	0.01396	0.010
R15	0.01064	0.01356	0.01189	0.01124	0.01259	0.010
R16	0.01042	0.01349	0.01074	0.01047	0.01108	0.010
R17	0.0092	0.01058	0.00867	0.00869	0.00893	0.008
R18	0.00904	0.00936	0.00819	0.0083	0.00848	0.007
R19	0.02429	0.01703	0.02449	0.01964	0.01674	0.017
R20	0.01387	0.01414	0.015	0.01443	0.01235	0.011

Receptor	Modelled PC to Annual Mean Hydrogen Sulphide Concentrations for Each Year of Meteorological Data (µg.m^{-3})					Maximum PC to EAL (%)
	2019	2020	2021	2022	2023	
R21	0.00431	0.00359	0.00354	0.00394	0.00362	0.003
R22	0.00448	0.00373	0.0037	0.00413	0.00379	0.003
R23	0.00479	0.004	0.00401	0.0045	0.0041	0.003
R24	0.00548	0.00454	0.00481	0.00553	0.00478	0.004

Table 5.9 – Maximum Modelled 24-Hour Mean Hydrogen Sulphide Concentrations at Receptor Locations

Receptor	Maximum Modelled PC to 24-Hour Mean Hydrogen Sulphide Concentrations (μg.m^{-3})	Maximum PC to EAL (%)
R1	0.24669	0.16
R2	0.29354	0.20
R3	0.32773	0.22
R4	0.3919	0.26
R5	0.43012	0.29
R6	0.42294	0.28
R7	0.37027	0.25
R8	0.51497	0.34
R9	0.14815	0.10
R10	0.15307	0.10
R11	0.18385	0.12
R12	0.17655	0.12
R13	0.19927	0.13
R14	0.20989	0.14
R15	0.20051	0.13
R16	0.20906	0.14
R17	0.1854	0.12
R18	0.1827	0.12
R19	0.41575	0.28
R20	0.23945	0.16

Receptor	Maximum Modelled PC to 24-Hour Mean Hydrogen Sulphide Concentrations ($\mu g.m^{-3}$)	Maximum PC to EAL (%)
R21	0.05581	0.04
R22	0.06426	0.04
R23	0.07632	0.05
R24	0.10124	0.07

Table 5.10 – Modelled Annual Mean Ammonia Concentrations at Ecological Receptor Locations

Receptor	Modelled PC to Annual Mean Ammonia Concentrations for Each Year of Meteorological Data ($\mu g.m^{-3}$)					Maximum PC to Critical Level (%)	Maximum PEC ($\mu g.m^{-3}$)	Contribution of PEC to Critical Level (%)
	2019	2020	2021	2022	2023			
R25	0.0091	0.00873	0.00834	0.00847	0.00878	0.91	3.71	370.91
R26	0.00099	0.00061	0.00083	0.00124	0.00089	0.12	3.70	370.12
R27	0.00058	0.00054	0.0006	0.00045	0.00057	0.06	3.70	370.06
R28	0.2747	0.22624	0.31038	0.24953	0.24073	31.04	4.01	401.04
R29	0.62072	0.62653	0.58583	0.6102	0.57172	62.65	4.33	432.65
R30	0.217	0.16718	0.22732	0.19195	0.16022	22.73	3.93	392.73
R31	0.20413	0.19944	0.18881	0.19336	0.18872	20.41	3.90	390.41
R32	0.11138	0.10248	0.10901	0.09971	0.11266	11.27	3.81	381.27
R33	0.01869	0.01784	0.016	0.01648	0.01674	1.87	3.72	371.87
R34	0.02055	0.02073	0.01805	0.01838	0.0183	2.07	3.72	372.07
R35	0.00629	0.006	0.00589	0.00584	0.00618	0.63	3.71	370.63
R36	0.00218	0.00233	0.0021	0.00211	0.00204	0.23	3.70	370.23
R37	0.02072	0.01494	0.01613	0.02193	0.01674	2.19	3.72	372.19
R38	0.00643	0.0052	0.00555	0.00685	0.0054	0.69	3.71	370.69
R39	0.00478	0.00682	0.00513	0.00492	0.00515	0.68	3.71	370.68
R40	0.00748	0.00651	0.00688	0.00687	0.0058	0.75	3.71	370.75
R41	0.01162	0.01004	0.01249	0.0099	0.01026	1.25	3.71	371.25
R42	0.01679	0.01751	0.0215	0.01763	0.01775	2.15	3.72	372.15
R43	0.01415	0.01455	0.01813	0.01571	0.01388	1.81	3.72	371.81

Receptor	Modelled PC to Annual Mean Ammonia Concentrations for Each Year of Meteorological Data ($\mu g.m^{-3}$)					Maximum PC to Critical Level (%)	Maximum PEC ($\mu g.m^{-3}$)	Contribution of PEC to Critical Level (%)
	2019	2020	2021	2022	2023			
R44	0.00957	0.0102	0.01186	0.01105	0.00869	1.19	3.71	371.19
R45	0.00588	0.00377	0.00533	0.00444	0.0042	0.59	3.71	370.59
R46	0.0091	0.00873	0.00834	0.00847	0.00878	0.91	3.71	370.91
R47	0.00746	0.00659	0.00653	0.00714	0.00645	0.75	3.71	370.75
R48	0.03935	0.04051	0.0408	0.0347	0.04207	4.21	3.74	374.21

5.2 Assessment of Potential Impacts at Human Receptors

5.2.1 Long Term AQLVs

5.2.1.1 The PEC for annual mean benzene concentrations is <70% of the AQLV at all relevant receptor locations.

5.2.1.2 The PC to the annual mean EAL for ammonia is <1% at all relevant receptor locations.

5.2.1.3 The PC to the annual mean EAL for Hydrogen Sulphide is <1% at all relevant receptor locations.

5.2.1.4 Therefore, given the above, potential long term impacts at human receptor locations are not predicted to be significant.

5.2.2 Short Term EALs

5.2.2.1 Although the modelled PC to the 24-hour mean EAL for benzene exceeds 10% at some receptor locations, the PEC is substantially below the EAL at all relevant receptor locations, the maximum PEC being 20.27% at receptor R8. Furthermore, the maximum modelled PC is less than 20% of the EAL minus background concentration at all relevant receptors, the highest being 17.72% at Receptor R8.

5.2.2.2 The modelled PC to the 1-hour mean EAL for HCL is less than 10% at Receptors R1 to R24. At the maximum point of impact surrounding the plant, the PC is 12.13% of the EAL. However, the PC is less than 20% of the EAL minus background concentration (12.15%).

5.2.2.3 The modelled PC to 24-hour mean Hydrogen Sulphide EAL is less than 10% at all relevant receptor locations.

5.2.2.4 The modelled PC to the 1-hour mean EAL for ammonia is less than 10% at Receptors R1 to R24. At the maximum point of impact surrounding the plant, the PC is 14.51% of the EAL. However, the PC is less than 20% of the EAL minus background concentration (14.56%).

5.2.2.5 Therefore, given the above, potential short term impacts are not predicted to be significant.

5.3 Assessment of Potential Impacts on Critical Levels at Ecological Receptors

5.3.1 Critical Levels

5.3.2 The modelled PC to critical level for annual mean ammonia concentrations is <1% at Receptors R25 to R27. As such potential impacts are not predicted to be significant at SSSIs and European Sites.

5.3.3 The modelled PC to critical level for annual mean ammonia concentrations is <100% at Receptors R28 to R48. As such potential impacts are not predicted to be significant at Local Nature Sites.

5.3.1 Critical Loads for Nitrogen Deposition

5.3.1.1 The maximum PC to nitrogen deposition has been calculated from the predicted annual ammonia concentrations, in accordance with the relevant guidance using the following formula:

$$F = \left(\frac{Vd \ \times C \times 10000}{1000000000}\right) \times 0.3 \times 31536000$$

Where: F = deposition flux (Kg N.ha^{-1}.Year^{-1})

V_d = nitrogen dry deposition velocity, assumed to be 0.03m.s^{-1} (precautionary, assuming all sensitive vegetation is tall vegetation)

C = predicted annual mean ammonia concentration (µg.m^{-3})

10000 = conversion from m^2 to hectares (ha)

1000000000 = conversion from µg to Kg

0.824 = fraction of ammonia that is N

31536000 = conversion from seconds to year

5.3.1.2 Calculated annual nitrogen deposition at relevant receptors is presented in the table below.

5.3.1.3 The modelled PC to annual nitrogen deposition is less than 1% of the critical load at Receptors R25 to R27 (SSSIs and European Sites) and less than 100% of the critical load at Local Nature Sites. As such, potential impacts screen out as insignificant in accordance with the relevant assessment methodology.

Table 5.11 - Calculated Annual Nitrogen Deposition at Ecological Receptors

Receptor	Maximum Modelled Annual Mean Ammonia Concentration ($\mu g.m^{-3}$)	Calculated PC to Annual Nitrogen Deposition (Kg $N.ha^{-1}.Year^{-1}$) Based on Annual Mean Ammonia Concentrations	PC as Percentage Contribution to Critical Load for Annual Nitrogen Deposition (%)
R25	0.00910	0.07094	0.71
R26	0.00124	0.00967	0.10
R27	0.00060	0.00468	0.05
R28	0.31038	2.41963	48.39
R29	0.62653	4.88424	97.68
R30	0.22732	1.77212	35.44
R31	0.20413	1.59134	31.83
R32	0.11266	0.87826	17.57
R33	0.01869	0.14570	2.91
R34	0.02073	0.16160	3.23
R35	0.00629	0.04903	0.98
R36	0.00233	0.01816	0.36
R37	0.02193	0.17096	3.42
R38	0.00685	0.05340	1.07
R39	0.00682	0.05317	1.06
R40	0.00748	0.05831	1.17
R41	0.01249	0.09737	1.95
R42	0.02150	0.16761	3.35
R43	0.01813	0.14134	2.83
R44	0.01186	0.09246	1.85
R45	0.00588	0.04584	0.92
R46	0.00910	0.07094	1.42
R47	0.00746	0.05816	1.16
R48	0.04207	0.32797	6.56

5.3.2 Critical Loads for Acid Deposition

5.3.2.1 The potential PC to acid deposition across relevant ecological sites can be calculated by converting nitrogen and HCL deposition predictions to kiloequivalents (keq.ha^{-1}.Year^{-1}) using the following assumptions:

- 1 keq N.ha^{-1}.Year^{-1} is equal to 14kg N.ha^{-1}.Year^{-1}; and,
- 1keq HCL.ha^{-1}.Year^{-1} is equal to 36.45kg HCL.ha^{-1}.Year^{-1}

5.3.2.2 Potential HCL deposition across ecological sites was calculated in a similar fashion to nitrogen deposition, using the following equation and assumptions:

$$F = \left(\frac{Vd \ \times C \times 10000}{1000000000}\right) \times 31536000$$

Where: F = deposition flux (Kg HCL.ha^{-1}.Year^{-1})

V_d = HCL dry deposition velocity, assumed to be 0.06m.s^{-1}(precautionary, assuming all sensitive vegetation is tall vegetation)

C = predicted annual mean HCL concentration (µg.m^{-3})

10000 = conversion from m^2 to hectares (ha)

1000000000 = conversion from µg to Kg

31536000 = conversion from seconds to year

5.3.2.3 Based upon the above, the following table summarises annual nitrogen and HCL deposition, total PC to annual acid deposition at ecological receptors due to nitrogen and HCL and percentage contribution to critical load function for nitrogen (CLmaxN).

5.3.2.4 The modelled PC to annual acid deposition is less than 1% of the critical load function at Receptors R25 to R27 (SSSIs and European Sites) and less than 100% of the critical load at Local Nature Sites. As such, potential impacts screen out as insignificant in accordance with the relevant assessment methodology.

Table 5.12 - Calculated Acid Deposition at Ecological Receptors

Receptor	Calculated PC to Annual Nitrogen Deposition (Kg N.ha^{-1}.Year^{-1}) Based on Modelled Annual Mean Ammonia Concentrations	Calculated PC to Annual HCL Deposition (Kg HCL.ha^{-1}.Year^{-1}) Based on Modelled Annual Mean HCL Concentration	Total PC to Annual Acid Deposition Due to Nitrogen and HCL (keq.ha^{-1}. Year^{-1})	PC as Percentage Contribution to CLMaxN (%)
R25	0.07094	0.21590	0.01099	0.55
R26	0.00967	0.02933	0.00150	0.03
R27	0.00468	0.01438	0.00073	0.04
R28	2.41963	7.36239	0.37482	12.38
R29	4.88424	14.86159	0.75660	24.99
R30	1.77212	5.39228	0.27452	28.51
R31	1.59134	4.84204	0.24651	8.14
R32	0.87826	2.67230	0.13605	4.49
R33	0.14570	0.44333	0.02257	0.75
R34	0.16160	0.49177	0.02503	0.23
R35	0.04903	0.14910	0.00759	0.38
R36	0.01816	0.05525	0.00281	0.06
R37	0.17096	0.52015	0.02648	1.27
R38	0.05340	0.16254	0.00827	0.40
R39	0.05317	0.16178	0.00824	0.27
R40	0.05831	0.17748	0.00903	0.30
R41	0.09737	0.29631	0.01508	1.57
R42	0.16761	0.51013	0.02597	2.70
R43	0.14134	0.43009	0.02189	2.27
R44	0.09246	0.28117	0.01432	1.49
R45	0.04584	0.13945	0.00710	0.25
R46	0.07094	0.21590	0.01099	0.55
R47	0.05816	0.17692	0.00901	0.91
R48	0.32797	0.99811	0.05081	1.05

6 Conclusions

6.1 An assessment of potential air quality impacts has been undertaken for the proposed operation of waste treatment facility to be located at St Michaels Close, Aylesford. Modelling has been undertaken using AERMOD to quantify potential resulting long and short-term pollutant concentrations at surrounding receptor locations as a result of operation of the proposed plant. A series of highly conservative assumptions have been made within the report, resulting in a highly precautionary assessment.

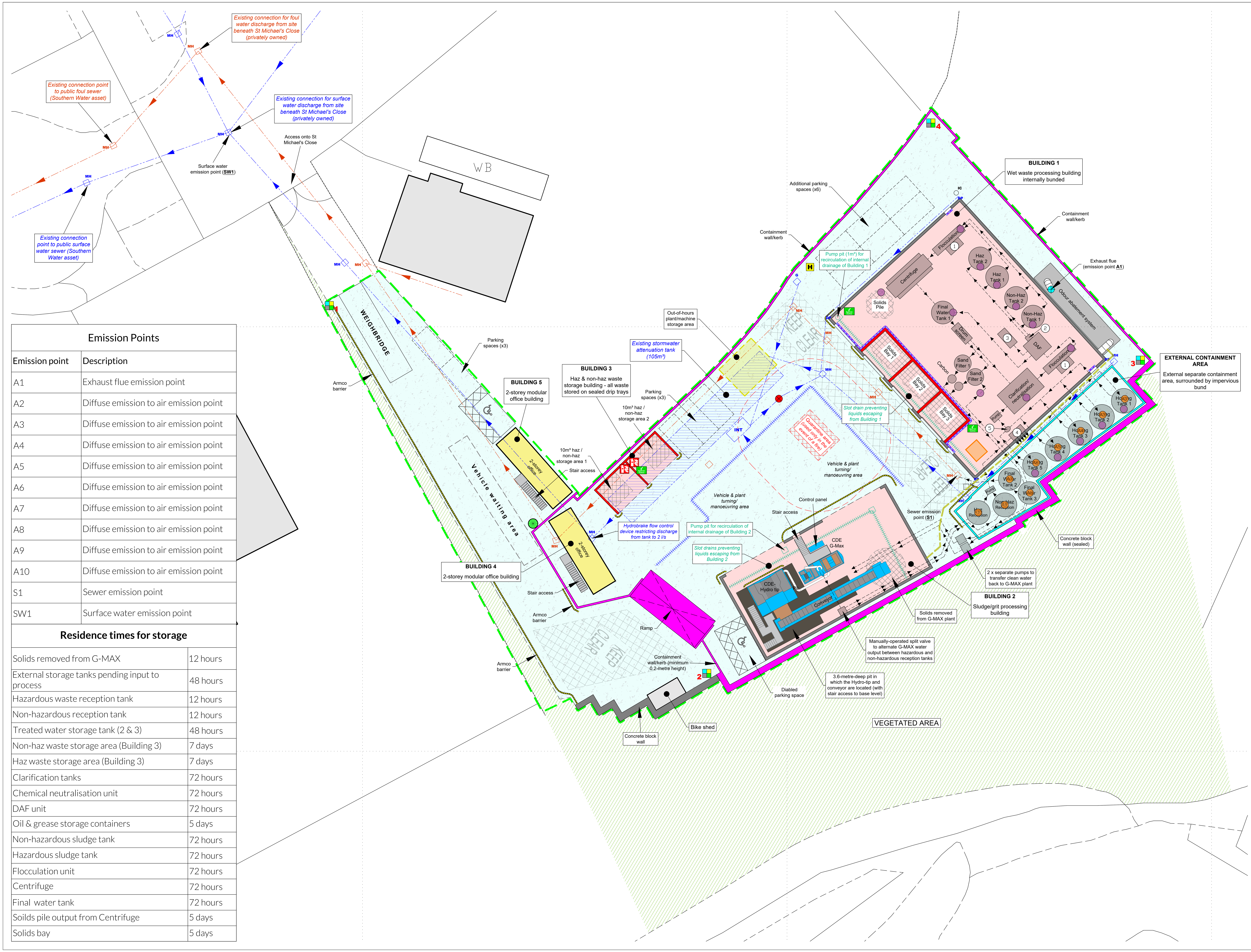
6.2 No significant impacts are predicted on long and short term AQLVs/EALS at any receptor locations and no exceedences of relevant AQLVs and EALs are predicted at any relevant locations of exposure.

6.2 No significant impacts are predicted on ecological receptors as a result of residual emissions from the proposed plant, the PCs to critical levels and loads for nitrogen deposition being less than 100% at Local Nature Site and less than 1% at SSSIs and European ecological sites.

6.4 Given the above, the model results have demonstrated that the proposals will not generate any significant adverse impacts on local air quality. Confidence in this prediction is high, given the conservative assumptions made within the assessment.

Appendix I

Site Plans



Emission Points

Emission point	Description
A1	Exhaust flue emission point
A2	Diffuse emission to air emission point
A3	Diffuse emission to air emission point
A4	Diffuse emission to air emission point
A5	Diffuse emission to air emission point
A6	Diffuse emission to air emission point
A7	Diffuse emission to air emission point
A8	Diffuse emission to air emission point
A9	Diffuse emission to air emission point
A10	Diffuse emission to air emission point
S1	Sewer emission point
SW1	Surface water emission point

Residence times for storage

Solids removed from G-MAX	12 hours
External storage tanks pending input to process	48 hours
Hazardous waste reception tank	12 hours
Non-hazardous reception tank	12 hours
Treated water storage tank (2 & 3)	48 hours
Non-haz waste storage area (Building 3)	7 days
Haz waste storage area (Building 3)	7 days
Clarification tanks	72 hours
Chemical neutralisation unit	72 hours
DAF unit	72 hours
Oil & grease storage containers	5 days
Non-hazardous sludge tank	72 hours
Hazardous sludge tank	72 hours
Flocculation unit	72 hours
Centrifuge	72 hours
Final water tank	72 hours
Soilds pile output from Centrifuge	5 days
Solids bay	5 days

NOTES

Drawing for indication only. Reproduced with the permission of the controller of H.M.S.O.

REVISION HISTORY

Rev:	Date:	Init:	Description:
-	08.11.23	RS/IA	Initial drawing
A	07.03.24	JH	Amendment
B	08.03.24	JH	Parking added
C	11.06.24	JH	Working amendment
D	19.06.24	RS	Application submission
E	26.06.24	RS	Quarantine area added
F	01.10.24	IA	Emission point added
G	24.10.25	RS	Schedule 5 response update
H	05.11.25	RS	Crash barriers added
J	06.11.25	RS	Minor amendment
K	10.03.26	JH	Amendment
L	10.03.26	JH	Amendment
M	12.03.26	JH	Amendment

KEY:

- Permit boundary
- Chemicals and raw materials storage area
- Out-of-hours plant storage area
- Extent of concrete surfacing within the permit boundary
- Unsurfaced areas (freely-draining to ground)
- Bund wall around external containment area
- Perimeter bunding around main facility (including access ramp)
- Fire wall
- Bunding around the thresholds of Building 1
- Vehicle crash barrier (Armco, or similar)
- INT Full retention oil interceptor (fitted with penstock valve)
- Piped surface drainage (surface, foul, building)
- Linear slot drains (aco or similar) - (surface, building)
- MH Manhole (foul, surface, building)
- IC Inspection cover (other services)
- G Gully
- Quarantine area (only used in the event of a fire and kept clear at all other times
- 6 metre separation distance around the quarantine area where no other combustible wastes will be stored
- Penstock valve remotely deployable in the event of an emergency or spill to shut-off yard drainage preventing site discharge to surface water system
- Bunded fuel tank (1,340 litre or similar)
- H On-site fire hydrant
- Numbered boundary odour monitoring points (indicative)
- Dosing points
- Venting points
- Odour control lines
- Firefighting equipment/extinguishers (indicative locations)
- Spill kits (indicative locations)

Additional point references

Item	Description
1	Polymer make-up system
2	Solid sludge hopper
3	Waste oils/grease (IBCs)
4	5-way manifold
5	Flush point

N

Scale Bar (1:200) 0 2 4 6 8 10m

Oaktree Environmental Ltd
Waste, Planning and Environmental Consultants

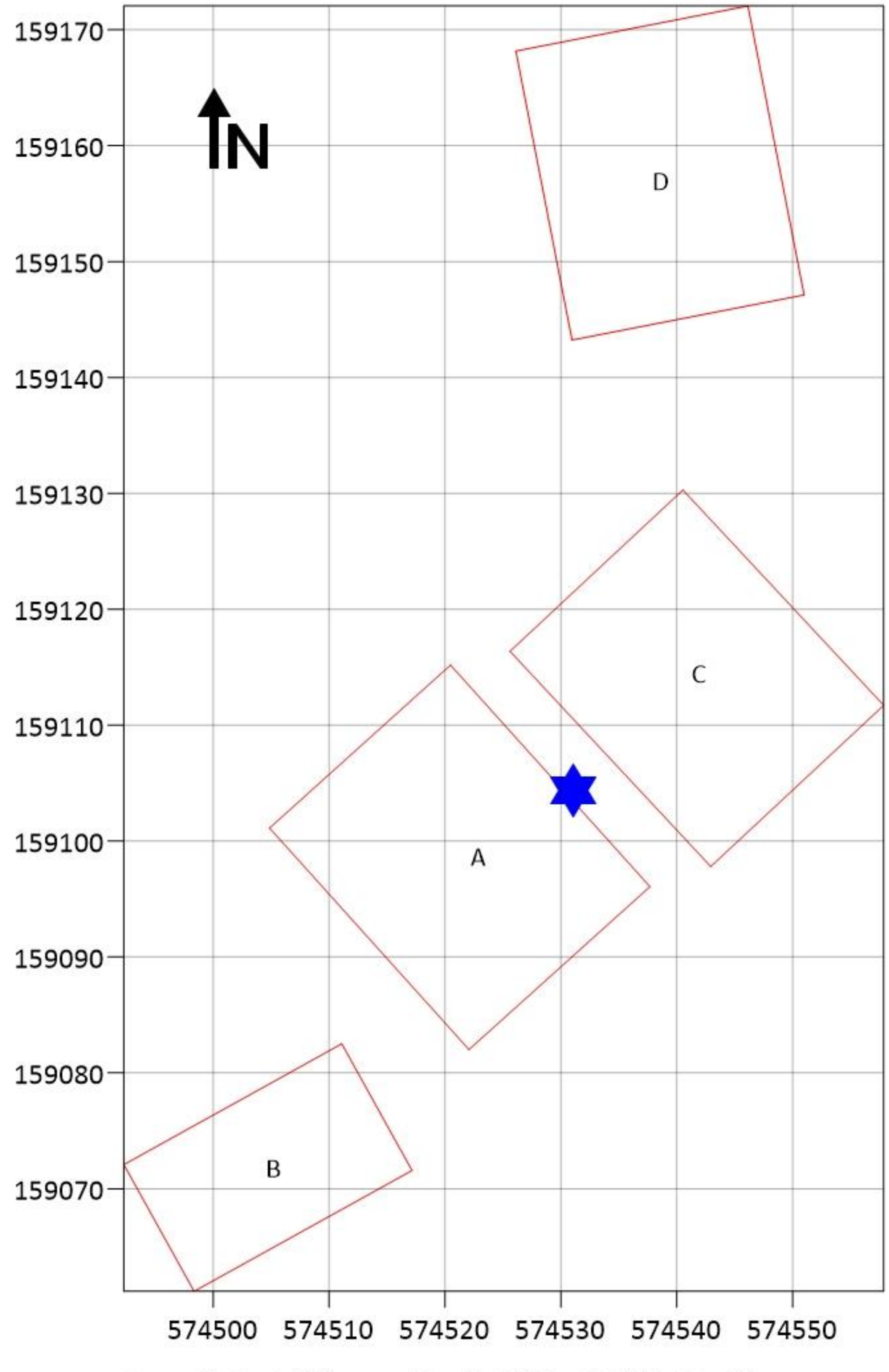
DRAWING TITLE
PERMIT LAYOUT PLAN

CLIENT
Elliott Environmental Drainage Ltd

PROJECT/SITE
St Michael's Close, Aylesford, Kent

SCALE @ A1	CLIENT NO	JOB NO
1:200	2499	002
DRAWING NUMBER	**REV**	**STATUS**
2499-002-03	M	Issued
DRAWN BY	**CHECKED**	**DATE**
RS/JH	RS	12.03.26

Lime House, Road Two, Winsford, Cheshire, CW7 3QZ
t: 01606 558833 | e: sales@oaktree-environmental.co.uk



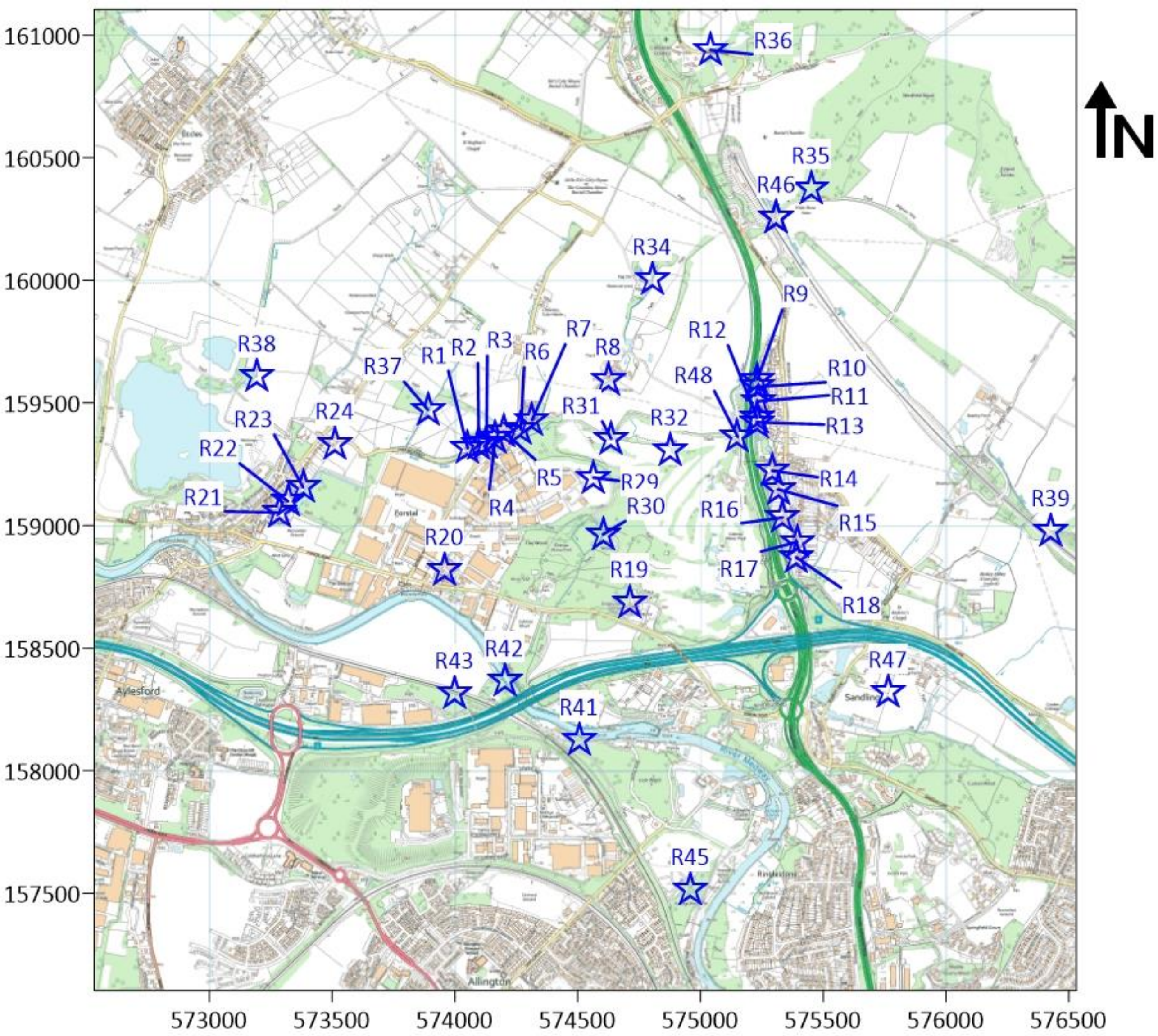
Appendix I - Buildings and Stacks Digitised Within Model

Stack Location

Oaktree Environmental Ltd
Lime House
2 Road Two
Winsford
Cheshire
CW7 3QZ

Appendix II

Sensitive Receptor Locations



Appendix II Figure 1 - Sensitive Receptors

Receptor Location

R1 Receptor Identifier

Oaktree Environmental Ltd
Lime House
2 Road Two
Winsford
Cheshire
CW7 3QZ

N.B - Map contains Ordnance Survey data

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Appendix III

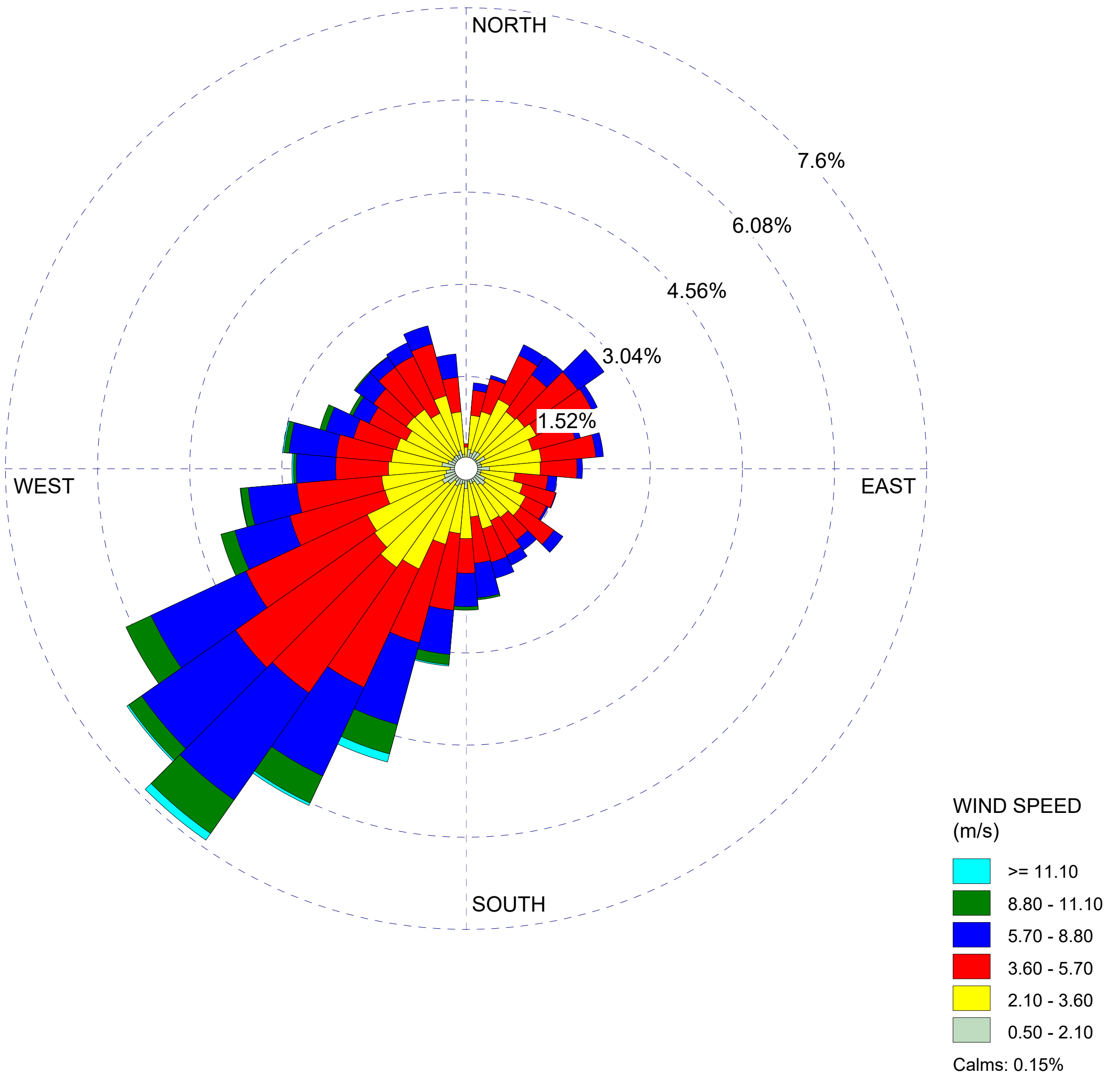
Wind Roses

WIND ROSE PLOT:

NWP Wind Speed and Direction Frequency - 2019

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 01/01/2019 - 00:00** **End Date: 31/12/2019 - 23:59**	COMPANY NAME: MODELER:	
	CALM WINDS: **0.15%**	TOTAL COUNT: **8759 hrs.**	
	AVG. WIND SPEED: **4.08 m/s**	DATE: **15/03/2024**	PROJECT NO.: **2499**

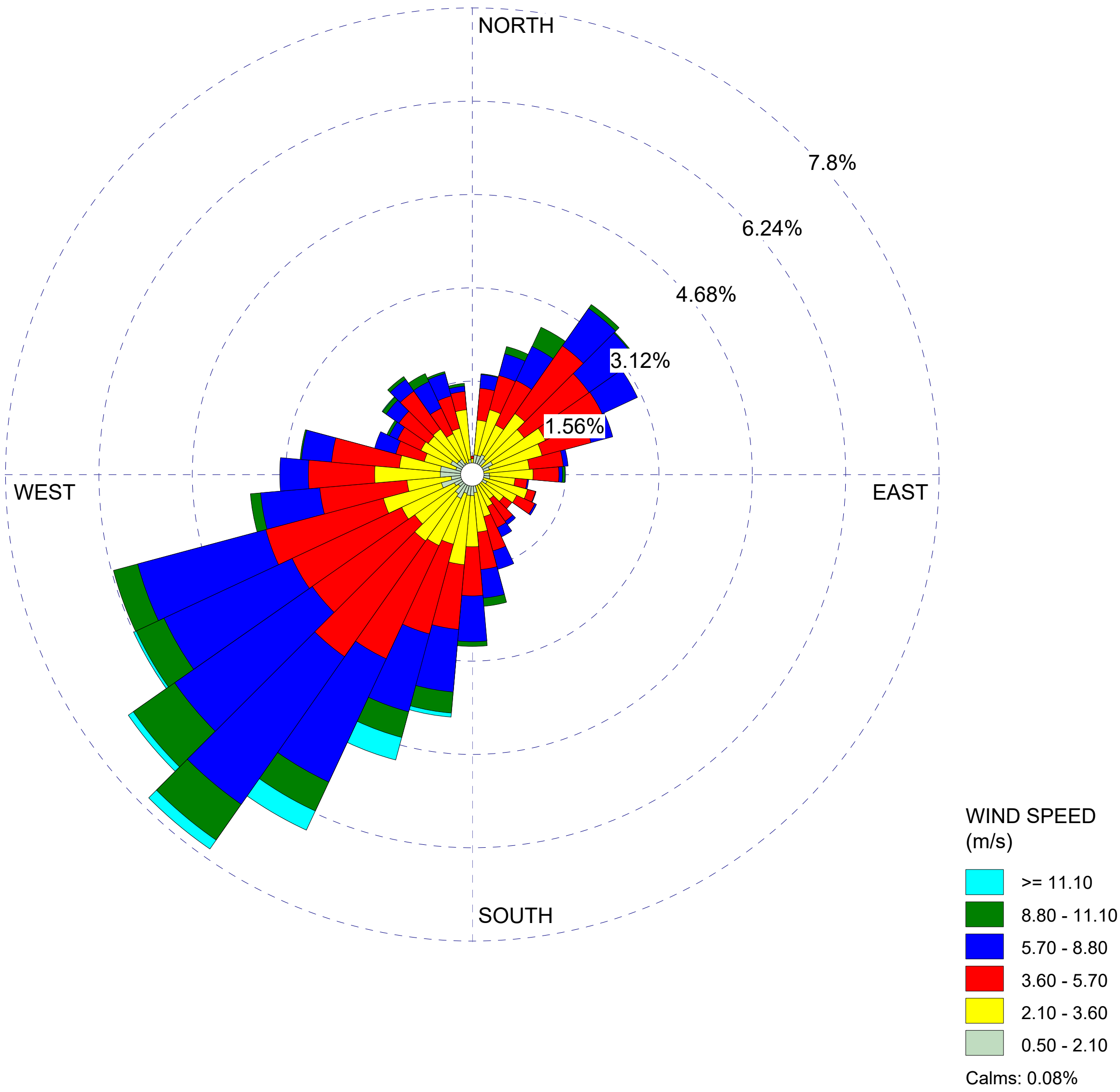
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

NWP Wind Speed and Direction Frequency - 2020

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 01/01/2020 - 00:00
End Date: 31/12/2020 - 23:59

COMPANY NAME:

MODELER:

CALM WINDS:

0.08%

TOTAL COUNT:

8783 hrs.

AVG. WIND SPEED:

4.50 m/s

DATE:

15/03/2024

PROJECT NO.:

2499

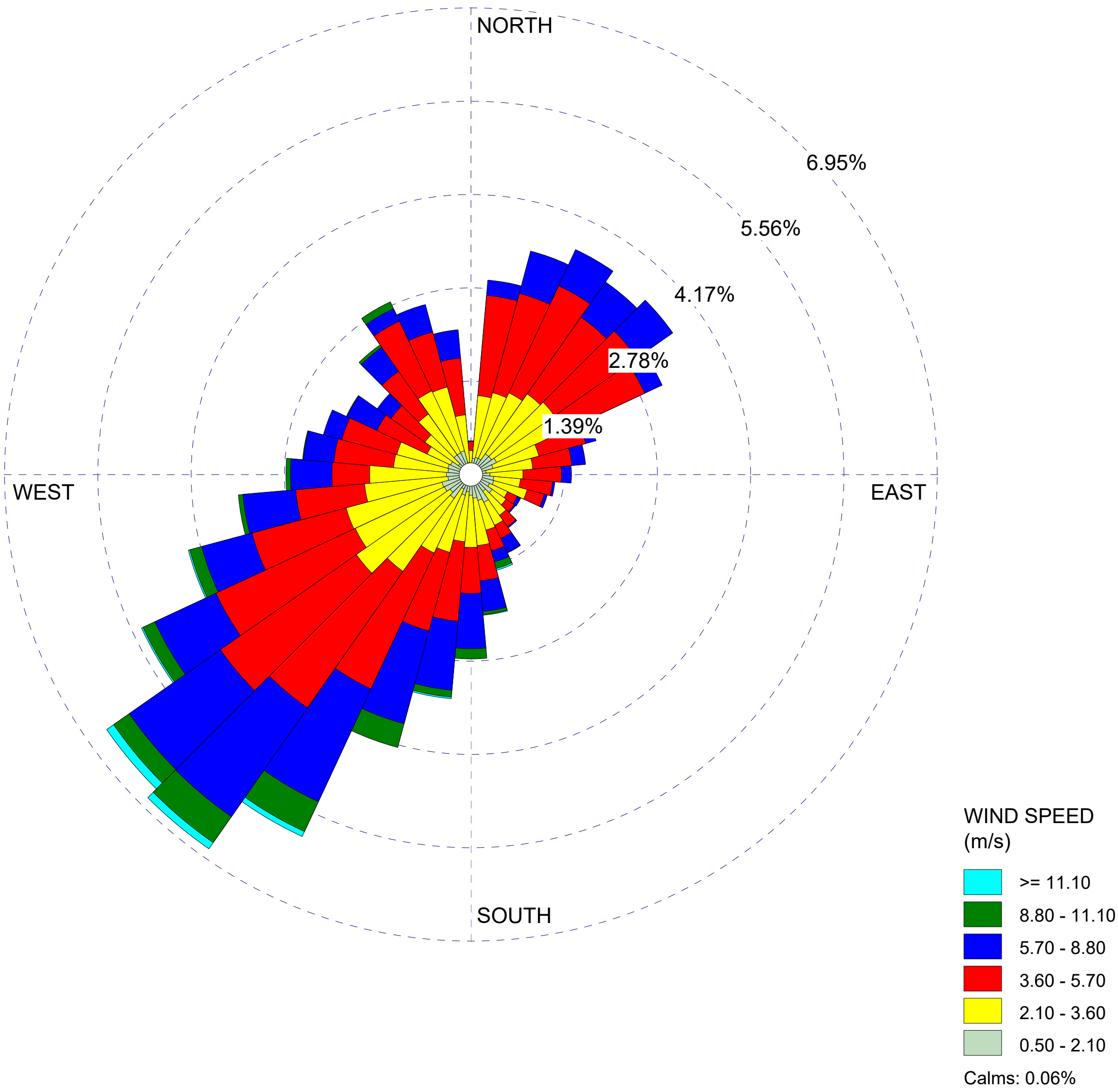
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

NWP Wind Speed and Direction Frequency - 2021

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 01/01/2021 - 00:00 **End Date: 31/12/2021 - 23:59**		
		MODELER:	
	CALM WINDS: **0.06%**	TOTAL COUNT: **8759 hrs.**	
	AVG. WIND SPEED: **4.05 m/s**	DATE: **15/03/2024**	PROJECT NO.: **2499**

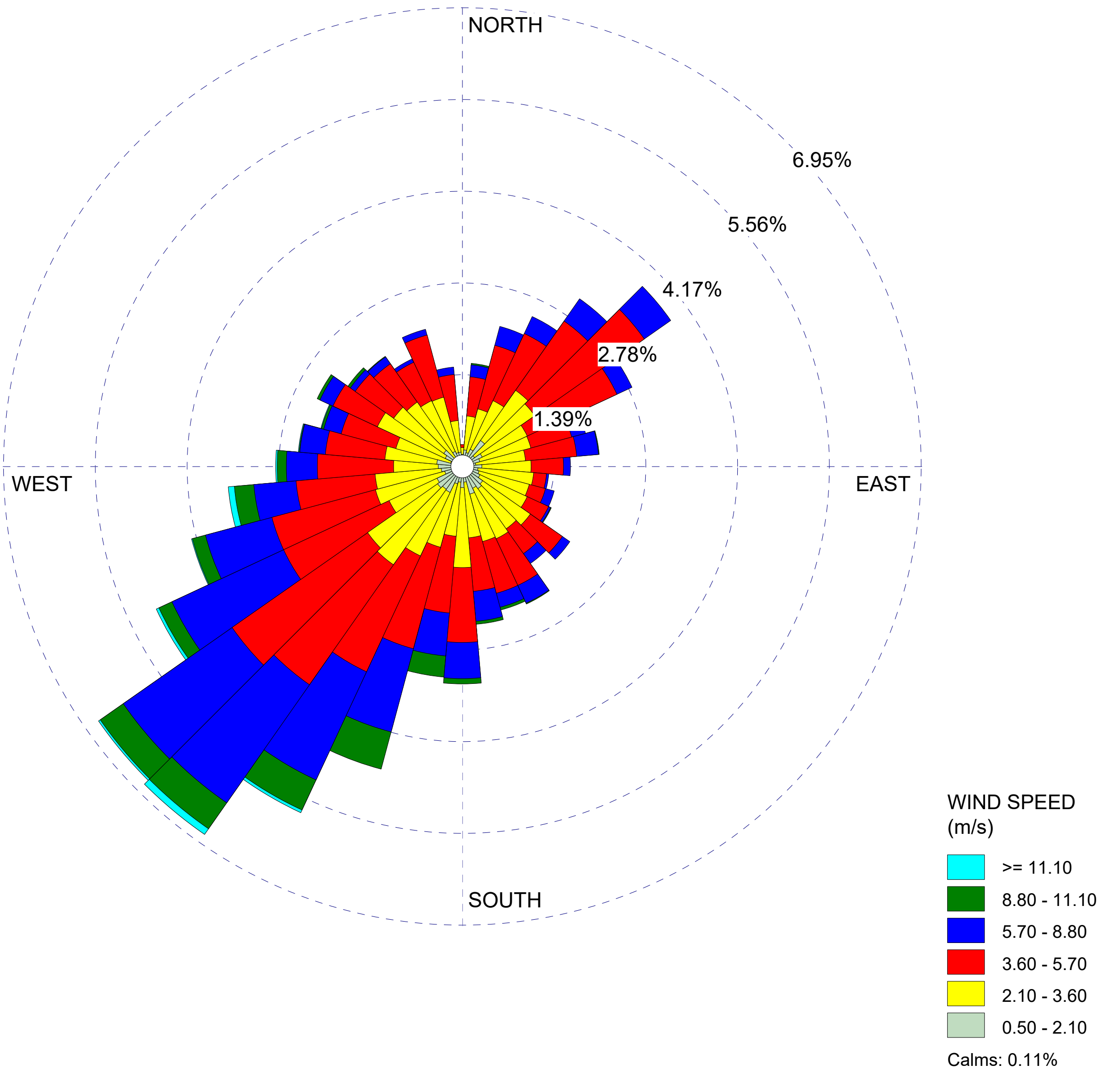
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

NWP Wind Speed and Direction Frequency - 2022

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
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	CALM WINDS: **0.11%**	TOTAL COUNT: **8759 hrs.**	
	AVG. WIND SPEED: **4.06 m/s**	DATE: **15/03/2024**	PROJECT NO.: **2499**

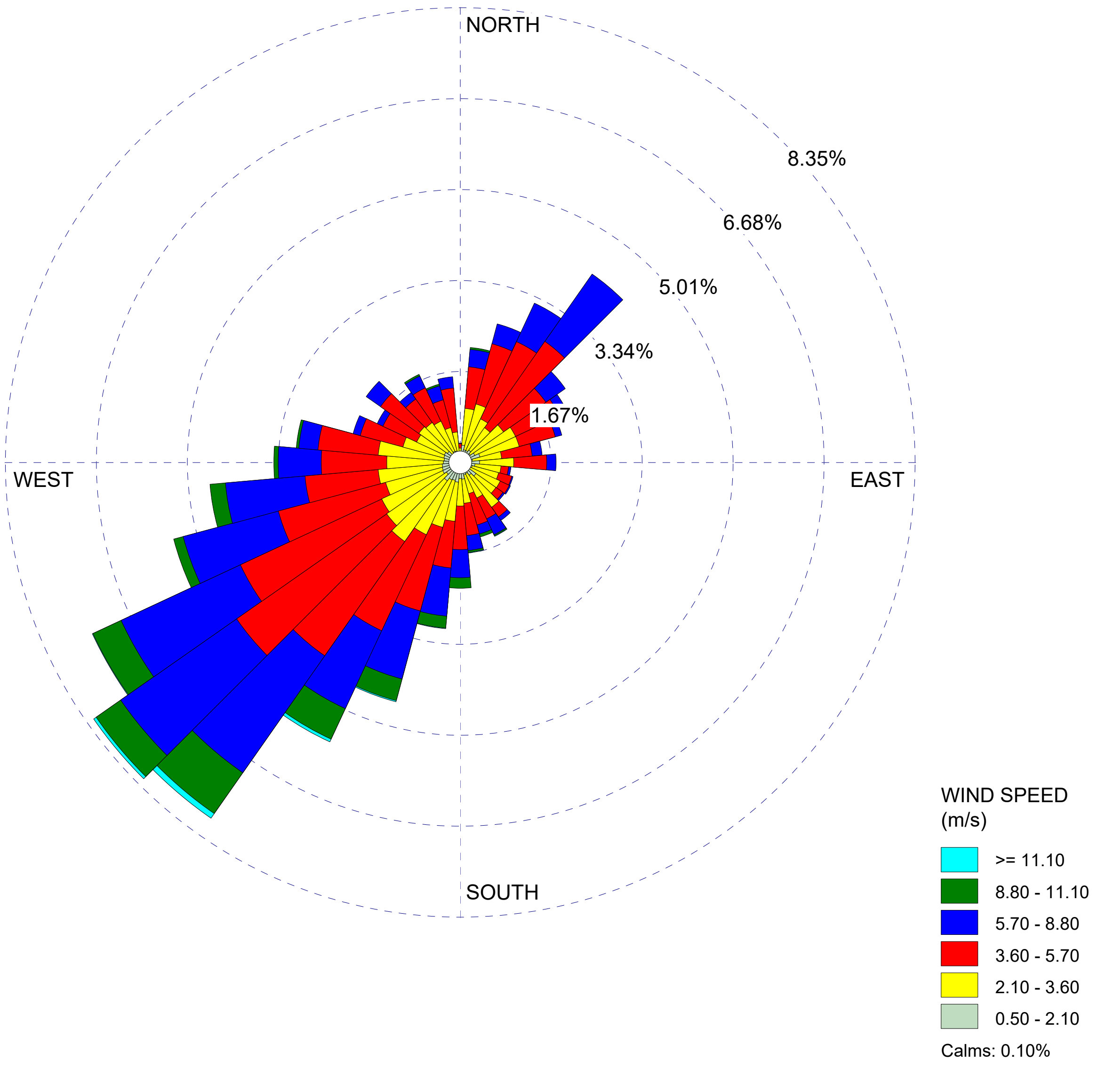
WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:

NWP Wind Speed and Direction Frequency - 2023

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 01/01/2023 - 00:00
End Date: 31/12/2023 - 23:59

COMPANY NAME:

MODELER:

CALM WINDS:

0.10%

TOTAL COUNT:

8759 hrs.

AVG. WIND SPEED:

4.32 m/s

DATE:

15/03/2024

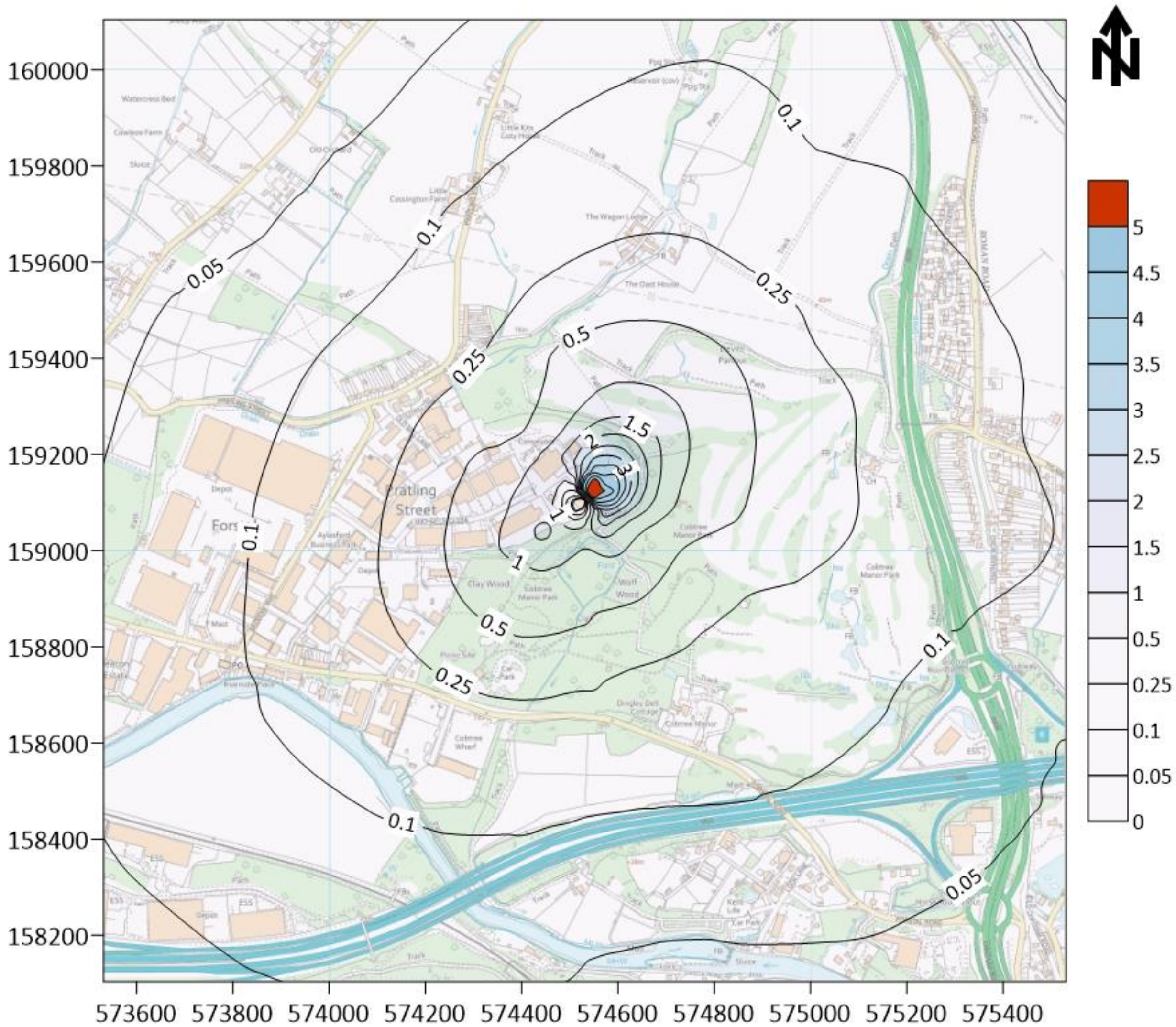
PROJECT NO.:

2499

WRPLOT View - Lakes Environmental Software

Appendix IV

Pollutant Contour Profiles



Appendix IV Figure 1 - Modelled annual mean benzene concentrations ($\mu g.m^{-3}$) based upon 2020 meteorological data (process contribution only)

Oaktree Environmental Ltd
Lime House
2 Road Two
Winsford
Cheshire
CW7 3QZ

N.B - Map contains Ordnance Survey data

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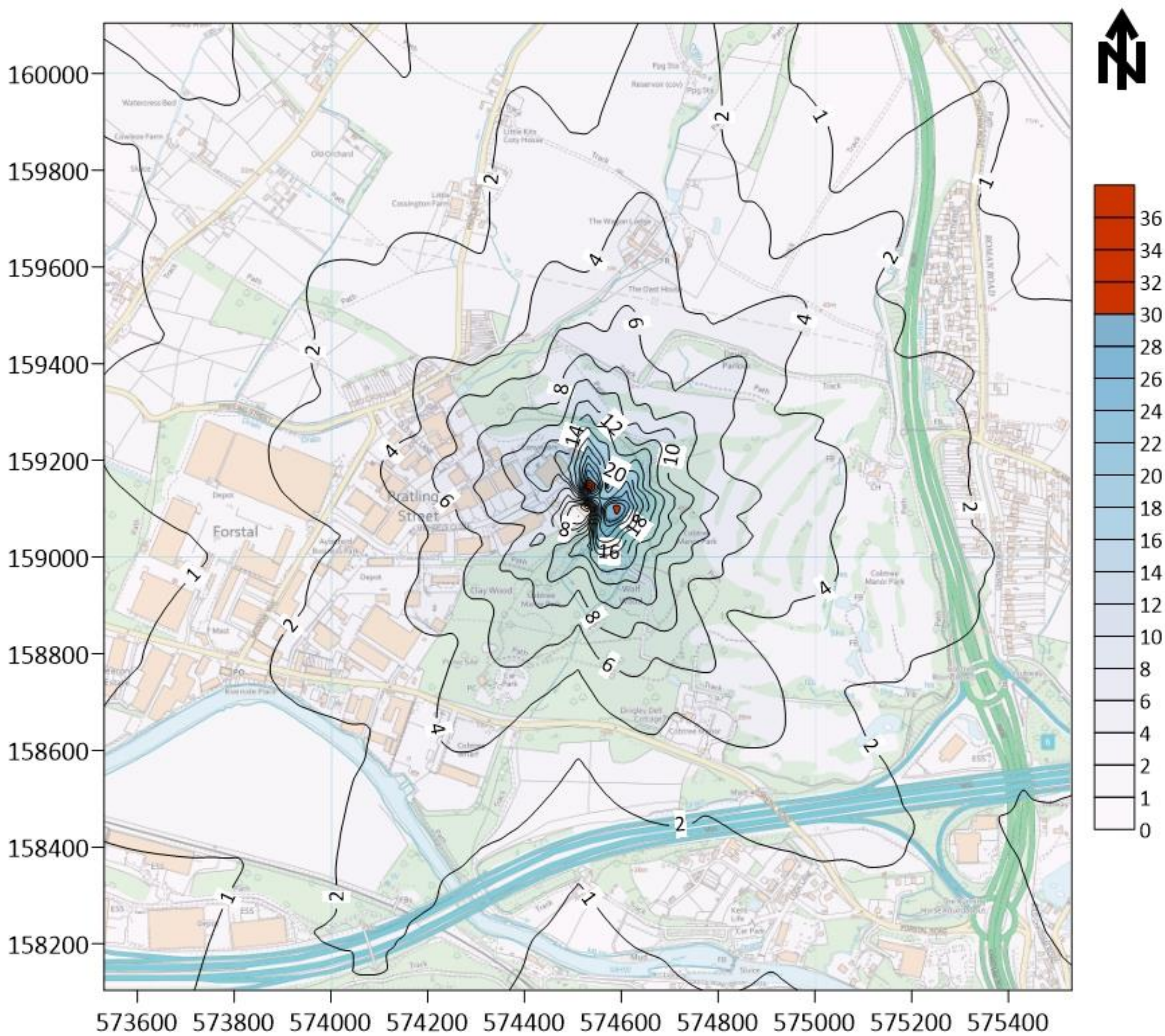

Appendix IV Figure 2 - Maximum modelled 24-hour mean benzene concentrations (μg.m^{-3}) (process contribution only)

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Cheshire
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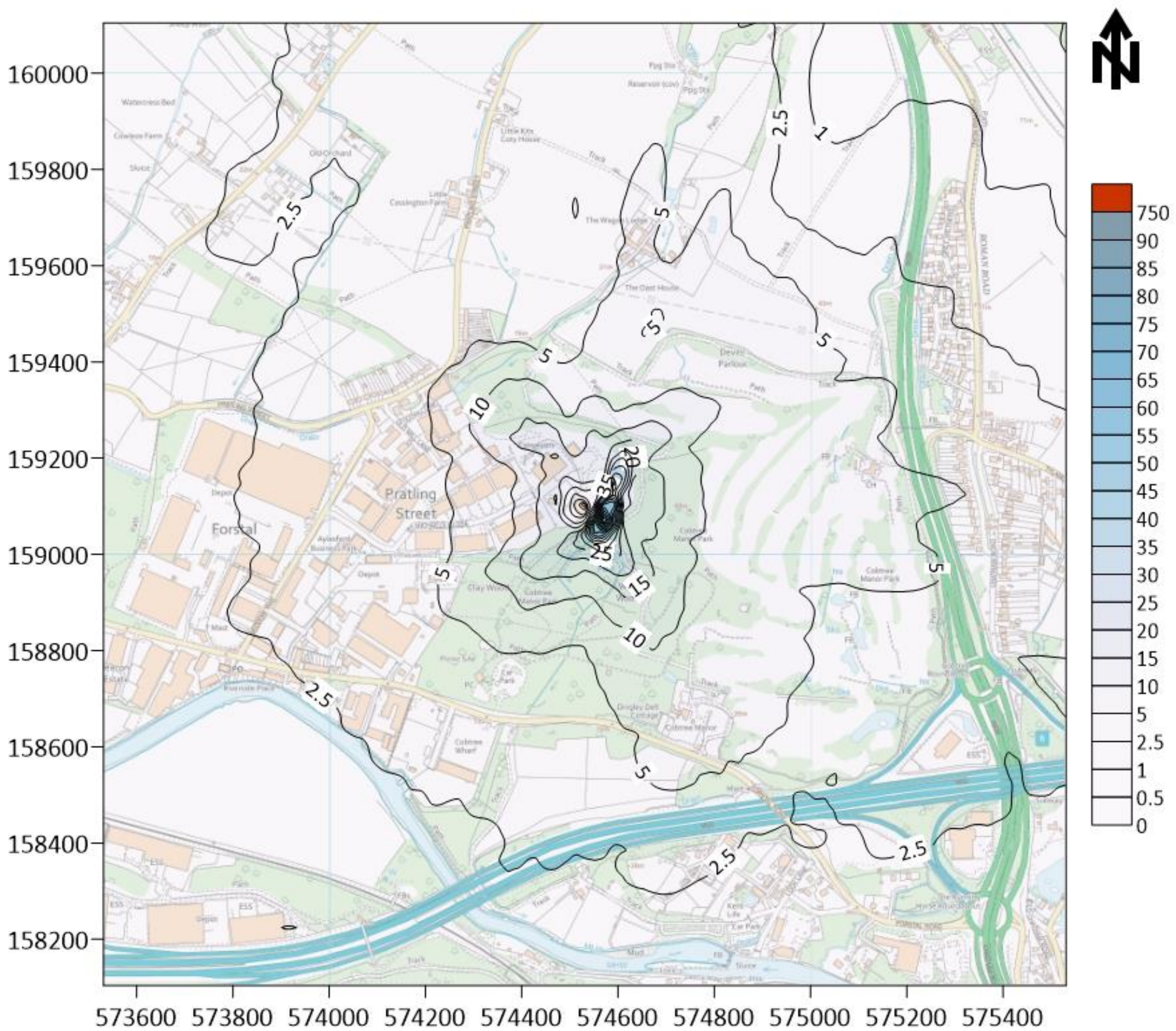

Appendix IV Figure 3 - Maximum modelled 1-hour mean HCL concentrations ($\mu g.m^{-3}$) (process contribution only)

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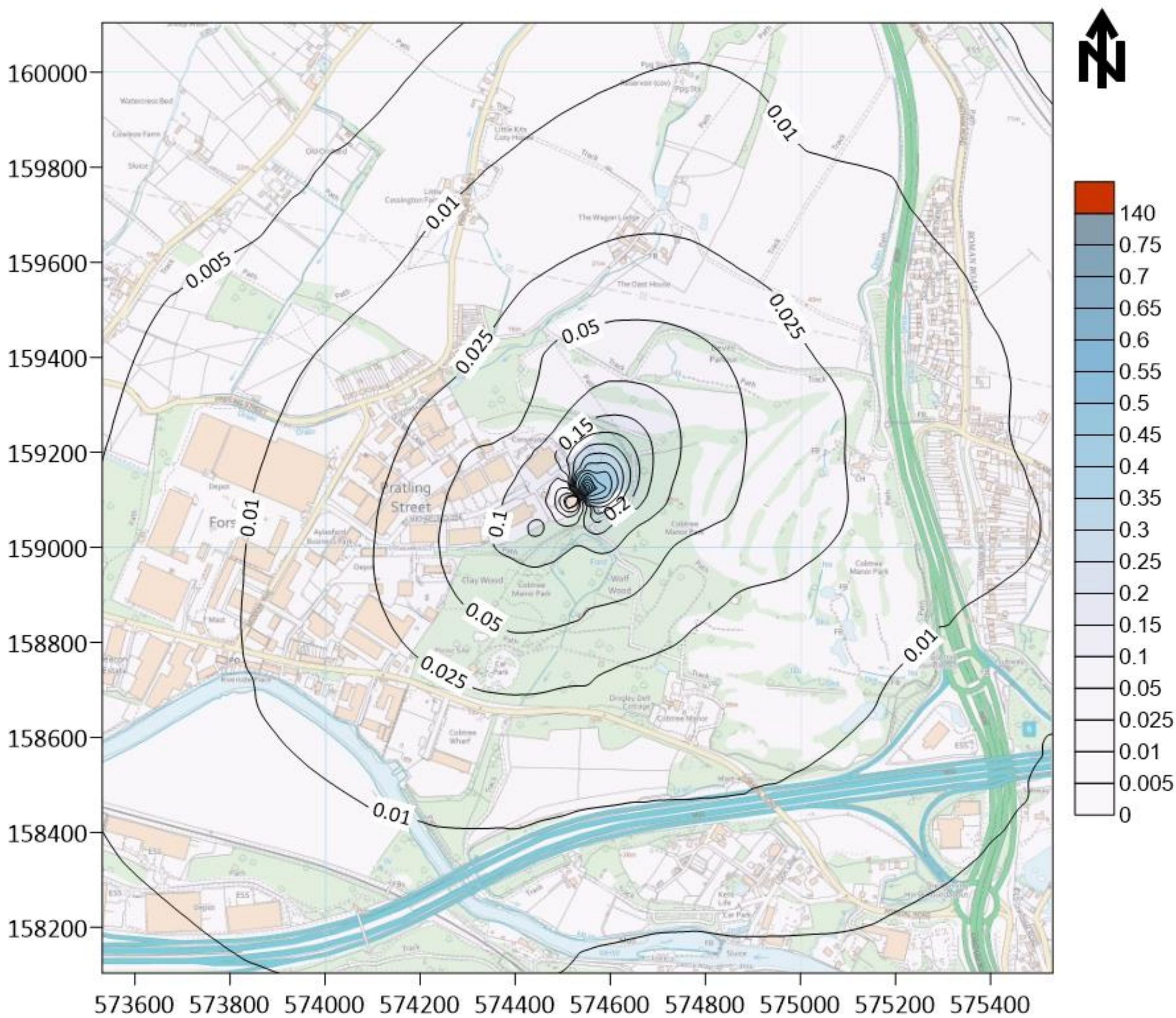

Appendix IV Figure 4 - Modelled annual mean hydrogen sulphide concentrations ($\mu g.m^{-3}$) based upon 2020 meteorological data (process contribution only)

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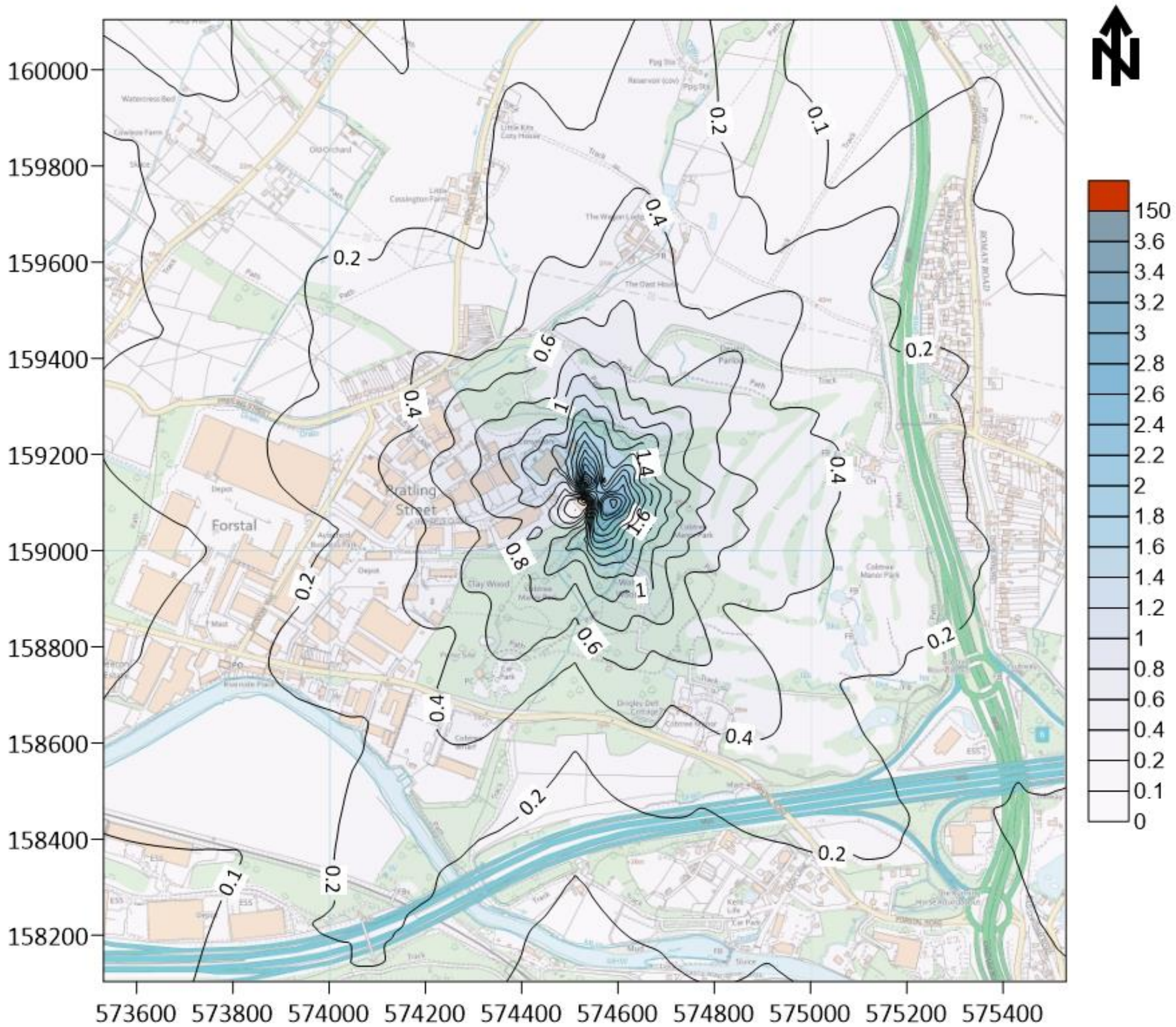

Appendix IV Figure 5 - Modelled 24-hour mean hydrogen sulphide concentrations ($\mu g.m^{-3}$) based upon 2020 meteorological data (process contribution only)

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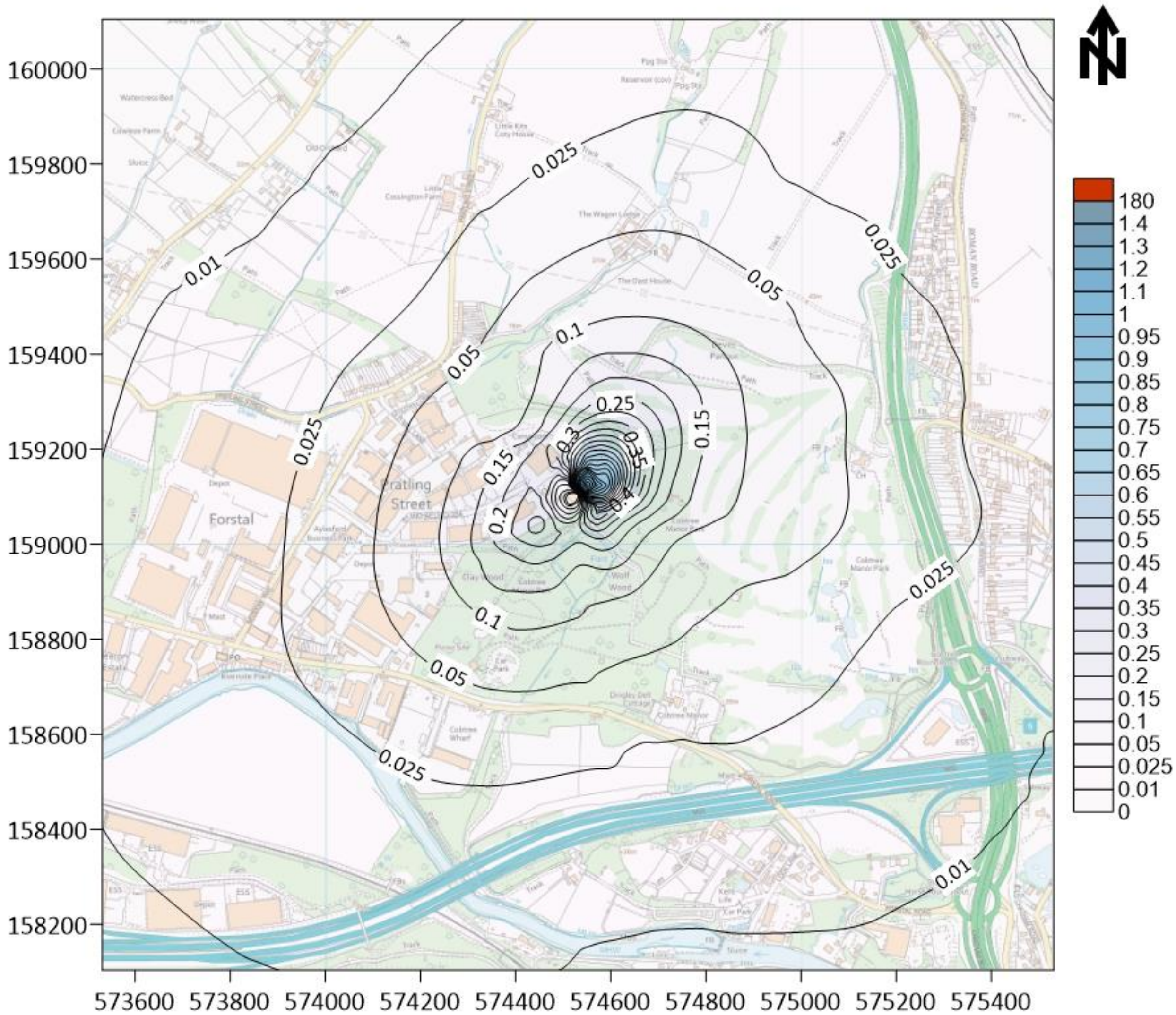

Appendix IV Figure 6 - Modelled annual mean ammonia concentrations ($\mu g.m^{-3}$) based upon 2020 meteorological data (human receptors, process contribution only)

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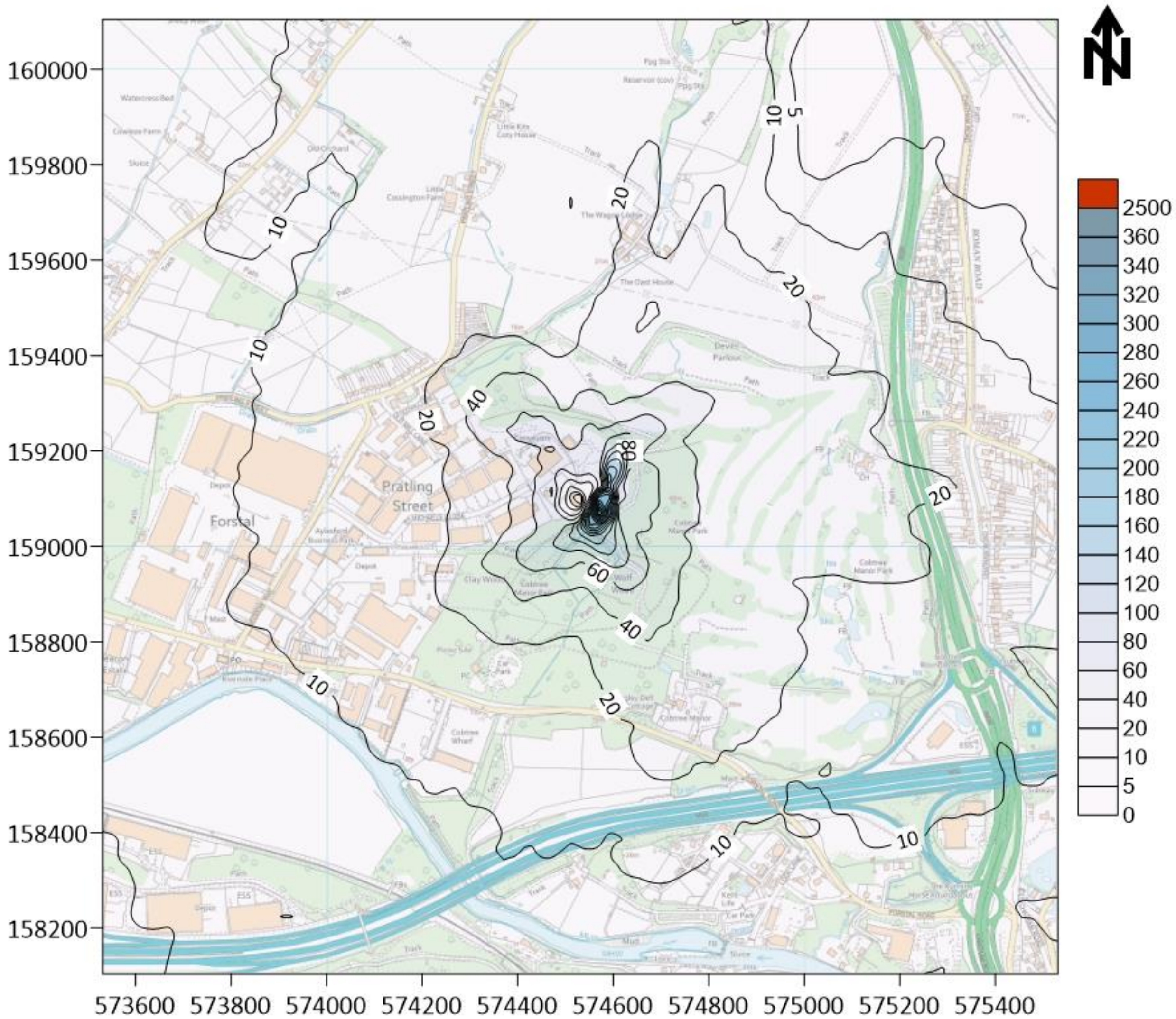

Appendix IV Figure 7 - Modelled 1-hour mean ammonia concentrations ($\mu g.m^{-3}$) (process contribution only)

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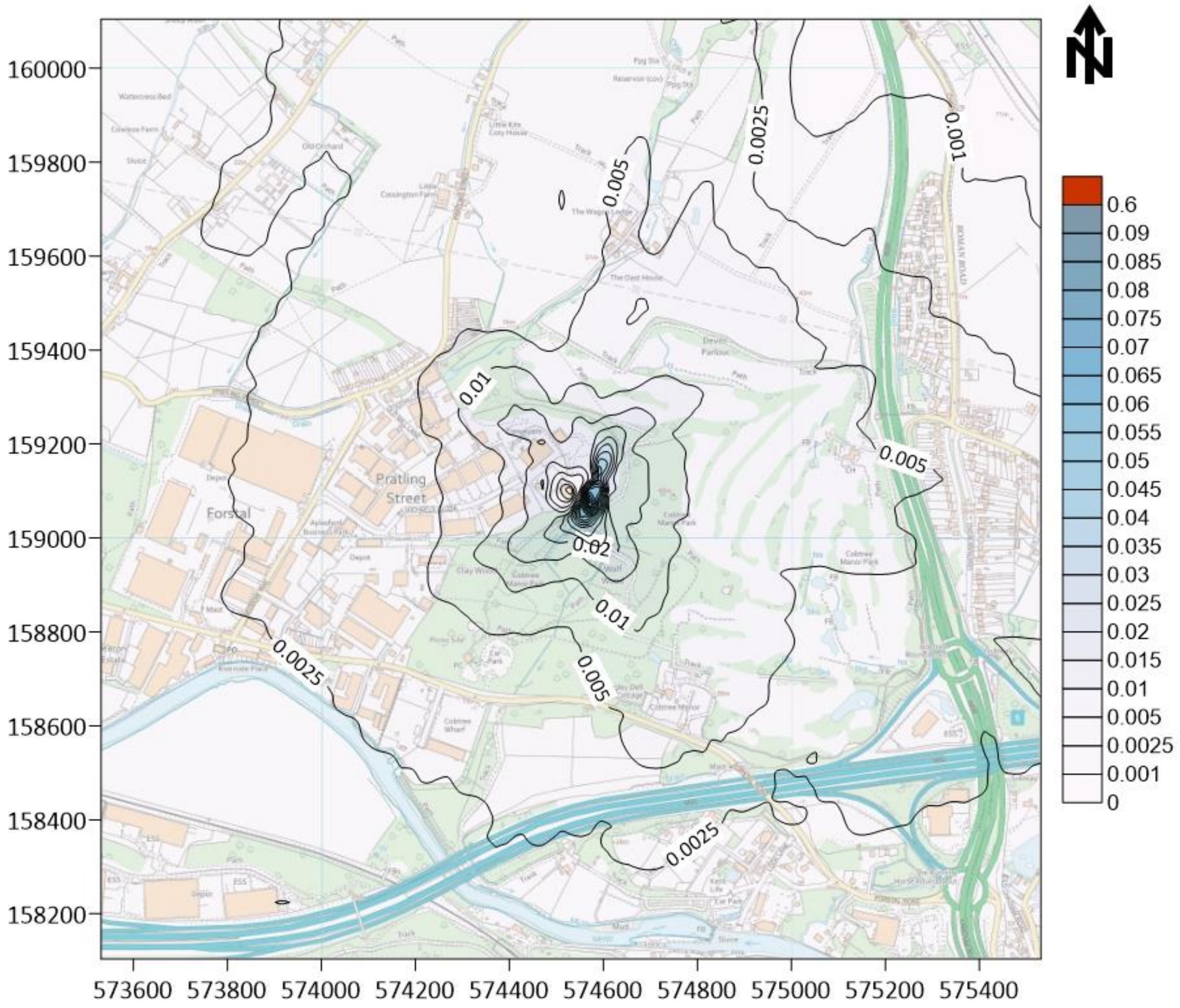

Appendix IV Figure 8 - Modelled 1-hour mean mercury concentrations ($\mu g.m^{-3}$) (process contribution only)

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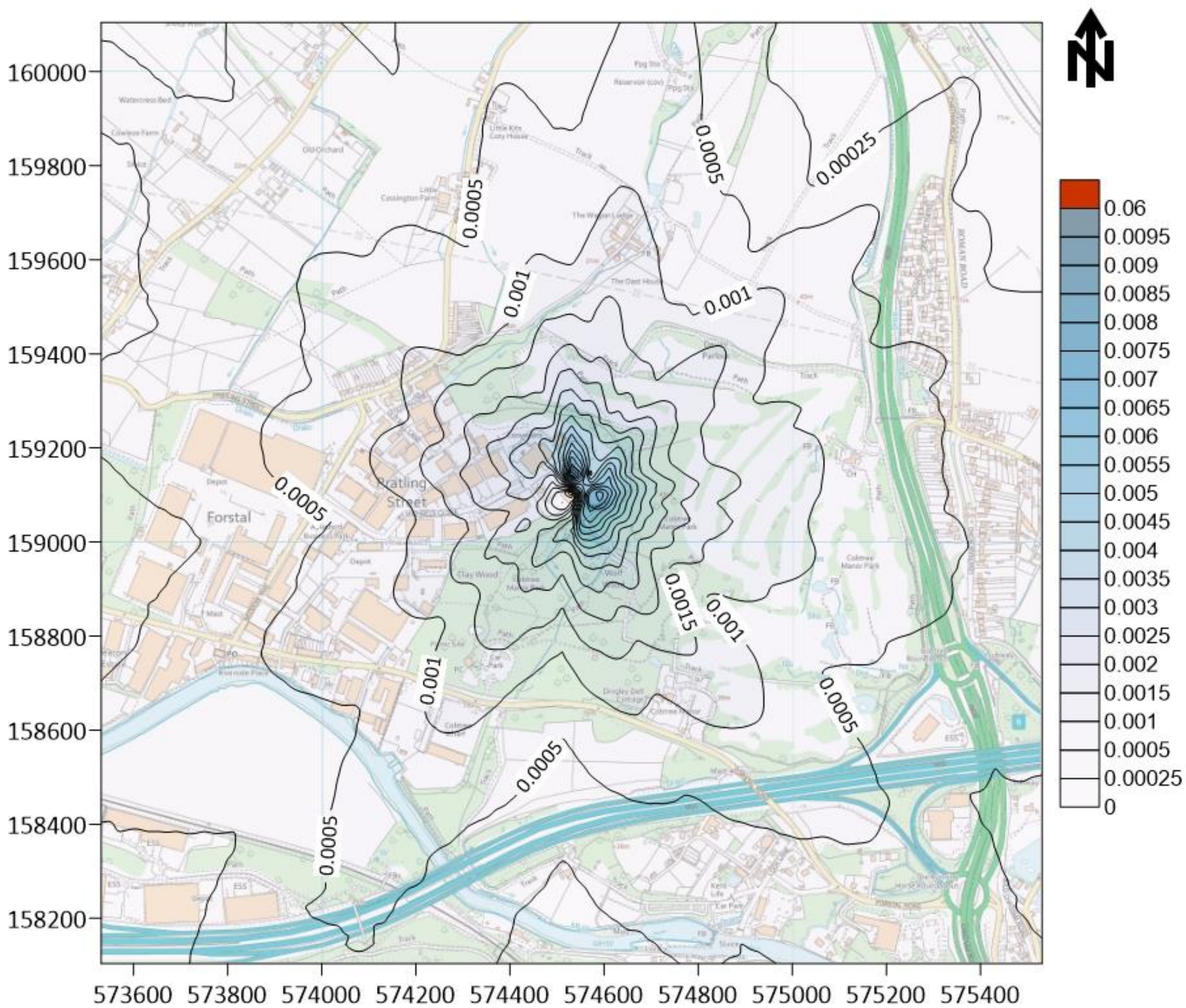

Appendix IV Figure 9 - Modelled 24-hour mean mercury concentrations (µg.m^{-3}) (process contribution only)

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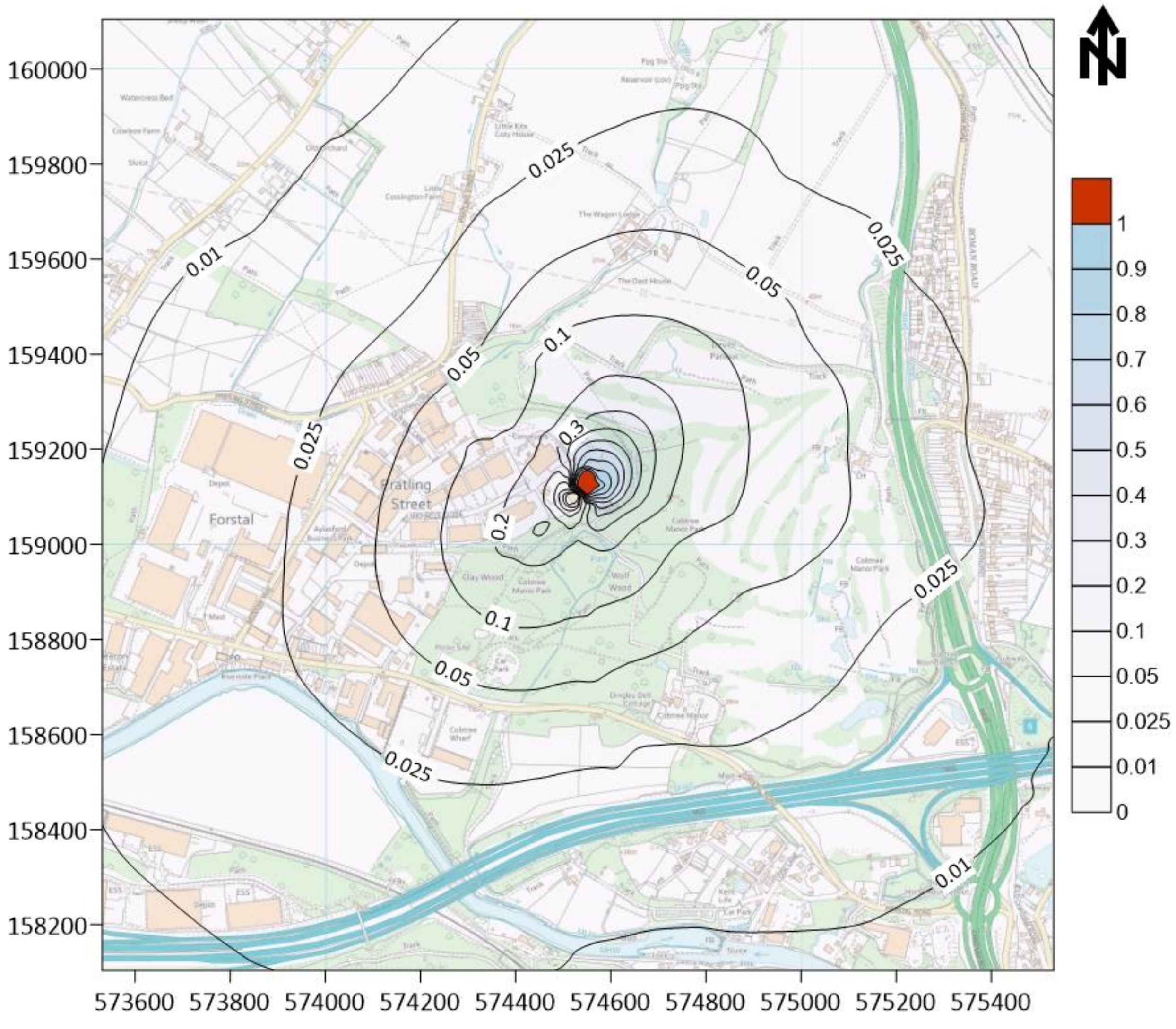

Appendix IV Figure 10 - Modelled annual mean ammonia concentrations based upon 2020 meteorological data ($\mu g.m^{-3}$) (ecological receptors, process contribution only)

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