Air Quality Assessment

StandardAero, Gosport

Client: Vector Aerospace Ltd

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Executive Summary

Redmore Environmental Ltd was commissioned by Vector Aerospace International Ltd to undertake an Air Quality Assessment in support of an Environmental Permit Variation for StandardAero, Gosport.

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

Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the facility. The results indicated that impacts on pollutant concentrations were not predicted to be significant at any human or ecological receptor location in the vicinity of the site.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Vector Aerospace International Ltd to undertake an Air Quality Assessment in support of an Environmental Permit Variation for StandardAero, Gosport.

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

1.2 Site Location and Context

1.2.1 StandardAero is located off Fareham Road, Gosport, at approximate National Grid Reference (NGR): 458885, 104040. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The site currently holds an Environmental Permit (reference: EPR/NP3930KB) issued by the Environment Agency (EA) in 2014. It is proposed to vary the Environmental Permit to consolidate the following activities into one authorisation:

- Section 2.3 - Surface Treatment of Metals and Plastics - Cleaning Plant;
- Section 5.4 - Mix of Disposal and Recovery of Non-Hazardous Waste - ETP; and,
- The operation of Medium Combustion Plant (MCP).

1.2.3 An Environmental Permit Variation Application (EPR/YP3126SE/A001) was submitted to the EA on 5th March 2024 in order to authorise the proposals. A Schedule 5 Notice[1] was subsequently issued which indicated the requirement for an Air Quality Assessment in order to demonstrate that proposed operations at the facility will not cause air quality impacts at sensitive locations within the vicinity of the site. This is detailed in the followed report.

[1] VAIL - Not Duly Made - Request for Further Information Letter, EA, 2024.

2.0 LEGISLATION

2.1 Legislation

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

- Nitrogen dioxide (NO_2);
- Sulphur dioxide;
- Lead ;
- Particulate matter with an aerodynamic diameter of less than 10µm;
- Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$);
- Benzene (C_6H_6); and,
- Carbon monoxide (CO).

2.1.2 Air Quality Target Values (AQTVs) were also provided for an additional five pollutants. These include:

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

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

2.1.4 The Environmental Improvement Plan 2023[2] was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to $PM_{2.5}$. The concentration target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

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

2.1.5 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in April 2023[3]. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

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

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (µg/m³)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
C_6H_6	5	Annual mean

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

Table 2 Air Quality Target Values

Pollutant	Air Quality Target Value	
	Concentration (ng/m³)	Averaging Period
Cd	5	Annual mean
Ni	20	Annual mean

2.1.8 Table 3 summarises the advice provided in DEFRA guidance[4] on where the AQOs for pollutants considered within this report apply.

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

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

Table 3 Examples of Where the Air Quality Objectives Apply

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

2.2 Industrial Pollution Control Legislation

2.2.1 Atmospheric emissions from industry are controlled in the UK through the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. StandardAero operates as an A(1) installation in accordance with an Environmental Permit issued by the EA (reference: EPR/NP3930KB). There is a requirement to vary the Environmental Permit in order to authorise the proposed changes. This process requires detailed consideration of potential atmospheric emissions and associated impacts at sensitive locations in the vicinity of the facility. In accordance the provisions of the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, any Environmental Permit which is subsequently issued for an installation will include appropriate conditions to restrict environmental impacts beyond the boundary of the site. These will help to limit the potential for adverse effects from the facility.

2.3 Local Air Quality Management

2.3.1 Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 Environmental Assessment Levels

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

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

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

2.4.3 EALs used in this assessment were obtained from Environment Agency (EA) guidance 'Air emissions risk assessment for your environmental permit'[5] and are summarised in Table 4.

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

Table 4 Environmental Assessment Levels

Pollutant	Environmental Assessment Level (µg/m³)	
	Long Term (Annual)	Short Term
Cd	-	0.03(a)
C_6H_6	-	30(a)
Ni	-	0.7(b)
Chromium (Cr), Cr (II) and Cr (III)	-	2(a)
Cr (VI)	0.00025	-
Hydrogen chloride (HCl)	-	750(b)

Note: (a) 24-hour mean
(b) 1-hour mean

2.5 Critical Loads and Levels

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

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

2.5.2 A critical level is defined as:

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

2.5.3 A critical load refers to deposition of a pollutant, while a critical level refers to pollutant concentrations in the atmosphere (which usually have direct effects on vegetation or human health).

2.5.4 When pollutant loads (or concentrations) exceed the critical load or level it is considered that there is a risk of harmful effects. The excess over the critical load or level is termed the

6 UK Air Pollution Information System, www.apis.ac.uk.

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

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

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

Table 5 Critical Levels for the Protection of Vegetation

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

2.5.7 Critical loads have been designated within the UK based on the sensitivity of the receiving habitat and have been reviewed for the purpose of this assessment. These are summarised in Section 3.5.

3.0 BASELINE

3.1 Introduction

3.1.1 Existing air quality conditions in the vicinity of the site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

3.2 Local Air Quality Management

3.2.1 As required by the Environment Act (1995), Gosport Borough Council (GBC) has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that concentrations of all pollutants considered within the AQS are currently below the relevant AQOs within the council's administrative extents. As such, no AQMAs have been designated within the borough.

3.3 Air Quality Monitoring

Local Authority Monitoring

3.3.1 Monitoring of pollutant concentrations is undertaken by GBC throughout their area of jurisdiction. Recent NO_2 results recorded in the vicinity of the facility are shown in Table 6.

Table 6 Monitoring Results - NO_2

Monitoring Site		Monitored 2022 NO_2 Concentration ($\mu g/m^3$)
J	Fareham Road/ Lederle Lane	21.0
V	Wych Lane/ Fareham Road	17.9

3.3.2 As shown in Table 6, annual mean NO_2 concentrations were below the AQO at both monitoring sites in 2022. Reference should be made to Figure 2 for a map of the survey locations.

3.3.3 GBC do not undertake monitoring of any other pollutants considered within the Air Quality Assessment.

Heavy Metals Monitoring

3.3.4 Monitoring of heavy metals is carried out by DEFRA at 24 industrial sites and 10 rural locations throughout the UK. The closest site to the facility is Chilbolton at NGR: 439390, 139078, approximately 40.4km north-west of the facility. The most recent available data is from 2023, as summarised in Table 7.

Table 7 Heavy Metals Monitoring Results

Species	Annual Mean Concentration (ng/m^3)
Cd	0.07
Cr	0.71
Ni	0.44

Acid Gas Monitoring

3.3.5 Concentrations of HCl are monitored in the UK through the UK Eutrophying and Acidifying Pollutants (UKEAP) network. The closest site is Yarner Wood at NGR: 278611, 78949 approximately 182km west of the plant. The most recent data available for HCl from the monitoring station is from 2016 which is summarised in Table 6.

Table 8 Acid Gas Monitoring Results

Species	Annual Mean Concentration (ng/m^3)
HCl	0.22

3.4 Background Pollutant Concentrations

3.4.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist Local Authorities in their Review and Assessment of air quality. The site is located in grid square NGR: 458500, 104500. Data for this location was downloaded from the DEFRA website[7] for the purpose of the assessment and is summarised in Table 9.

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

Table 9 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m³)
NO_2	12.66
C_6H_6	0.44

3.4.2 It should be noted that concentrations of NO_2 are predicted for 2024 and C_6H_6 for 2010. These are the most recent predictions available from DEFRA and are therefore considered to provide a reasonable representation of background concentrations in the vicinity of the site.

3.5 Sensitive Receptors

3.5.1 A sensitive receptor is defined as any location which may be affected by changes in air quality. These have been defined for human and ecological receptors in the following Sections.

Human Receptors

3.5.2 A desk-top study was undertaken in order to identify any sensitive human receptor locations in the vicinity of the site that required specific consideration during the assessment. These are summarised in in Table 10.

Table 10 Sensitive Human Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Aerodrome Road	458778.3	103880.4
R2	Residential - A32	458470.9	103920.3
R3	Residential - A32	458482.6	103844.4
R4	Residential - A32	458633.7	103704.5
R5	Residential - A32	458735.8	103565.8
R6	Residential - A32	458425.1	103987.2
R7	Residential - A33	458357.2	104068.0

Receptor		NGR (m)	
		X	Y
R8	Residential - Lederle Lane	458391.2	104151.5

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

Ecological Receptors

3.5.4 Atmospheric emissions from the facility also have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2010) and subsequent amendments require competent authorities to review applications and consents that have the potential to impact on ecological designations. A pre-application request was therefore submitted to the EA in order to identify any sites of ecological or nature conservation importance that required consideration within the assessment. The response indicated the following should be included:

- Solent Maritime Special Area of Conservation (SAC);
- Solent & Isle of Wight Lagoons SAC;
- Chichester and Langstone Harbours Special Protection Areas (SPA) and Ramsar;
- Portsmouth Harbour SPA, Ramsar and Site of Special Scientific Interest (SSSI);
- Solent and Dorset Coast SPA;
- Solent and Southampton Water SPA and Ramsar;
- Alver Valley Local Wildlife Site (LWS);
- Alverwood LWS;
- Bathinghouse Grove & Cams Coastline LWS;
- Bedenham LWS;
- Cams Plantation LWS;
- DM Gosport South LWS;
- Fort Brockhurst LWS;
- Fort Fareham LWS;
- Land off Aerodrome Road LWS;
- Lee-on-Solent Gold Course South LWS;
- Meadows North of Woodcote Lane, Peel Common LWS;

- Monks Walk Meadow LWS;
- Oakdene Wood LWS;
- Rowner Copse (2 sites) LWS; and,
- Unnamed Ancient Woodland (AW).

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

Table 11 Ecological Receptor Locations

Receptor		NGR (m)	
		X	Y
E1	Solent Maritime SAC	466958.9	104166.7
E2	Solent & Isle of Wight Lagoons SAC	460961.1	97956.9
E3	Solent Maritime SAC	450129.0	105224.0
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	458799.9	104244.0
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	457863.8	104512.0
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	459488.5	103139.4
E7	Solent & Southampton Water SPA & Ramsar	455463.2	101375.4
E8	Solent & Southampton Water SPA & Ramsar	454874.9	104287.1
E9	Chichester & Langstone Harbours SPA & Ramsar	467036.7	104106.6
E10	Chichester & Langstone Harbours SPA & Ramsar	467469.8	99437.1
E11	Solent and Dorset Coast SPA	457317.1	99161.8
E12	Oakdene Wood LWS	458800.0	102500.0
E13	Alver Valley LWS	457757.6	101223.9
E14	Alverwood LWS	457833.8	102087.8
E15	Bedenham LWS	459013.5	104002.5
E16	Gosport South LWS	459259.2	103030.7
E17	Fort Brockhurst LWS	459587.7	102221.2

Receptor		NGR (m)	
		X	Y
E18	Land off Aerodrome Road LWS	459100.1	103397.2
E19	Lee-on-Solent Golf Course South LWS	457813.9	101730.3
E20	Monks Walk Meadow LWS	460261.6	102509.8
E21	Rowner Copse LWS	458461.1	101923.5
E22	Peel Common LWS	457040.8	103105.7
E23	Fort Fareham LWS	457330.2	104723.1
E24	Bathinghouse Grove & Cams Coastline LWS	458316.1	104981.3
E25	Cams Plantation LWS	458917.2	105269.8
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	459896.7	104175.7
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	459793.3	103709.6
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	459075.8	104523.7
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	459350.3	104689.7
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	459658.9	104457.7
E31	Unnamed Ancient Woodland	459974.8	103263.5

3.5.6 Reference should be made to Figure 3 for a map of the ecological receptors.

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

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

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

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

Table 12 Critical Loads for Nitrogen Deposition

Receptor		Feature	APIS Habitat	Nitrogen Critical Load (kgN/ha/yr)	
				Low	High
E1	Solent Maritime SAC	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Coastal dune grasslands (grey dunes) - acid type	5	10
E2	Solent & Isle of Wight Lagoons SAC	Atlantic salt meadows	Atlantic upper-mid & mid-low salt marshes	10	20
E3	Solent Maritime SAC	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Coastal dune grasslands (grey dunes) - acid type	5	10
E4 - E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Atriplex portulacoides Saltmarsh	Atlantic upper-mid & mid-low salt marshes	10	20
E7-E11	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Sterna albifrons	Coastal dune grasslands (grey dunes) - acid type	5	10
E12	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E13	Solent & Southampton Water SPA & Ramsar	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E14	Solent & Southampton Water SPA & Ramsar	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E15	Chichester & Langstone Harbours SPA & Ramsar	Calcareous grassland	Semi-dry Perennial calcareous grassland (basic meadow steppe)	10	20
E16	Chichester & Langstone Harbours SPA & Ramsar	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E17	Solent and Dorset Coast SPA	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15

Receptor		Feature	APIS Habitat	Nitrogen Critical Load (kgN/ha/yr)	
				Low	High
E18	Oakdene Wood LWS	Calcareous grassland	Semi-dry Perennial calcareous grassland (basic meadow steppe)	10	20
E19	Alver Valley LWS	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E20	Alverwood LWS	Neutral grassland	Low and medium altitude hay meadows	10	20
E21	Bedenham LWS	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E22	Gosport South LWS	Neutral grassland	Low and medium altitude hay meadows	10	20
E23	Fort Brockhurst LWS	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E24	Land off Aerodrome Road LWS	Coastal and Floodplain Grazing Marsh	Low and medium altitude hay meadows	10	20
E25	Lee-on-Solent Golf Course South LWS	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15
E26 - E28	Monks Walk Meadow LWS	Atriplex portulacoides Saltmarsh	Atlantic upper-mid & mid-low salt marshes	10	20
E29	Rowner Copse LWS	Atriplex portulacoides Saltmarsh	Atlantic upper-mid & mid-low salt marshes	10	20
E30	Peel Common LWS	Atriplex portulacoides Saltmarsh	Atlantic upper-mid & mid-low salt marshes	10	20
E31	Fort Fareham LWS	Broadleaved mixed and Yew woodland	Broadleaved deciduous	10	15

3.5.9 The site features were also reviewed to identify the habitat types most sensitive to acid deposition. These are summarised in Table 13.

Table 13 Critical Loads for Acid Deposition

Receptor		Feature	APIS Habitat	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E1	Solent Maritime SAC	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Calcareous grassland	0.856	4	4.856
E2	Solent & Isle of Wight Lagoons SAC	No available acid information	-(a)	-(a)	-(a)	-(a)
E3	Solent Maritime SAC	Fixed coastal dunes with herbaceous vegetation ("grey dunes")	Calcareous grassland	0.856	4	4.856
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E7	Solent & Southampton Water SPA & Ramsar	Sterna albifrons	Calcareous grassland	0.856	4	4.856
E8	Solent & Southampton Water SPA & Ramsar	Sterna albifrons	Calcareous grassland	0.856	4	4.856
E9	Chichester & Langstone Harbours SPA & Ramsar	Numenius arquata	Calcareous grassland	0.856	4	4.856

Receptor		Feature	APIS Habitat	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E10	Chichester & Langstone Harbours SPA & Ramsar	Numenius arquata	Calcareous grassland	0.856	4	4.856
E11	Solent and Dorset Coast SPA	Sterna albifrons	Calcareous grassland	0.856	4	4.856
E12	Oakdene Wood LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.679	2.036
E13	Alver Valley LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.142	1.799	1.941
E14	Alverwood LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.68	2.037
E15	Bedenham LWS	Calcareous grassland	Calcareous grassland	-(a)	-(a)	-(a)
E16	Gosport South LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.68	2.037
E17	Fort Brockhurst LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.678	2.035
E18	Land off Aerodrome Road LWS	Calcareous grassland	Calcareous grassland	1.071	4	5.071
E19	Lee-on-Solent Golf Course South LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.142	1.799	1.941
E20	Monks Walk Meadow LWS	Neutral Grassland	Calcareous grassland	-(a)	-(a)	-(a)
E21	Rowner Copse LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.676	2.033
E22	Peel Common LWS	Neutral Grassland	Calcareous grassland	1.071	4	5.071
E23	Fort Fareham LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.687	2.044

Receptor		Feature	APIS Habitat	Acid Critical Load (keq/ha/yr)		
				CLMinN	CLMaxS	CLMaxN
E24	Bathinghouse Grove & Cams Coastline LWS	Coastal and Floodplain Grazing Marsh	No comparable acid critical load class	-(a)	-(a)	-(a)
E25	Cams Plantation LWS	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.677	2.034
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	Festuca Ovina - Avenula Pratensis Lowland Calcereous Grassland	Calcareous grassland	0.856	4	4.856
E31	Unnamed Ancient Woodland	Broadleaved mixed and Yew woodland	Broadleafed/ Coniferous woodland	0.357	1.68	2.037

Notes: (a) Critical loads not defined for relevant feature/ habitat.

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

Table 14 Baseline Pollution Levels at Ecological Receptors

Receptor		Baseline Annual Mean NO_x Conc. ($\mu g/m^3$)	Baseline Deposition Rate	
			Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)
E1	Solent Maritime SAC	29.97	12.33	0.97
E2	Solent & Isle of Wight Lagoons SAC	16.19	11.60	0.90
E3	Solent Maritime SAC	16.35	11.88	0.98
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	18.31	12.30	1.01
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	20.05	12.01	0.98
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.78	12.40	1.02
E7	Solent & Southampton Water SPA & Ramsar	14.30	11.46	0.92
E8	Solent & Southampton Water SPA & Ramsar	14.53	11.76	0.95
E9	Chichester & Langstone Harbours SPA & Ramsar	32.29	12.06	0.94
E10	Chichester & Langstone Harbours SPA & Ramsar	16.20	8.7	-(a)
E11	Solent and Dorset Coast SPA	15.26	11.74	0.93
E12	Oakdene Wood LWS	16.76	20.64	1.65
E13	Alver Valley LWS	14.86	20.13	1.59
E14	Alverwood LWS	16.03	20.24	1.62
E15	Bedenham LWS	15.54	21.57	1.71
E16	Gosport South LWS	15.78	21.31	1.69
E17	Fort Brockhurst LWS	17.65	21.05	1.68

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

Receptor		Baseline Annual Mean NO_x Conc. ($\mu g/m^3$)	Baseline Deposition Rate	
			Nitrogen (kgN/ha/yr)	Acid (keq/ha/yr)
E18	Land off Aerodrome Road LWS	15.78	21.31	1.69
E19	Lee-on-Solent Golf Course South LWS	14.86	20.13	1.59
E20	Monks Walk Meadow LWS	16.45	12.45	1.02
E21	Rowner Copse LWS	16.04	20.45	1.62
E22	Peel Common LWS	16.11	11.88	0.98
E23	Fort Fareham LWS	20.05	20.67	1.64
E24	Bathinghouse Grove & Cams Coastline LWS	18.31	12.3	1.01
E25	Cams Plantation LWS	17.8	21.36	1.68
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.54	12.58	1.03
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.78	12.4	1.02
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.54	12.58	1.03
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.54	12.58	1.03
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.54	12.58	1.03
E31	Unnamed Ancient Woodland	15.78	21.31	1.69

Notes: (a) Data not available on APIS.

4.0 METHODOLOGY

4.1 Introduction

4.1.1 Atmospheric emissions from the facility have the potential to cause air quality impacts in the vicinity of the site. These have been quantified through dispersion modelling in accordance with the methodology outlined in the following Sections.

4.2 Dispersion Model

4.2.1 Dispersion modelling was undertaken using ADMS-6 (v6.0.0.1), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-6 is a short-range dispersion modelling software package that simulates a wide range of buoyant and passive releases to atmosphere. It is a new generation model utilising boundary layer height and Monin-Obukhov length to describe the atmospheric boundary layer and a skewed Gaussian concentration distribution to calculate dispersion under convective conditions.

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

4.3 Modelling Scenarios

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

Table 15 Human Receptor Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
NO_2	99.8th percentile (%ile) 1-hour mean	Annual mean
Cd	24-hour mean	Annual mean

Parameter	Modelled As	
	Short Term	Long Term
Total Volatile Organic Compounds (VOCs) as C_6H_6	24-hour mean	Annual mean
Cr VI	-	Annual mean
Cr III	24-hour mean	
Ni	1-hour mean	Annual mean
HCl	1-hour mean	-

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

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

Table 16 Ecological Receptor Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
NO_x	24-hour mean	Annual mean
Nitrogen deposition	-	Annual deposition
Acid deposition	-	Annual deposition

4.3.4 Predicted pollutant concentrations were summarised in the following formats:

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

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

4.4 Assessment Area

4.4.1 The assessment area was defined based on the facility location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 458160, 103350 to 459660, 104850. One Cartesian grid with a resolution of 10m was used within the model to produce data suitable for contour plotting using the Surfer software package.

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

4.5 Process Conditions

4.5.1 Information to describe the physical parameters of the emission points and exhaust gas information was provided by the Applicant and obtained from monitoring reports produced by Socotec[11] [12] [13]. The relevant data is summarised in Table 17.

Table 17 Physical Parameters of Emission Points and Exhaust Gas Parameters

Emission Point	NGR (m)		Stack Height (m)	Stack Diameter (m)	Exhaust Gas Temperature (°C)	Exhaust Gas Flow Rate (Nm^3/s)	Efflux Velocity (m/s)
	X	Y					
Boiler flue 1[(b)]	458892	104034	32.0	0.59	182.1	1.45	9.02
Boiler flue 2[(b)]	458892	104034	32.0	0.59	182.1	1.45	9.02
Boiler flue 3[(b)]	458892	104034	32.0	0.59	182.1	1.45	9.02
A1 - Chemical Stack[(a)]	459055	104255	15.1	1.3	26.6	10.79	8.92

[11] Stack Emission Monitoring Report - A1-Fume Scrubber Stack M1, Socotec, 2023.

[12] Stack Emission Monitoring Report - A2-Fume Scrubber Stack M1, Socotec, 2023.

[13] Stack Emission Monitoring Report - A3-Fume Scrubber Stack M1, Socotec, 2023.

Emission Point	NGR (m)		Stack Height (m)	Stack Diameter (m)	Exhaust Gas Temperature (°C)	Exhaust Gas Flow Rate (Nm^3/s)	Efflux Velocity (m/s)
	X	Y					
A2 - Chemical Stack[a]	459048	104262	15.1	1.5	22.6	12.19	7.47
A3 - Chemical Stack[a]	459038	104270	15.1	1.3	16	11.61	9.26
A4 - Boiler[b]	459008	104251	10.0	0.40	247.9	0.30	4.48
A11 - Summer Boiler[b]	459126	104310	6.0	0.30	160	0.71	15.94
HCl Storage Tank	459102	104229	7.5	0.33	-	0.000361	0.00435

Note: (a) Existing emission point.
(b) Proposed emission point.

4.5.2 It should be noted that boiler flues 1, 2 and 3 are contained within a common windshield.

4.5.3 Reference should be made to Figure 4 for a map of the emission point locations.

4.6 Emissions

4.6.1 Pollutant concentrations in the A1 to A3 chemical stack exhaust gas streams were obtained from monitoring reports produced by Socotec[14] [15] [16]. Anticipated boiler emissions were obtained from the Emission Limit Value for medium combustion plant. These are shown in Table 18.

Table 18 Pollutant Emission Concentrations

Pollutant	Emission Concentration (mg/Nm^3)						
	A1 - Chemical Stack	A2 - Chemical Stack	A3 - Chemical Stack	Boiler Flues 1-3	A11 – Summer Boiler	A4 - Boiler	HCl Storage Tank
NO_x	-	2.1	-	200	250	250	-

[14] Stack Emission Monitoring Report - A1-Fume Scrubber Stack M1, Socotec, 2023.

[15] Stack Emission Monitoring Report - A2-Fume Scrubber Stack M1, Socotec, 2023.

[16] Stack Emission Monitoring Report - A3-Fume Scrubber Stack M1, Socotec, 2023.

Pollutant	Emission Concentration (mg/Nm³)						
	A1 - Chemical Stack	A2 - Chemical Stack	A3 - Chemical Stack	Boiler Flues 1-3	A11 – Summer Boiler	A4 - Boiler	HCl Storage Tank
Total VOCs	1.92	0.44	0.5	-	-	-	-
Cd	0.00035	0.00040	0.00040	-	-	-	-
Cr	0.03381	0.00963	0.00924	-	-	-	-
Ni	0.0078	0.01476	0.01007	-	-	-	-
HCl	-	-	-	-	-	-	5

4.6.2 The pollutant mass emission rates for each source were derived from the concentrations shown in Table 18 and the flow rates shown in Table 17. The results are summarised in Table 19.

Table 19 Pollutant Emission Rates

Emission Point	Emission Rate (g/s)					
	NO_x	Total VOC	Cd	Cr	Ni	HCl
Boiler flue 1	0.2908	-	-	-	-	-
Boiler flue 2	0.2908	-	-	-	-	-
Boiler flue 3	0.2908	-	-	-	-	-
A1 - Chemical Stack	-	0.0207193	0.0000038	0.0003649	0.0000846	-
A2 - Chemical Stack	0.0255926	0.0053623	0.0000049	0.0001174	0.0001799	-
A3 - Chemical Stack	-	0.0058040	0.0000046	0.0001073	0.0001169	-
A4 - Boiler	0.0738	-	-	-	-	-
A11 – Summer Boiler	0.1778	-	-	-	-	-
HCl Storage Tank	-	-	-	-	-	0.00000181

4.6.3 The emission rate for Total VOCs is stated as Total Organic Carbon (TOC). However, for the purposes of dispersion modelling it was considered that the entire VOC emission

consisted of only C_6H_6. This allowed the maximum ground level impacts to be assessed with respect to the EQS. Actual plant emissions of VOC are unlikely to only consist of one species, resulting in a worst-case assessment. It should be noted that emissions were modelled as VOC and results factored to C_6H_6 using the relative atomic mass to carbon ratio.

4.6.4 Plant operation is not continuous. As such, NO_x, VOC, Cd, Ni and Cr III emissions were assumed to occur for 4,000-hours per year as advised by the Applicant[17]. Emissions of Cr VI were assumed to occur for 100-hours per year. This represents the 16-minutes per day that operational processes could lead to releases of this species.

4.7 NO_x to NO_2 Conversion

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

4.8 Building Effects

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

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

17 Vector Permit Application Notes, StandardAero, 2024.

18 Environmental permitting: air dispersion modelling reports, EA, 2021.

Table 20 Building Geometries

Building	NGR (m)		Height (m)	Length (m)	Width (m)	Angle (°)
	X	Y				
Boiler house	458889.0	104040.3	7.1	10.9	26.0	131.6
Building 110	458983.8	104190.8	10.8	44.4	182.8	131.6
Building 52	459012.9	104314.9	8.2	32.7	81.3	131.6
Building 102	459062.4	104286.0	7.9	20.6	21.7	131.6
Building 98	459091.1	104300.0	9.2	48.4	31.2	131.6
Building 118	459026.4	104119.8	11.4	49.1	122.7	131.6
Building 95	459122.4	104310.1	4.0	6.5	6.5	220.4
Building 94	459110.5	104324.1	8.0	20.0	16.7	222.5

4.9 Meteorological Data

4.9.1 Meteorological data used in the assessment was taken from Thorney Island meteorological station over the period 1st January 2018 to 31st December 2022 (inclusive). This observation station is located at NGR: 476521, 102593, which is approximately 17.3km 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.

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

4.10 Roughness Length

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

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

4.11 Monin-Obukhov Length

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

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

4.12 Terrain Data

4.12.1 Ordnance Survey OS Terrain 50 data was included in the model for the site and surrounding area in order to take account of the specific flow field produced by variations in ground height throughout the assessment extents. This was pre-processed using the method suggested by CERC[19].

4.13 Nitrogen Deposition

4.13.1 Nitrogen deposition rates were calculated using the conversion factors provided within EA document 'Technical Guidance on Detailed Modelling approach for an Appropriate Assessment for Emissions to Air AQTAG 06'[20]. Predicted pollutant concentrations were multiplied by the relevant deposition velocity and conversion factor to calculate the speciated dry deposition flux. The conversion factors used for the determination of nitrogen deposition are presented within Table 21.

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

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

Table 21 Conversion Factors to Determine Dry Deposition Flux for Nitrogen Deposition

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

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

4.14 Acid Deposition

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

Table 22 Conversion Factors to Determine Dry Deposition Flux for Acid Deposition

Pollutant	Deposition Velocity (m/s)		Conversion Factor (µg/m²/s to keq/ha/yr of pollutant species)
	Grassland	Forest	
NO_2	0.0015	0.003	6.84

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

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

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

4.15 Background Concentrations

4.15.1 Review of existing data in the vicinity of the site was undertaken in Section 3.0 in order to identify suitable background values for use in the assessment. These were subsequently

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

utilised to represent existing concentrations at human receptors in the vicinity of the site. A summary of the relevant values is provided in Table 23.

Table 23 Background Pollutant Concentrations - Human Receptors

Pollutant	Background Pollutant Concentration Used in Model	Unit	Source
NO_2	21	µg/m³	Local monitoring data
C_6H_6	0.44	µg/m³	DEFRA mapping
Cd	0.07	ng/m³	DEFRA (Chillbolton)
Cr	0.71	ng/m³	DEFRA (Chillbolton)
Cr VI	0.11 (a)	ng/m³	DEFRA (Chillbolton)
Ni	0.44	ng/m³	DEFRA (Chillbolton)
HCl	0.22	µg/m³	UKEAP Network (Yarner Wood)

Note: (a) The total background Cr concentration was assumed to comprise 15% Cr VI[22].

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

4.15.3 It is not possible to add short-term peak baseline and process concentrations. This is because the conditions which give rise to peak ground-level concentrations of substances emitted from an elevated source at a particular location and time are likely to be different to the conditions which give rise to peak concentrations due to emissions from other sources. This point is addressed in in EA guidance 'Air emissions risk assessment for your environmental permit'[23], 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.

22 https://www.sciencedirect.com/science/article/abs/pii/S1352231014007857.

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

4.16 Assessment Criteria

Human Receptors

4.16.1 EA guidance 'Air emissions risk assessment for your environmental permit'[24] states that PCs can be screened as insignificant if they meet the following criteria:

- The short-term PC is less than 10% of the short-term environmental standard; and,
- The long-term PC is less than 1% of the long-term environmental standard.

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

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

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

Ecological Receptors

4.16.4 EA guidance 'Air emissions risk assessment for your environmental permit'[25] states that PCs at SPAs, SACs, Ramsars and SSSIs can be screened as insignificant if they meet the following criteria:

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

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

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

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

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

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

4.17 Modelling Uncertainty

4.17.1 Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty - due to model limitations;
- Data uncertainty - due to errors in input data, including emission estimates, operational procedures, land use characteristics and meteorology; and,
- Variability - randomness of measurements used.

4.17.2 Potential uncertainties in the model results were minimised as far as practicable and worst-case inputs used in order to provide a robust assessment. This included the following:

- Choice of model - ADMS-6 is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible;
- Meteorological data - Modelling was undertaken using five annual meteorological data sets from an observation station local to the site. The analysis was based on the worst-case year for each averaging period to ensure maximum concentrations were considered;
- Surface characteristics - The z_0 and Monin-Obukhov length were determined for both the dispersion and meteorological sites based on the surrounding land uses and guidance provided by CERC;

- Plant operating conditions - Operational parameters were obtained from the Vector Permit Application Notes document[26] for the site, as well as information provided by the Applicant. As such, these are considered to be representative of normal operating conditions;
- Emission rates - Emission rates were derived from the relevant ELVs or previous monitoring results;
- Background concentrations - Background pollutant levels were obtained from local and national monitoring data, DEFRA mapping study and APIS website. These are considered representative of baseline air quality conditions at sensitive locations within the vicinity of the site;
- Receptor locations - A Cartesian Grid was included in the model in order to provide suitable data for contour plotting. Receptor points were also included at sensitive locations to provide additional consideration of these areas; and,
- Variability - All model inputs were as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

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

[26] Vector Permit Application Notes, Standard Aero, 2024

5.0 RESULTS

5.1 Introduction

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

5.1.2 Reference should be made to Figure 6 to Figure 15 for graphical representations of predicted PECs, inclusive of background levels, throughout the assessment extents. It should be noted that the values shown in the Figures are predictions from the meteorological data set which resulted in the maximum pollutant concentration for that averaging period. For example, the maximum annual mean NO_2 concentration was predicted using the 2020 meteorological data set. As such, the contours shown in Figure 6 were produced from the 2020 model outputs.

5.2 Maximum Pollutant Concentrations

5.2.1 Maximum predicted off-site pollutant concentrations for any meteorological data set are summarised in Table 24.

Table 24 Maximum Predicted Off-Site Pollutant Concentrations

Pollutant	Averaging Period	Units	EQS	PC	PC Proportion of EQS (%)	PEC	PEC Proportion of EQS (%)
NO_2	Annual	µg/m³	40	4.43	11.08	25.43	63.58
	99.8th %ile 1-hour	µg/m³	200	49.44	24.72	91.44	45.72
C_6H_6	Annual	µg/m³	5	0.31	6.18	0.75	15.00
	24-hour	µg/m³	30	2.57	8.56	3.45	11.50
Cd	Annual	ng/m³	5	0.12	2.30	0.20	3.62
	24-hour	ng/m³	0.03	0.9	3.16	1.08	3.60
Cr	Annual (Cr VI)	ng/m³	0.25	0.12	47.14	0.23	90.00
	24-hour (Cr III)	ng/m³	2,000	48.67	2.43	50.10	2.51

Pollutant	Averaging Period	Units	EQS	PC	PC Proportion of EQS (%)	PEC	PEC Proportion of EQS (%)
Ni	Annual	ng/m³	20	4.10	20.28	4.50	22.50
	1-hour	ng/m³	700	177.80	24.40	171.70	24.53
HCl	1-hour	µg/m3	750	0.14	0.02	0.58	0.08

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

5.3 Human Receptors

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

Nitrogen Dioxide

5.3.2 Predicted annual mean NO_2 PECs at the sensitive human receptors, inclusive of background levels, are summarised in Table 25.

Table 25 Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 PEC (µg/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	21.45	21.33	21.40	21.49	21.40
R2	Residential - A32	21.29	21.24	21.21	21.21	21.24
R3	Residential - A32	21.31	21.24	21.24	21.25	21.25
R4	Residential - A32	21.31	21.23	21.27	21.33	21.28
R5	Residential - A32	21.20	21.17	21.19	21.26	21.21
R6	Residential - A32	21.24	21.21	21.17	21.16	21.21
R7	Residential - A33	21.18	21.17	21.14	21.13	21.17
R8	Residential - Lederle Lane	21.17	21.17	21.14	21.12	21.17

5.3.3 As indicated in Table 25, NO_2 PECs were below the annual mean EQS of 40µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.3.4 Maximum predicted annual mean NO_2 concentrations at the receptor locations are summarised in Table 26.

Table 26 Maximum Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Aerodrome Rd	0.49	21.49	1.23	53.73
R2	Residential - A32	0.29	21.29	0.73	53.23
R3	Residential - A32	0.31	21.31	0.76	53.26
R4	Residential - A32	0.33	21.33	0.83	53.33
R5	Residential - A32	0.26	21.26	0.66	53.16
R6	Residential - A32	0.24	21.24	0.59	53.09
R7	Residential - A33	0.18	21.18	0.44	52.94
R8	Residential - Lederle Lane	0.17	21.17	0.43	52.93

5.3.5 As indicated in Table 26, all PECs were below 70% of the EQS. As such, predicted effects on annual mean NO_2 concentrations are not considered to be significant, in accordance with the EA criteria.

5.3.6 Predicted 99.8th %ile 1-hour mean NO_2 PECs, inclusive of background levels, are summarised in Table 27.

Table 27 Predicted 99.8th %ile 1-hour Mean NO_2 Concentrations

Receptor		Predicted 99.8th %ile 1-hour Mean NO_2 PEC (µg/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	49.90	49.89	49.95	50.02	50.19
R2	Residential - A32	46.33	46.24	46.21	46.23	46.33

Receptor		Predicted 99.8th %ile 1-hour Mean NO_2 PEC (µg/m³)				
		2018	2019	2020	2021	2022
R3	Residential - A32	46.43	46.37	46.43	46.44	46.46
R4	Residential - A32	46.96	46.87	46.97	46.94	47.01
R5	Residential - A32	46.15	46.22	46.23	46.26	46.23
R6	Residential - A32	45.69	45.73	45.71	45.50	45.65
R7	Residential - A33	45.30	45.21	45.25	45.13	45.23
R8	Residential - Lederle Lane	45.54	45.33	45.22	45.13	45.28

5.3.7 As indicated in Table 27, 1-hour mean NO_2 PECs were below the EQS of 200µg/m³ at all sensitive human receptor locations for all meteorological data sets.

5.3.8 Maximum predicted 99.8th %ile 1-hour mean NO_2 concentrations at the human receptor locations are summarised in Table 28.

Table 28 Maximum Predicted 99.8th %ile 1-hour Mean NO_2 Concentrations

Receptor		Maximum Predicted 99.8th %ile 1-hour Mean NO_2 Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)(a)
		PC	PEC		
R1	Residential - Aerodrome Rd	8.19	50.19	4.09	5.18
R2	Residential - A32	4.33	46.33	2.17	2.74
R3	Residential - A32	4.46	46.46	2.23	2.82
R4	Residential - A32	5.01	47.01	2.50	3.17
R5	Residential - A32	4.26	46.26	2.13	2.69
R6	Residential - A32	3.73	45.73	1.86	2.36
R7	Residential - A33	3.30	45.30	1.65	2.09
R8	Residential - Lederle Lane	3.54	45.54	1.77	2.24

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

5.3.9 As shown in Table 28, PCs were below 10% of the EQS at all human receptor locations. As such, predicted effects on 1-hour mean NO_2 concentrations are not considered to be significant, in accordance with the EA criteria.

Volatile Organic Compounds

5.3.10 Predicted annual mean VOC (as C_6H_6) PECs at the human receptors, inclusive of background levels, are summarised in Table 29.

Table 29 Predicted Annual Mean VOC (as C_6H_6) Concentrations

Receptor		Predicted Annual Mean VOC (as C_6H_6) PEC (µg/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	0.46	0.46	0.46	0.46	0.46
R2	Residential - A32	0.45	0.45	0.45	0.45	0.45
R3	Residential - A32	0.45	0.45	0.45	0.45	0.45
R4	Residential - A32	0.45	0.45	0.45	0.45	0.45
R5	Residential - A32	0.45	0.45	0.45	0.45	0.45
R6	Residential - A32	0.45	0.45	0.45	0.45	0.45
R7	Residential - A33	0.45	0.45	0.45	0.45	0.45
R8	Residential - Lederle Lane	0.45	0.45	0.45	0.45	0.45

5.3.11 As indicated in Table 29, predicted VOC (as C_6H_6) PECs were below the annual mean EQS of 5µg/m³ at all human receptor locations for all meteorological data sets.

5.3.12 Maximum predicted annual mean VOC (as C_6H_6) concentrations at the receptor locations are summarised in Table 30. Reference should be made to Figure 8 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 30 Maximum Predicted Annual Mean VOC (as C_6H_6) Concentrations

Receptor		Predicted Annual Mean VOC (as C_6H_6) Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Aerodrome Rd	0.02	0.46	0.40	9.22
R2	Residential - A32	0.01	0.45	0.26	9.08
R3	Residential - A32	0.01	0.45	0.24	9.06
R4	Residential - A32	0.01	0.45	0.24	9.06
R5	Residential - A32	0.01	0.45	0.22	9.04
R6	Residential - A32	0.01	0.45	0.25	9.07
R7	Residential - A33	0.01	0.45	0.22	9.04
R8	Residential - Lederle Lane	0.01	0.45	0.22	9.04

5.3.13 As indicated in Table 30, PECs were below 1% of the EQS at all human receptor locations. As such, predicted effects on annual mean VOC (as C_6H_6) concentrations are not considered to be significant in accordance with the EA criteria.

5.3.14 Predicted 24-hour mean VOC (as C_6H_6) PECs, inclusive of background levels, are summarised in Table 31.

Table 31 Predicted 24-hour Mean VOC (as (C_6H_6) Concentrations

Receptor		Predicted 24-hour Mean VOC (as C_6H_6) PEC (µg/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	1.29	1.16	1.15	1.17	1.17
R2	Residential - A32	1.07	1.05	1.08	1.13	1.06
R3	Residential - A32	1.04	1.05	1.10	1.11	1.05
R4	Residential - A32	1.13	1.06	1.06	1.05	1.05
R5	Residential - A32	1.06	1.03	1.07	1.08	1.07
R6	Residential - A32	1.08	1.07	1.07	1.14	1.10
R7	Residential - A33	1.07	1.09	1.09	1.04	1.08

Receptor		Predicted 24-hour Mean VOC (as C_6H_6) PEC (µg/m³)				
		2018	2019	2020	2021	2022
R8	Residential - Lederle Lane	1.15	1.10	1.09	1.08	1.08

5.3.15 As indicated in Table 31, 24-hour mean VOC (as C_6H_6) PECs were below the EQS of 30µg/m³ at all human receptor locations for all meteorological data sets.

5.3.16 Maximum predicted 24-hour mean VOC concentrations at the human receptor locations are summarised in Table 32. Reference should be made to Figure 9 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 32 Maximum Predicted 24-hour Mean VOC (as (C_6H_6) Concentrations

Receptor		Maximum Predicted 24-hour Mean VOC Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Aerodrome Rd	0.41	1.29	1.36	1.40
R2	Residential - A32	0.25	1.13	0.82	0.84
R3	Residential - A32	0.22	1.11	0.74	0.77
R4	Residential - A32	0.25	1.13	0.82	0.84
R5	Residential - A32	0.20	1.08	0.65	0.67
R6	Residential - A32	0.26	1.14	0.85	0.88
R7	Residential - A33	0.21	1.09	0.71	0.73
R8	Residential - Lederle Lane	0.26	1.15	0.88	0.91

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

5.3.17 As shown in Table 32, PCs were below 10% of the EQS at all human receptor locations. As such, predicted effects on 24-hour mean VOC concentrations are not considered to be significant in accordance with the EA guidance.

Cadmium

5.3.18 Predicted annual mean Cd PECs at the sensitive human receptors, inclusive of background levels, are summarised in Table 33.

Table 33 Predicted Annual Mean Cd Concentrations

Receptor		Predicted Annual Mean Cd PEC (ng/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	0.074	0.072	0.073	0.074	0.073
R2	Residential - A32	0.071	0.071	0.070	0.070	0.071
R3	Residential - A32	0.071	0.070	0.070	0.070	0.071
R4	Residential - A32	0.071	0.070	0.070	0.070	0.070
R5	Residential - A32	0.069	0.069	0.069	0.070	0.070
R6	Residential - A32	0.071	0.070	0.070	0.070	0.071
R7	Residential - A33	0.070	0.070	0.069	0.069	0.070
R8	Residential - Lederle Lane	0.070	0.070	0.069	0.069	0.070

5.3.19 As shown in Table 33, Cd PECs were below the annual mean EQS of 5ng/m³ at all sensitive receptor locations for all meteorological data sets.

5.3.20 Maximum predicted annual mean Cd concentrations at the receptor locations are summarised in Table 34.

Table 34 Maximum Predicted Annual Mean Cd Concentrations

Receptor		Predicted Annual Mean Cd Concentration (ng/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Aerodrome Rd	0.008	0.074	0.16	1.48
R2	Residential - A32	0.005	0.071	0.10	1.42
R3	Residential - A32	0.005	0.071	0.10	1.41
R4	Residential - A32	0.005	0.071	0.10	1.41

Receptor		Predicted Annual Mean Cd Concentration (ng/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R5	Residential - A32	0.004	0.070	0.09	1.40
R6	Residential - A32	0.005	0.071	0.10	1.42
R7	Residential - A33	0.004	0.070	0.09	1.40
R8	Residential - Lederle Lane	0.004	0.070	0.09	1.40

5.3.21 As shown in Table 34, PCs were below 1% of the EQS at all human receptor locations. As such, predicted effects on annual mean Cd concentrations are not considered to be significant in accordance with the EA criteria.

5.3.22 Predicted 24-hour mean Cd PECs, inclusive of background levels, are summarised in Table 35.

Table 35 Predicted 24-hour Mean Cd Concentrations

Receptor		Predicted 24-hour Mean Cd PEC (ng/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	0.293	0.239	0.238	0.248	0.244
R2	Residential - A32	0.206	0.197	0.215	0.231	0.203
R3	Residential - A32	0.196	0.198	0.223	0.221	0.199
R4	Residential - A32	0.229	0.202	0.202	0.198	0.195
R5	Residential - A32	0.199	0.189	0.209	0.209	0.209
R6	Residential - A32	0.207	0.203	0.205	0.232	0.219
R7	Residential - A33	0.202	0.213	0.216	0.196	0.211
R8	Residential - Lederle Lane	0.236	0.219	0.217	0.211	0.210

5.3.23 As indicated in Table 35, 24-hour mean Cd PECs were below the EQS of 30ng/m³ at all human receptor locations for all meteorological data sets.

5.3.24 Maximum predicted 24-hour mean Cd concentrations at the human receptor locations are summarised in Table 36. Reference should be made to Figure 10 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 36 Maximum Predicted 24-hour Mean Cd Concentrations

Receptor		Maximum Predicted 24-hour Mean Cd Concentration (ng/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Aerodrome Rd	0.161	0.293	0.54	0.54
R2	Residential - A32	0.099	0.231	0.33	0.33
R3	Residential - A32	0.091	0.223	0.30	0.30
R4	Residential - A32	0.097	0.229	0.32	0.32
R5	Residential - A32	0.078	0.209	0.26	0.26
R6	Residential - A32	0.101	0.232	0.34	0.34
R7	Residential - A33	0.084	0.216	0.28	0.28
R8	Residential - Lederle Lane	0.104	0.236	0.35	0.35

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

5.3.25 As shown in Table 36, PCs were below 10% of the EQS at all human receptor locations. As such, predicted effects on 24-hour mean Cd concentrations are not considered to be significant in accordance with the EA guidance.

Chromium

5.3.26 Predicted annual mean Cr VI PECs at the sensitive human receptors, inclusive of background levels, are summarised in Table 37. It should be noted that the results assume the entire Cr emission comprises Cr VI as a worst-case.

Table 37 Predicted Annual Mean Cr VI Concentrations

Receptor		Predicted Annual Mean Cr VI PEC (ng/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	0.116	0.114	0.114	0.116	0.115
R2	Residential - A32	0.113	0.112	0.112	0.112	0.113
R3	Residential - A32	0.112	0.112	0.112	0.112	0.112
R4	Residential - A32	0.112	0.111	0.112	0.112	0.112
R5	Residential - A32	0.111	0.111	0.111	0.112	0.112
R6	Residential - A32	0.112	0.112	0.111	0.111	0.112
R7	Residential - A33	0.112	0.111	0.110	0.110	0.111
R8	Residential - Lederle Lane	0.112	0.111	0.110	0.110	0.111

5.3.27 As shown in Table 37, Cr VI PECs were below the annual mean EQS of 0.25ng/m³ at all sensitive receptor locations for all meteorological data sets.

5.3.28 Maximum predicted annual mean Cr VI concentrations at the receptor locations are summarised in Table 38.

Table 38 Maximum Predicted Annual Mean Cr VI Concentrations

Receptor		Predicted Annual Mean Cr VI Concentration (ng/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Aerodrome Rd	0.009	0.116	3.45	46.30
R2	Residential - A32	0.005	0.113	2.18	45.04
R3	Residential - A32	0.005	0.112	2.08	44.93
R4	Residential - A32	0.005	0.112	2.08	44.94
R5	Residential - A32	0.005	0.112	1.88	44.74
R6	Residential - A32	0.005	0.112	2.13	44.99
R7	Residential - A33	0.005	0.112	1.87	44.72

Receptor		Predicted Annual Mean Cr VI Concentration (ng/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R8	Residential - Lederle Lane	0.005	0.112	1.87	44.72

5.3.29 As indicated in Table 38, PECs were below 70% of the EQS at all human receptor locations. As such, predicted effects on annual mean Cr VI concentrations are not considered to be significant in accordance with the EA criteria.

5.3.30 Predicted 24-hour mean Cr III PECs, inclusive of background levels, are summarised in Table 39. It should be noted that the results assume the entire Cr emission comprises Cr III as a worst-case.

Table 39 Predicted 24-hour Mean Cr III Concentrations

Receptor		Predicted 24-hour Mean Cr III PEC (ng/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	8.40	6.16	6.02	6.39	6.34
R2	Residential - A32	4.65	4.27	4.87	5.63	4.40
R3	Residential - A32	4.18	4.22	5.24	5.25	4.31
R4	Residential - A32	5.63	4.39	4.45	4.33	4.23
R5	Residential - A32	4.39	3.89	4.68	4.76	4.68
R6	Residential - A32	4.76	4.58	4.67	5.79	5.20
R7	Residential - A33	4.57	4.99	5.06	4.17	4.85
R8	Residential - Lederle Lane	5.94	5.17	5.06	4.83	4.82

5.3.31 As indicated in Table 39, 24-hour mean Cr III PECs were below the EQS of 2,000ng/m³ at all human receptor locations for all meteorological data sets.

5.3.32 Maximum predicted 24-hour mean Cd concentrations at the human receptor locations are summarised in Table 40. Reference should be made to Figure 11 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 40 Maximum Predicted 24-hour Mean Cr III Concentrations

Receptor		Maximum Predicted 24-hour Mean Cr III Concentration (ng/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Aerodrome Rd	6.97	8.40	0.35	0.35
R2	Residential - A32	4.20	5.63	0.21	0.21
R3	Residential - A32	3.82	5.25	0.55	0.19
R4	Residential - A32	4.20	5.63	0.60	0.21
R5	Residential - A32	3.33	4.76	0.48	0.17
R6	Residential - A32	4.36	5.79	0.62	0.22
R7	Residential - A33	3.63	5.06	0.52	0.18
R8	Residential - Lederle Lane	4.51	5.94	0.64	0.23

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

5.3.33 As indicated in Table 40, the PC is less than 10% of the short-term environmental standard at all human receptor locations. As such, predicted effects on 24-hour mean Cr III concentrations are not considered to be significant in accordance with the stated criteria.

Nickel

5.3.34 Predicted annual mean Ni PECs at the sensitive human receptors, inclusive of background levels, are summarised in Table 41.

Table 41 Predicted Annual Mean Ni Concentrations

Receptor		Predicted Annual Mean Ni PEC (ng/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	0.67	0.62	0.64	0.67	0.66
R2	Residential - A32	0.59	0.58	0.57	0.58	0.59
R3	Residential - A32	0.58	0.57	0.57	0.58	0.58

Receptor		Predicted Annual Mean Ni PEC (ng/m³)				
		2018	2019	2020	2021	2022
R4	Residential - A32	0.58	0.56	0.56	0.58	0.57
R5	Residential - A32	0.55	0.54	0.54	0.57	0.56
R6	Residential - A32	0.59	0.57	0.55	0.56	0.58
R7	Residential - A33	0.57	0.55	0.53	0.53	0.56
R8	Residential - Lederle Lane	0.57	0.55	0.53	0.53	0.56

5.3.35 As indicated in Table 41, Ni PECs were below the annual mean EQS of 20ng/m³ at all sensitive receptor locations for all meteorological data sets.

5.3.36 Maximum predicted annual mean Ni concentrations at the receptor locations are summarised in Table 42.

Table 42 Maximum Predicted Annual Mean Ni Concentrations

Receptor		Predicted Annual Mean Ni Concentration (ng/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
R1	Residential - Aerodrome Rd	0.23	0.67	1.15	3.37
R2	Residential - A32	0.15	0.59	0.74	2.96
R3	Residential - A32	0.14	0.58	0.70	2.92
R4	Residential - A32	0.14	0.58	0.69	2.91
R5	Residential - A32	0.12	0.57	0.62	2.84
R6	Residential - A32	0.14	0.59	0.72	2.94
R7	Residential - A33	0.12	0.57	0.62	2.84
R8	Residential - Lederle Lane	0.13	0.57	0.63	2.85

5.3.37 As shown in Table 42, PECs were below 70% at all locations. As such, predicted effects on annual mean Ni concentrations are not considered to be significant in accordance with the EA criteria.

5.3.38 Predicted 1-hour mean Ni PECs, inclusive of background levels, are summarised in Table 43.

Table 43 Predicted 1-hour Mean Ni Concentrations

Receptor		Predicted 1-hour Mean Ni PEC (ng/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	13.20	15.02	14.92	12.93	14.19
R2	Residential - A32	9.06	8.84	9.50	9.06	10.84
R3	Residential - A32	9.09	8.85	9.34	9.01	9.37
R4	Residential - A32	9.18	9.09	9.96	8.91	9.44
R5	Residential - A32	8.34	8.80	7.78	8.15	9.31
R6	Residential - A32	9.93	10.57	11.74	10.12	10.70
R7	Residential - A33	8.93	9.82	9.65	8.90	10.59
R8	Residential - Lederle Lane	9.81	11.38	10.92	9.88	11.55

5.3.39 As indicated in Table 43, 1-hour mean Ni PECs were below the EQS of 700ng/m³ at all human receptor locations for all meteorological data sets.

5.3.40 Maximum predicted 1-hour mean Ni concentrations at the human receptor locations are summarised in Table 44. Reference should be made to Figure 15 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 44 Maximum Predicted 1-hour Mean Ni Concentrations

Receptor		Predicted 1-hour Mean Ni Concentration (ng/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Aerodrome Rd	14.13	15.02	2.02	2.02
R2	Residential - A32	9.95	10.84	1.42	1.42
R3	Residential - A32	8.48	9.37	1.21	1.21
R4	Residential - A32	9.07	9.96	1.30	1.30

Receptor		Predicted 1-hour Mean Ni Concentration (ng/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R5	Residential - A32	8.42	9.31	1.20	1.20
R6	Residential - A32	10.85	11.74	1.55	1.55
R7	Residential - A33	9.70	10.59	1.39	1.39
R8	Residential - Lederle Lane	10.67	11.55	1.52	1.53

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

5.3.41 As shown in Table 44, the PC was below 10% of the EQS all human receptor locations. As such, predicted effects on 1-hour mean Ni concentrations are not considered to be significant in accordance with the EA criteria.

Hydrogen Chloride

5.3.42 Predicted 1-hour mean HCl PECs, inclusive of background levels, are summarised in Table 45.

Table 45 Predicted 1-hour Mean HCl Concentrations

Receptor		Predicted 1-hour Mean HCl PEC (µg/m³)				
		2018	2019	2020	2021	2022
R1	Residential - Aerodrome Rd	0.44016	0.44012	0.44012	0.44012	0.44012
R2	Residential - A32	0.44009	0.44008	0.44008	0.44008	0.44008
R3	Residential - A32	0.44008	0.44008	0.44008	0.44008	0.44007
R4	Residential - A32	0.44006	0.44006	0.44006	0.44006	0.44006
R5	Residential - A32	0.44007	0.44006	0.44006	0.44007	0.44007
R6	Residential - A32	0.44006	0.44006	0.44007	0.44006	0.44006
R7	Residential - A33	0.44005	0.44005	0.44005	0.44006	0.44005
R8	Residential - Lederle Lane	0.44006	0.44006	0.44006	0.44006	0.44006

5.3.43 As indicated in Table 45, 1-hour mean HCl PECs were below the EQS of 750µg/m³ at all sensitive receptor locations for all meteorological data sets.

5.3.44 Maximum predicted 1-hour mean HCl concentrations at the sensitive receptor locations are summarised in Table 46. Reference should be made to Figure 16 for a graphical representation of predicted concentrations throughout the assessment extents.

Table 46 Maximum Predicted 1-hour Mean HCl Concentrations

Receptor		Predicted 1-hour Mean HCl Concentration (µg/m³)		PC Proportion of EQS (%)	PC Proportion of EQS Headroom (%)[a]
		PC	PEC		
R1	Residential - Aerodrome Rd	0.00016	0.44016	0.00002	0.00002
R2	Residential - A32	0.00009	0.44009	0.00001	0.00001
R3	Residential - A32	0.00008	0.44008	0.00001	0.00001
R4	Residential - A32	0.00006	0.44006	0.00001	0.00001
R5	Residential - A32	0.00007	0.44007	0.00001	0.00001
R6	Residential - A32	0.00007	0.44007	0.00001	0.00001
R7	Residential - A33	0.00006	0.44006	0.00001	0.00001
R8	Residential - Lederle Lane	0.00006	0.44006	0.00001	0.00001

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

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

5.4 Ecological Receptors

Nitrogen Oxides

5.4.1 Predicted annual mean NO_x PECs at the ecological receptor locations, inclusive of background levels, are summarised in Table 47.

Table 47 Predicted Annual Mean NO_x Concentrations

Receptor		Predicted Annual Mean NO_x PEC (µg/m³)				
		2018	2019	2020	2021	2022
E1	Solent Maritime SAC	29.98	29.98	29.98	29.98	29.98
E2	Solent & Isle of Wight Lagoons SAC	16.20	16.20	16.20	16.20	16.20
E3	Solent Maritime SAC	16.36	16.35	16.35	16.35	16.36
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	18.93	18.91	18.78	18.76	18.92
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	20.14	20.12	20.11	20.11	20.13
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.90	15.89	15.87	15.91	15.89
E7	Solent & Southampton Water SPA & Ramsar	14.33	14.33	14.33	14.33	14.33
E8	Solent & Southampton Water SPA & Ramsar	14.55	14.55	14.54	14.54	14.55
E9	Chichester & Langstone Harbours SPA & Ramsar	32.30	32.30	32.30	32.30	32.30
E10	Chichester & Langstone Harbours SPA & Ramsar	16.21	16.21	16.21	16.21	16.21
E11	Solent and Dorset Coast SPA	15.28	15.28	15.28	15.28	15.28
E12	Oakdene Wood LWS	16.82	16.83	16.83	16.86	16.85
E13	Alver Valley LWS	14.90	14.90	14.90	14.91	14.91
E14	Alverwood LWS	16.10	16.09	16.09	16.10	16.10
E15	Bedenham LWS	15.98	15.95	15.95	16.08	16.00
E16	Gosport South LWS	15.88	15.88	15.86	15.90	15.88
E17	Fort Brockhurst LWS	17.71	17.70	17.69	17.71	17.70
E18	Land off Aerodrome Road LWS	15.92	15.93	15.91	15.96	15.93
E19	Lee-on-solent Golf Course South LWS	14.91	14.91	14.91	14.92	14.92
E20	Monks Walk Meadow LWS	16.51	16.51	16.50	16.52	16.51
E21	Rowner Copse LWS	16.08	16.09	16.10	16.11	16.11
E22	Peel Common LWS	16.19	16.19	16.17	16.18	16.19

Receptor		Predicted Annual Mean NO_x PEC (µg/m³)				
		2018	2019	2020	2021	2022
E23	Fort Fareham LWS	20.10	20.09	20.09	20.08	20.10
E24	Bathinghouse Grove & Cams Coastline LWS	18.38	18.37	18.35	18.35	18.37
E25	Cams Plantation LWS	17.88	17.90	17.89	17.90	17.91
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.79	15.79	15.79	15.76	15.76
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.97	15.98	15.96	15.97	15.95
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	16.23	16.27	16.25	16.33	16.34
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.91	15.92	15.94	15.96	15.93
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	15.89	15.95	15.96	15.91	15.93
E31	Ancient Woodland	15.89	15.89	15.88	15.90	15.89

5.4.2 As shown in Table 47, annual mean NO_x PECs were below the EQS of 30µg/m³ at all ecological receptor locations.

5.4.3 Maximum predicted annual mean NO_x concentrations at the ecological receptor locations are summarised in Table 48.

Table 48 Maximum Predicted Annual Mean NO_x Concentrations

Receptor		Maximum Predicted Annual Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	Solent Maritime SAC	0.01	29.98	0.03	99.93
E2	Solent & Isle of Wight Lagoons SAC	0.01	16.20	0.04	54.01
E3	Solent Maritime SAC	0.01	16.36	0.02	54.52
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.62	18.93	2.08	63.11

Receptor		Maximum Predicted Annual Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.09	20.14	0.29	67.12
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.13	15.91	0.43	53.03
E7	Solent & Southampton Water SPA & Ramsar	0.03	14.33	0.11	47.77
E8	Solent & Southampton Water SPA & Ramsar	0.02	14.55	0.07	48.50
E9	Chichester & Langstone Harbours SPA & Ramsar	0.01	32.30	0.03	107.66
E10	Chichester & Langstone Harbours SPA & Ramsar	0.01	16.21	0.03	54.03
E11	Solent and Dorset Coast SPA	0.02	15.28	0.08	50.95
E12	Oakdene Wood LWS	0.10	16.86	0.33	56.20
E13	Alver Valley LWS	0.05	14.91	0.16	49.70
E14	Alverwood LWS	0.07	16.10	0.24	53.67
E15	Bedenham LWS	0.54	16.08	1.80	53.60
E16	Gosport South LWS	0.12	15.90	0.39	52.99
E17	Fort Brockhurst LWS	0.06	17.71	0.20	59.03
E18	Land off Aerodrome Road LWS	0.18	15.96	0.61	53.21
E19	Lee-on-solent Golf Course South LWS	0.06	14.92	0.20	49.74
E20	Monks Walk Meadow LWS	0.07	16.52	0.22	55.06
E21	Rowner Copse LWS	0.07	16.11	0.25	53.71
E22	Peel Common LWS	0.08	16.19	0.26	53.96
E23	Fort Fareham LWS	0.05	20.10	0.16	67.00
E24	Bathinghouse Grove & Cams Coastline LWS	0.07	18.38	0.23	61.27
E25	Cams Plantation LWS	0.11	17.91	0.36	59.69

Receptor		Maximum Predicted Annual Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.25	15.79	0.84	52.64
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.20	15.98	0.68	53.28
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.80	16.34	2.65	54.45
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.42	15.96	1.40	53.20
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.42	15.96	1.39	53.19
E31	Ancient Woodland	0.12	15.90	0.38	52.98

5.4.4 As shown in Table 48, PCs were below 100% of the EQS at all local designations and PECs were below 70% of the EQS at all other designations. As such, predicted effects on annual mean NO_x concentrations are considered to be not significant, in accordance with the EA criteria.

5.4.5 Predicted 24-hour mean NO_x PECs at the ecological receptor locations, inclusive of background levels, are summarised in Table 49.

Table 49 Predicted 24-hour Mean NO_x Concentrations

Receptor		Predicted 24-hour Mean NO_x PEC (µg/m³)				
		2018	2019	2020	2021	2022
E1	Solent Maritime SAC	60.11	60.10	60.09	60.15	60.08
E2	Solent & Isle of Wight Lagoons SAC	32.76	32.69	32.69	32.75	32.76
E3	Solent Maritime SAC	32.89	32.85	32.85	32.91	32.90
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	46.79	45.73	45.29	44.05	46.88
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	42.36	42.25	42.67	42.01	42.06

Receptor		Predicted 24-hour Mean NO_x PEC (µg/m³)				
		2018	2019	2020	2021	2022
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	34.69	33.85	34.06	34.57	34.54
E7	Solent & Southampton Water SPA & Ramsar	29.17	29.21	29.27	29.09	29.21
E8	Solent & Southampton Water SPA & Ramsar	29.59	29.49	29.54	29.64	29.61
E9	Chichester & Langstone Harbours SPA & Ramsar	64.75	64.74	64.73	64.79	64.72
E10	Chichester & Langstone Harbours SPA & Ramsar	32.63	32.58	32.64	32.59	32.59
E11	Solent and Dorset Coast SPA	30.96	31.01	31.05	31.00	31.20
E12	Oakdene Wood LWS	35.55	35.76	35.54	35.77	35.66
E13	Alver Valley LWS	30.51	30.50	30.77	30.56	30.92
E14	Alverwood LWS	33.46	33.42	33.39	33.26	33.44
E15	Bedenham LWS	37.96	37.34	38.22	39.01	38.97
E16	Gosport South LWS	34.35	34.09	34.07	34.15	33.81
E17	Fort Brockhurst LWS	37.13	36.80	36.58	36.92	36.76
E18	Land off Aerodrome Road LWS	34.81	35.74	35.63	35.25	34.80
E19	Lee-on-solent Golf Course South LWS	30.83	30.65	30.93	30.81	31.05
E20	Monks Walk Meadow LWS	34.43	34.13	34.36	34.59	34.46
E21	Rowner Copse LWS	33.54	33.77	33.31	33.72	34.10
E22	Peel Common LWS	33.31	33.83	33.35	33.83	33.64
E23	Fort Fareham LWS	41.77	41.42	42.01	41.27	41.50
E24	Bathinghouse Grove & Cams Coastline LWS	38.11	38.08	38.27	38.19	38.80
E25	Cams Plantation LWS	37.39	37.84	37.16	37.68	37.33
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	34.16	34.02	33.80	33.89	34.18
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	35.52	34.50	34.84	34.42	34.41

Receptor		Predicted 24-hour Mean NO_x PEC (µg/m³)				
		2018	2019	2020	2021	2022
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	38.95	40.23	40.51	40.76	40.63
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	35.59	36.46	35.78	36.25	35.79
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	35.24	35.58	35.50	36.51	36.09
E31	Ancient Woodland	33.48	33.98	33.65	34.00	34.07

5.4.6 As shown in Table 49, 24-hour mean NO_x PECs were below the EQS of 75µg/m³ at all ecological receptor locations.

5.4.7 Maximum predicted 24-hour mean NO_x concentrations at the ecological receptor locations are summarised in Table 50.

Table 50 Maximum Predicted 24-hour Mean NO_x Concentrations

Receptor		Maximum Predicted 24-hour Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E1	Solent Maritime SAC	0.21	60.15	0.29	80.21
E2	Solent & Isle of Wight Lagoons SAC	0.38	32.76	0.51	43.68
E3	Solent Maritime SAC	0.21	32.91	0.29	43.89
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	10.26	46.88	13.68	62.51
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	2.57	42.67	3.43	56.89
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	3.13	34.69	4.18	46.26
E7	Solent & Southampton Water SPA & Ramsar	0.67	29.27	0.89	39.03
E8	Solent & Southampton Water SPA & Ramsar	0.58	29.64	0.77	39.52

Receptor		Maximum Predicted 24-hour Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E9	Chichester & Langstone Harbours SPA & Ramsar	0.21	64.79	0.28	86.39
E10	Chichester & Langstone Harbours SPA & Ramsar	0.24	32.64	0.32	43.52
E11	Solent and Dorset Coast SPA	0.68	31.20	0.91	41.60
E12	Oakdene Wood LWS	2.25	35.77	3.00	47.70
E13	Alver Valley LWS	1.20	30.92	1.59	41.22
E14	Alverwood LWS	1.40	33.46	1.87	44.61
E15	Bedenham LWS	7.93	39.01	10.58	52.02
E16	Gosport South LWS	2.79	34.35	3.72	45.80
E17	Fort Brockhurst LWS	1.83	37.13	2.44	49.51
E18	Land off Aerodrome Road LWS	4.18	35.74	5.58	47.66
E19	Lee-on-solent Golf Course South LWS	1.33	31.05	1.77	41.40
E20	Monks Walk Meadow LWS	1.69	34.59	2.25	46.12
E21	Rowner Copse LWS	2.02	34.10	2.69	45.46
E22	Peel Common LWS	1.61	33.83	2.15	45.11
E23	Fort Fareham LWS	1.91	42.01	2.55	56.01
E24	Bathinghouse Grove & Cams Coastline LWS	2.18	38.80	2.90	51.73
E25	Cams Plantation LWS	2.24	37.84	2.99	50.45
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	3.10	34.18	4.13	45.57
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	3.96	35.52	5.28	47.36
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	9.68	40.76	12.91	54.35
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	5.38	36.46	7.17	48.61

Receptor		Maximum Predicted 24-hour Mean NO_x Concentration (µg/m³)		Proportion of EQS (%)	
		PC	PEC	PC	PEC
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	5.43	36.51	7.24	48.68
E31	Unnamed Ancient Woodland	2.51	34.07	3.35	45.43

5.4.8 As shown in Table 50, PCs were below 100% of the EQS at all local designations. PCs were above 10% of the EQS at a number of other designations. However, the EQS was not exceeded at these positions. As such, predicted effects on 24-hour mean NO_x concentrations are considered to be not significant, in accordance with the stated criteria.

Nitrogen Deposition

5.4.9 Predicted annual nitrogen PC deposition rates at the ecological receptor locations are summarised in Table 51.

Table 51 Predicted Annual Nitrogen Deposition Rates

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
		2018	2019	2020	2021	2022
E1	Solent Maritime SAC	0.0008	0.0009	0.0009	0.0008	0.0008
E2	Solent & Isle of Wight Lagoons SAC	0.0012	0.0011	0.0007	0.0012	0.0012
E3	Solent Maritime SAC	0.0006	0.0005	0.0004	0.0004	0.0005
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0627	0.0600	0.0473	0.0452	0.0619
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0087	0.0074	0.0065	0.0057	0.0084
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0120	0.0113	0.0093	0.0130	0.0113
E7	Solent & Southampton Water SPA & Ramsar	0.0028	0.0031	0.0027	0.0028	0.0032

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
		2018	2019	2020	2021	2022
E8	Solent & Southampton Water SPA & Ramsar	0.0020	0.0016	0.0013	0.0014	0.0019
E9	Chichester & Langstone Harbours SPA & Ramsar	0.0008	0.0009	0.0009	0.0008	0.0008
E10	Chichester & Langstone Harbours SPA & Ramsar	0.0008	0.0009	0.0008	0.0008	0.0007
E11	Solent and Dorset Coast SPA	0.0015	0.0019	0.0019	0.0024	0.0023
E12	Oakdene Wood LWS	0.0130	0.0150	0.0146	0.0200	0.0177
E13	Alver Valley LWS	0.0074	0.0078	0.0079	0.0099	0.0095
E14	Alverwood LWS	0.0134	0.0120	0.0118	0.0144	0.0137
E15	Bedenham LWS	0.0441	0.0410	0.0414	0.0543	0.0463
E16	Gosport South LWS	0.0208	0.0204	0.0161	0.0237	0.0206
E17	Fort Brockhurst LWS	0.0114	0.0105	0.0077	0.0118	0.0108
E18	Land off Aerodrome Road LWS	0.0146	0.0155	0.0131	0.0186	0.0154
E19	Lee-on-solent Golf Course South LWS	0.0103	0.0098	0.0099	0.0123	0.0117
E20	Monks Walk Meadow LWS	0.0061	0.0063	0.0053	0.0067	0.0062
E21	Rowner Copse LWS	0.0090	0.0109	0.0114	0.0149	0.0135
E22	Peel Common LWS	0.0078	0.0077	0.0063	0.0069	0.0077
E23	Fort Fareham LWS	0.0098	0.0081	0.0071	0.0063	0.0093
E24	Bathinghouse Grove & Cams Coastline LWS	0.0070	0.0060	0.0043	0.0044	0.0065
E25	Cams Plantation LWS	0.0170	0.0192	0.0183	0.0205	0.0216
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0251	0.0252	0.0250	0.0223	0.0218
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0194	0.0205	0.0182	0.0191	0.0169
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0693	0.0736	0.0717	0.0794	0.0802
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0376	0.0379	0.0400	0.0424	0.0397

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)				
		2018	2019	2020	2021	2022
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.0351	0.0417	0.0421	0.0377	0.0390
E31	Unnamed ancient Woodland	0.0230	0.0230	0.0207	0.0233	0.0217

5.4.10 Maximum predicted annual nitrogen deposition rates at the receptor locations are summarised in Table 52.

Table 52 Maximum Predicted Annual Nitrogen Deposition Rates

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)	PC Proportion of EQS (%)	
			Low EQS	High EQS
E1	Solent Maritime SAC	0.00091	0.02	0.01
E2	Solent & Isle of Wight Lagoons SAC	0.00121	0.01	0.01
E3	Solent Maritime SAC	0.00058	0.01	0.01
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.06268	0.63	0.34
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00865	0.09	0.05
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.01302	0.13	0.07
E7	Solent & Southampton Water SPA & Ramsar	0.00319	0.06	0.04
E8	Solent & Southampton Water SPA & Ramsar	0.00202	0.04	0.02
E9	Chichester & Langstone Harbours SPA & Ramsar	0.00090	0.02	0.01
E10	Chichester & Langstone Harbours SPA & Ramsar	0.00085	0.02	0.01
E11	Solent and Dorset Coast SPA	0.00241	0.05	0.03
E12	Oakdene Wood LWS	0.01997	0.20	0.15
E13	Alver Valley LWS	0.00990	0.10	0.07
E14	Alverwood LWS	0.01438	0.14	0.11

Receptor		Predicted Annual PC Nitrogen Deposition Rate (kgN/ha/yr)	PC Proportion of EQS (%)	
			Low EQS	High EQS
E15	Bedenham LWS	0.05431	0.54	0.30
E16	Gosport South LWS	0.02369	0.24	0.17
E17	Fort Brockhurst LWS	0.01183	0.12	0.09
E18	Land off Aerodrome Road LWS	0.01856	0.19	0.10
E19	Lee-on-solent Golf Course South LWS	0.01231	0.12	0.09
E20	Monks Walk Meadow LWS	0.00670	0.07	0.04
E21	Rowner Copse LWS	0.01486	0.15	0.11
E22	Peel Common LWS	0.00779	0.08	0.04
E23	Fort Fareham LWS	0.00984	0.10	0.07
E24	Bathinghouse Grove & Cams Coastline LWS	0.00703	0.07	0.04
E25	Cams Plantation LWS	0.02161	0.22	0.16
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.02524	0.25	0.14
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.02055	0.21	0.11
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.08016	0.80	0.44
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.04241	0.42	0.23
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.04213	0.42	0.23
E31	Unnamed Ancient Woodland	0.02325	0.23	0.17

5.4.11 As shown in Table 52, PCs were below 100% of the EQS at all local designations and below 1% of the EQS at all other designations. As such, predicted effects on annual nitrogen deposition are considered to be not significant, in accordance with the stated criteria.

Acid Deposition

5.4.12 Predicted annual acid PC deposition rates are summarised in Table 53.

Table 53 Predicted Annual PC Acid Deposition Rates

Receptor		Predicted Annual PC Acid Deposition Rate (keq/ha/yr)				
		2018	2019	2020	2021	2022
E1	Solent Maritime SAC	0.00006	0.00006	0.00006	0.00006	0.00006
E2	Solent & Isle of Wight Lagoons SAC	0.00009	0.00008	0.00005	0.00008	0.00008
E3	Solent Maritime SAC	0.00004	0.00003	0.00003	0.00003	0.00004
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00447	0.00428	0.00338	0.00322	0.00442
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00062	0.00052	0.00047	0.00041	0.00060
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00086	0.00081	0.00066	0.00093	0.00081
E7	Solent & Southampton Water SPA & Ramsar	0.00020	0.00022	0.00019	0.00020	0.00023
E8	Solent & Southampton Water SPA & Ramsar	0.00014	0.00012	0.00009	0.00010	0.00014
E9	Chichester & Langstone Harbours SPA & Ramsar	0.00006	0.00006	0.00006	0.00006	0.00006
E10	Chichester & Langstone Harbours SPA & Ramsar	0.00005	0.00006	0.00006	0.00006	0.00005
E11	Solent and Dorset Coast SPA	0.00011	0.00013	0.00014	0.00017	0.00017
E12	Oakdene Wood LWS	0.00093	0.00107	0.00104	0.00142	0.00126
E13	Alver Valley LWS	0.00053	0.00055	0.00056	0.00071	0.00068
E14	Alverwood LWS	0.00096	0.00086	0.00084	0.00103	0.00097
E15	Bedenham LWS	0.00314	0.00293	0.00295	0.00387	0.00330
E16	Gosport South LWS	0.00148	0.00146	0.00115	0.00169	0.00147
E17	Fort Brockhurst LWS	0.00082	0.00075	0.00055	0.00084	0.00077
E18	Land off Aerodrome Road LWS	0.00104	0.00111	0.00093	0.00132	0.00110
E19	Lee-on-solent Golf Course South LWS	0.00074	0.00070	0.00071	0.00088	0.00084
E20	Monks Walk Meadow LWS	0.00044	0.00045	0.00038	0.00048	0.00044
E21	Rowner Copse LWS	0.00065	0.00078	0.00081	0.00106	0.00096

Receptor		Predicted Annual PC Acid Deposition Rate (keq/ha/yr)				
		2018	2019	2020	2021	2022
E22	Peel Common LWS	0.00056	0.00055	0.00045	0.00049	0.00055
E23	Fort Fareham LWS	0.00070	0.00058	0.00051	0.00045	0.00066
E24	Bathinghouse Grove & Cams Coastline LWS	0.00050	0.00043	0.00030	0.00031	0.00046
E25	Cams Plantation LWS	0.00121	0.00137	0.00131	0.00146	0.00154
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00179	0.00180	0.00179	0.00159	0.00156
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00138	0.00147	0.00130	0.00136	0.00121
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00495	0.00525	0.00511	0.00566	0.00572
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00268	0.00270	0.00285	0.00302	0.00283
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00250	0.00297	0.00300	0.00269	0.00278
E31	Unnamed Ancient Woodland	0.00164	0.00164	0.00148	0.00166	0.00155

5.4.13 Maximum predicted annual acid deposition rates at the receptor locations are summarised in Table 54.

Table 54 Predicted Annual Acid Deposition Rates

Receptor		Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)	PC Proportion of EQS (%)
E1	Solent Maritime SAC	0.00006	0.00
E2	Solent & Isle of Wight Lagoons SAC	0.00009	-(a)
E3	Solent Maritime SAC	0.00004	0.00
E4	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00447	0.09
E5	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00062	0.01

Receptor		Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)	PC Proportion of EQS (%)
E6	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00093	0.02
E7	Solent & Southampton Water SPA & Ramsar	0.00023	0.00
E8	Solent & Southampton Water SPA & Ramsar	0.00014	0.00
E9	Chichester & Langstone Harbours SPA & Ramsar	0.00006	0.00
E10	Chichester & Langstone Harbours SPA & Ramsar	0.00006	0.00
E11	Solent and Dorset Coast SPA	0.00017	0.00
E12	Oakdene Wood LWS	0.00142	0.07
E13	Alver Valley LWS	0.00071	0.04
E14	Alverwood LWS	0.00103	0.05
E15	Bedenham LWS	0.00387	-(a)
E16	Gosport South LWS	0.00169	0.08
E17	Fort Brockhurst LWS	0.00084	0.04
E18	Land off Aerodrome Road LWS	0.00132	0.03
E19	Lee-on-solent Golf Course South LWS	0.00088	0.05
E20	Monks Walk Meadow LWS	0.00048	-(a)
E21	Rowner Copse LWS	0.00106	0.05
E22	Peel Common LWS	0.00056	0.01
E23	Fort Fareham LWS	0.00070	0.03
E24	Bathinghouse Grove & Cams Coastline LWS	0.00050	-(a)
E25	Cams Plantation LWS	0.00154	0.08
E26	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00180	0.04
E27	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00147	0.03
E28	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00572	0.12

Receptor		Maximum Predicted Annual Acid PC Deposition Rate (keq/ha/yr)	PC Proportion of EQS (%)
E29	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00302	0.06
E30	Portsmouth Harbour SPA, Ramsar, SSSI & Solent and Dorset Coast SPA	0.00300	0.06
E31	Unnamed Ancient Woodland	0.00166	0.08

Note: (a) Critical Load not defined.

5.4.14 As shown in Table 54, PCs were below 100% of the EQS at all local designations and below 1% of the EQS at all other designations. As such, predicted effects on annual acid deposition are considered to be not significant, in accordance with the stated criteria.

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Vector Aerospace International Ltd to undertake an Air Quality Assessment in support of an Environmental Permit Variation for StandardAero, Gosport.

6.1.2 Atmospheric emissions from the plant have the potential to cause air quality impacts during normal operation. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects.

6.1.3 Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the site. Impacts at sensitive receptors were quantified and the results compared with the relevant EQSs and significance criteria.

6.1.4 The results of the assessment indicated that the operation of the facility is not predicted to result in exceedences of the relevant EQSs at any sensitive human receptor within the vicinity of the installation. Impacts were classified as not significant in accordance with the relevant methodology.

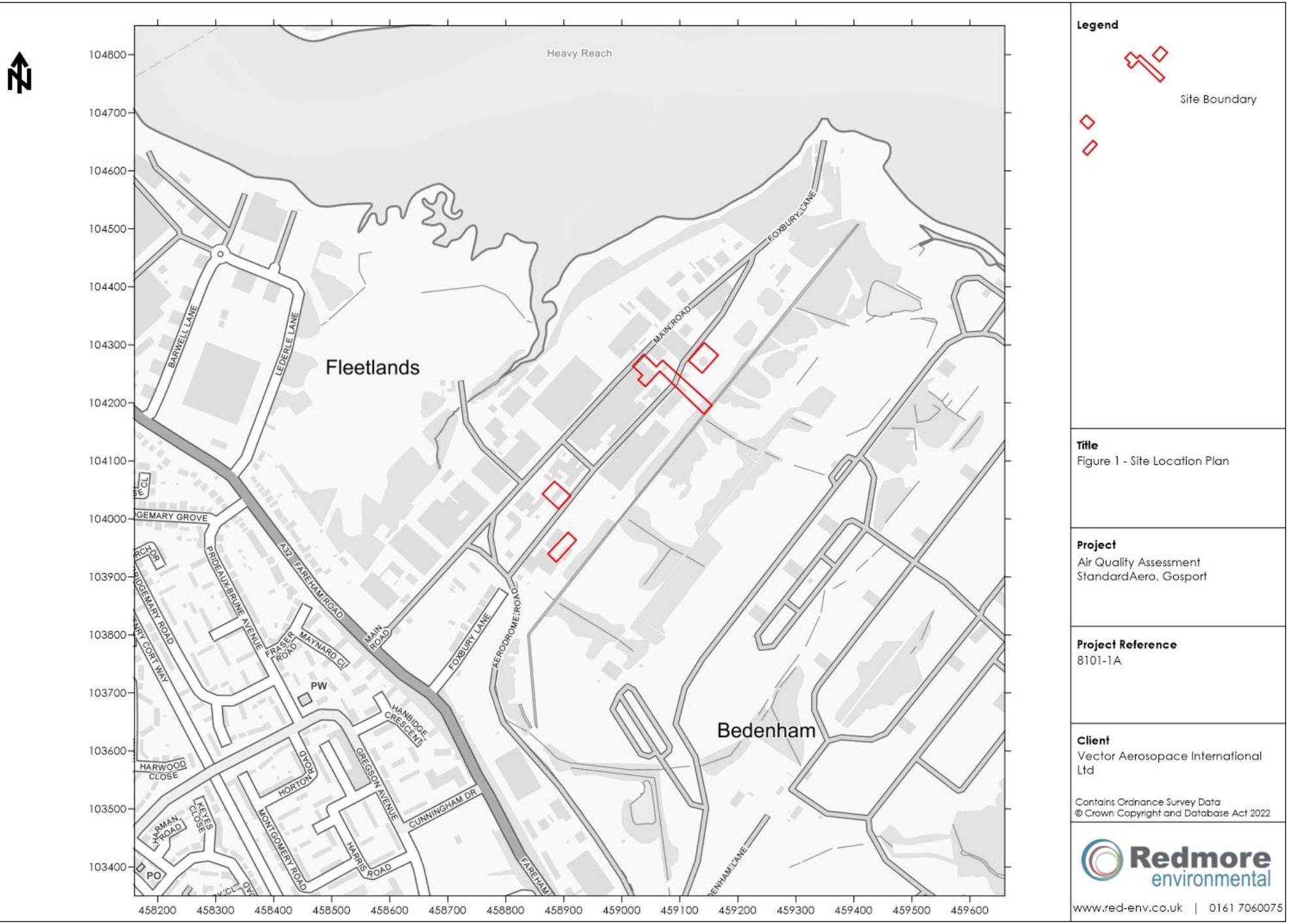
6.1.5 Impacts were also predicted at relevant ecological sites. The results indicated that emissions from the facility would not significantly affect existing conditions at any designation.

7.0 ABBREVIATIONS

APIS	Air Pollution Information System
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
AW	Ancient Woodland
C_6H_6	Benzene
Cd	Cadmium
CERC	Cambridge Environmental Research Consultants
Cr	Chromium
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
EQS	Environmental Quality Standard
EPAQS	Expert Panel on Air Quality Standards
HCl	Hydrogen chloride
GBC	Gosborough Borough Council
LAQM	Local Air Quality Management
MAGIC	Multi-Agency Geographic Information for the Countryside
NGR	National Grid Reference
Ni	Nickel
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
PC	Process Contribution
PEC	Predicted Environmental Concentration
PM	Particulate matter
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 10µm
SAC	Special Area of Conservation
SPA	Special Protection Area
TOC	Total Organic Carbon
UKEAP	UK Eutrophying and Acidifying Pollutants
VOC	Volatile Organic Compound
z_0	Roughness length

%ile	Percentile

Figures



Legend

Site Boundary

Title
Figure 1 - Site Location Plan

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StandardAero, Gosport

Project Reference
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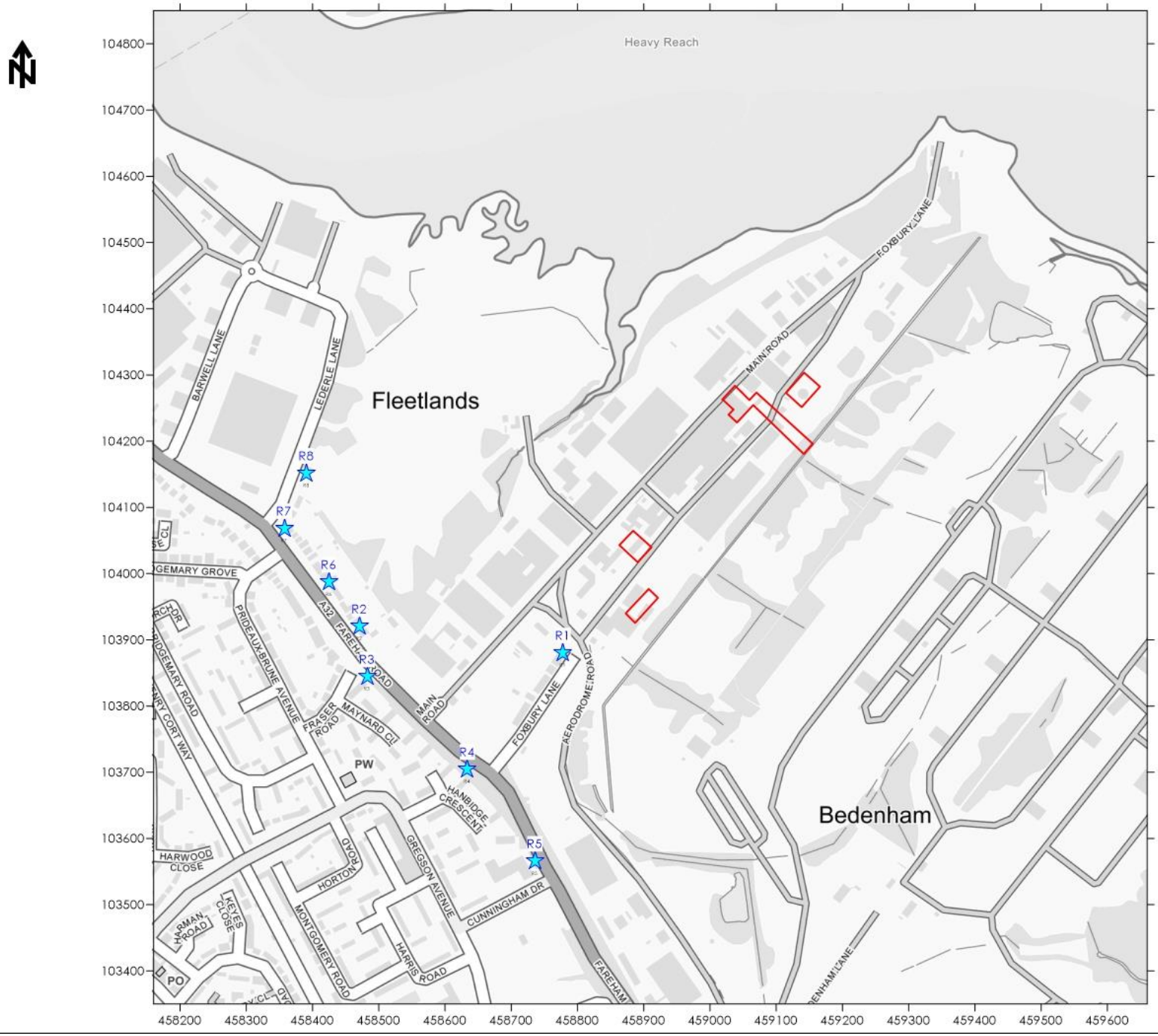

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Site Boundary

Receptor

Title
Figure 2 - Human Receptor Locations

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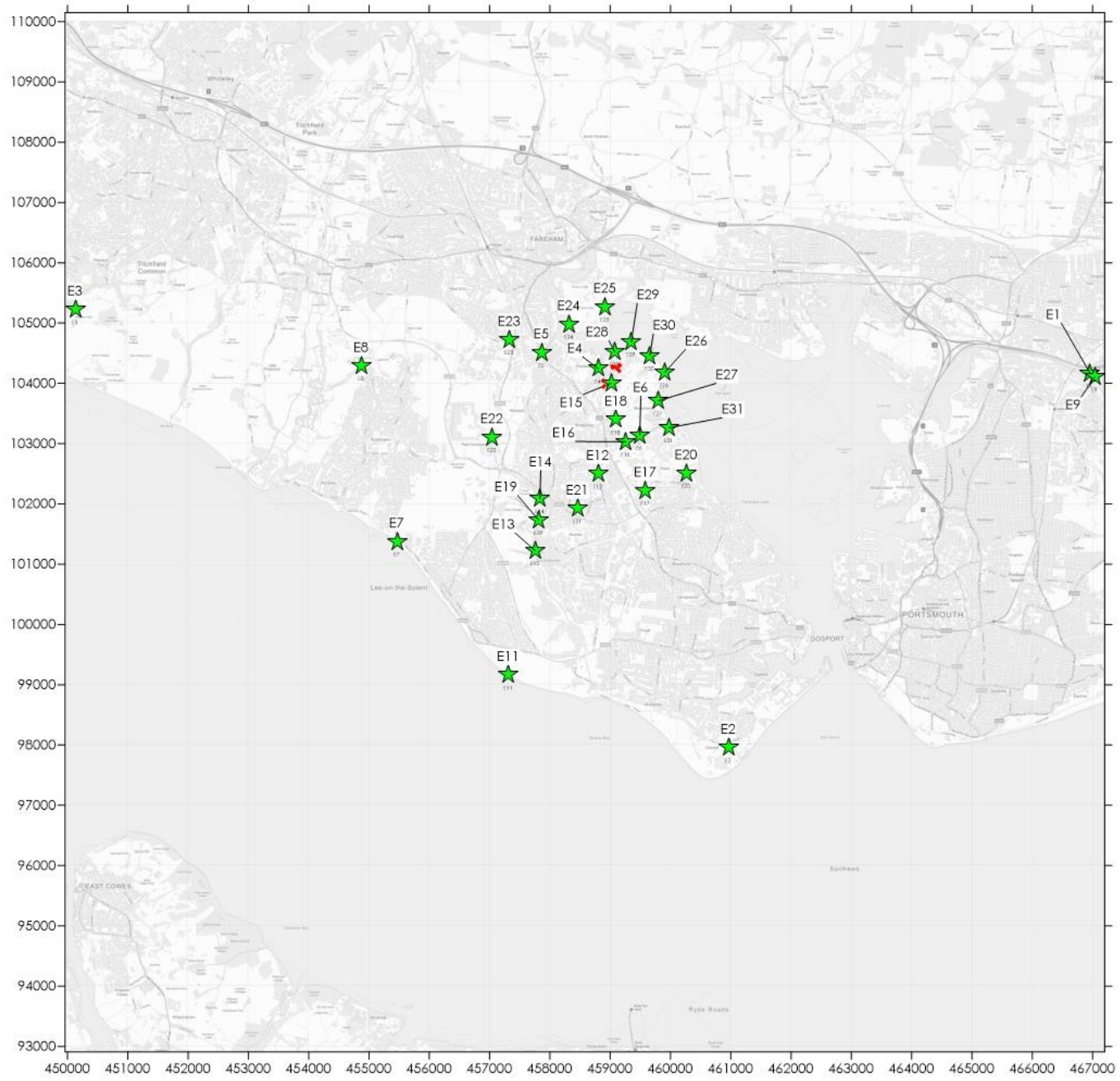

Legend

Site Boundary

Ecological Receptor

Title

Figure 3 - Sensitive Ecological Receptor Locations

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- Stack
- Building
- Output Grid

Title
Figure 4 - ADMS-6 Inputs

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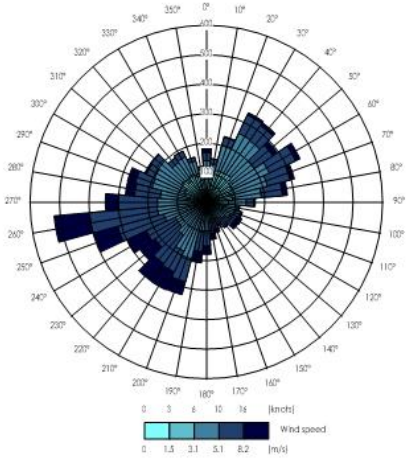

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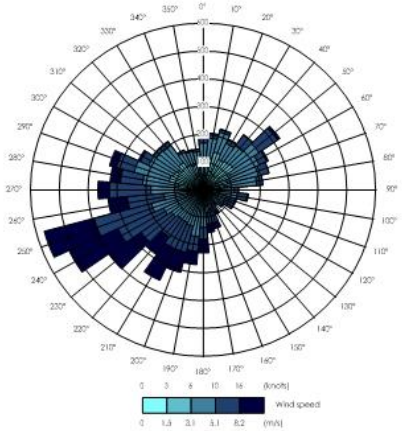
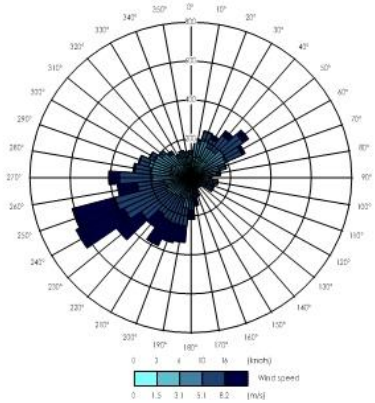


2019 Meteorological Data



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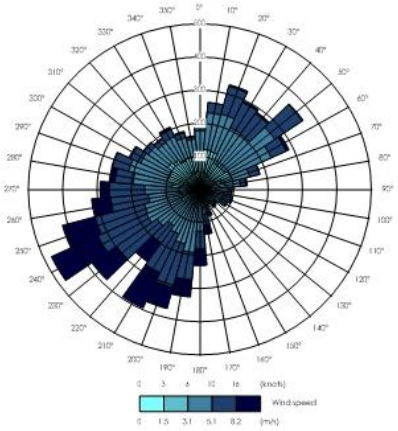
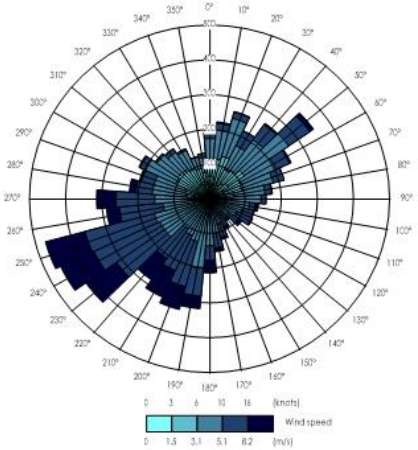


2021 Meteorological Data



2022 Meteorological Data

Legend

Title
Figure 5 - Wind Roses of 2018 to 2022 Thorney Island Meteorological Data

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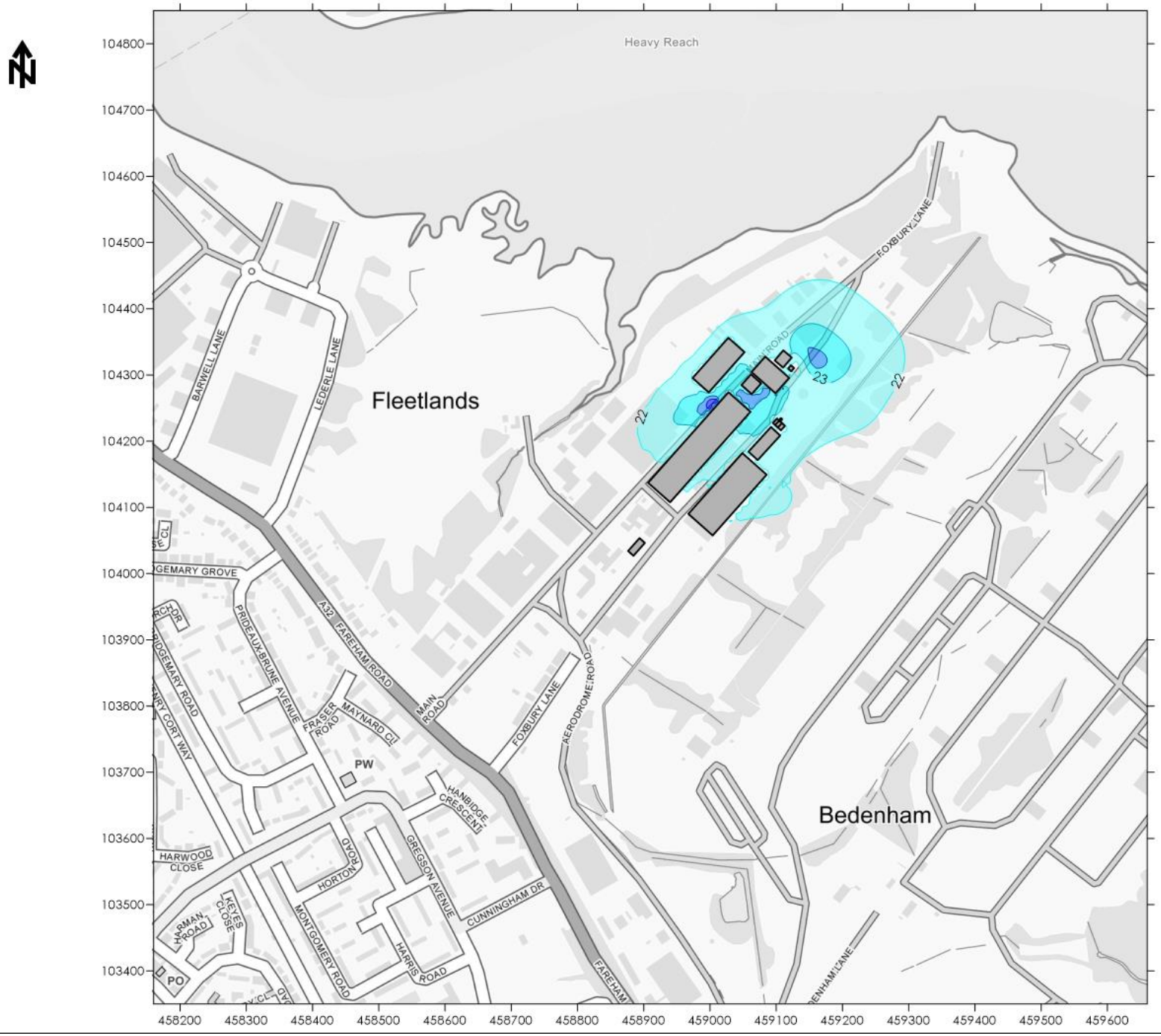

Legend

Building

25
24
23
22

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

Title

Figure 6 - Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$) 2018 Meteorological Data

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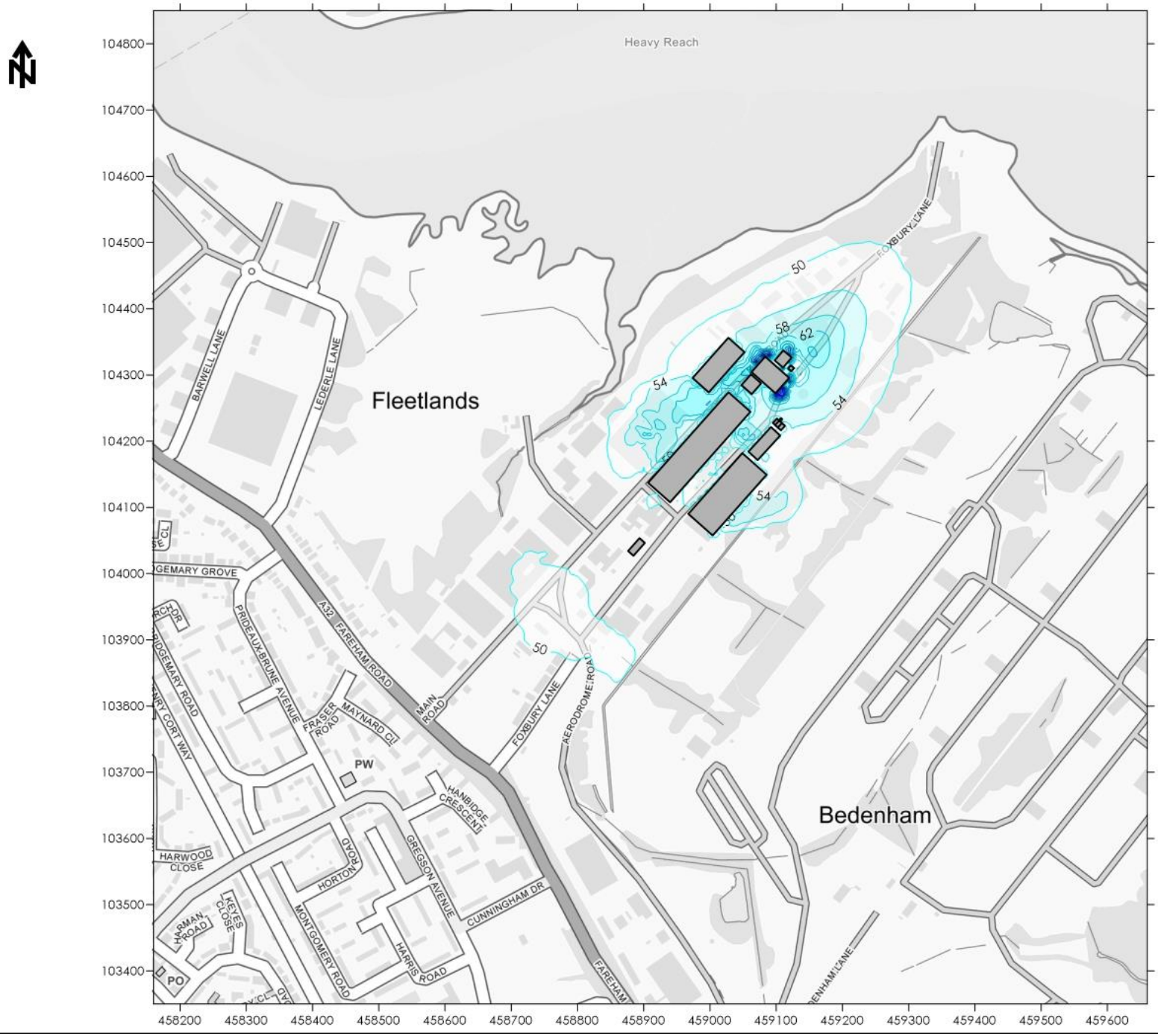

Legend

Building

90
86
82
78
74
70
66
62
58
54
50

Predicted 99.8th %ile 1-hour Mean NO_2 Concentration (µg/m³)

Title

Figure 7 - Predicted 99.8th %ile 1-hour Mean NO_2 Concentration (µg/m³)
2021 Meteorological Data

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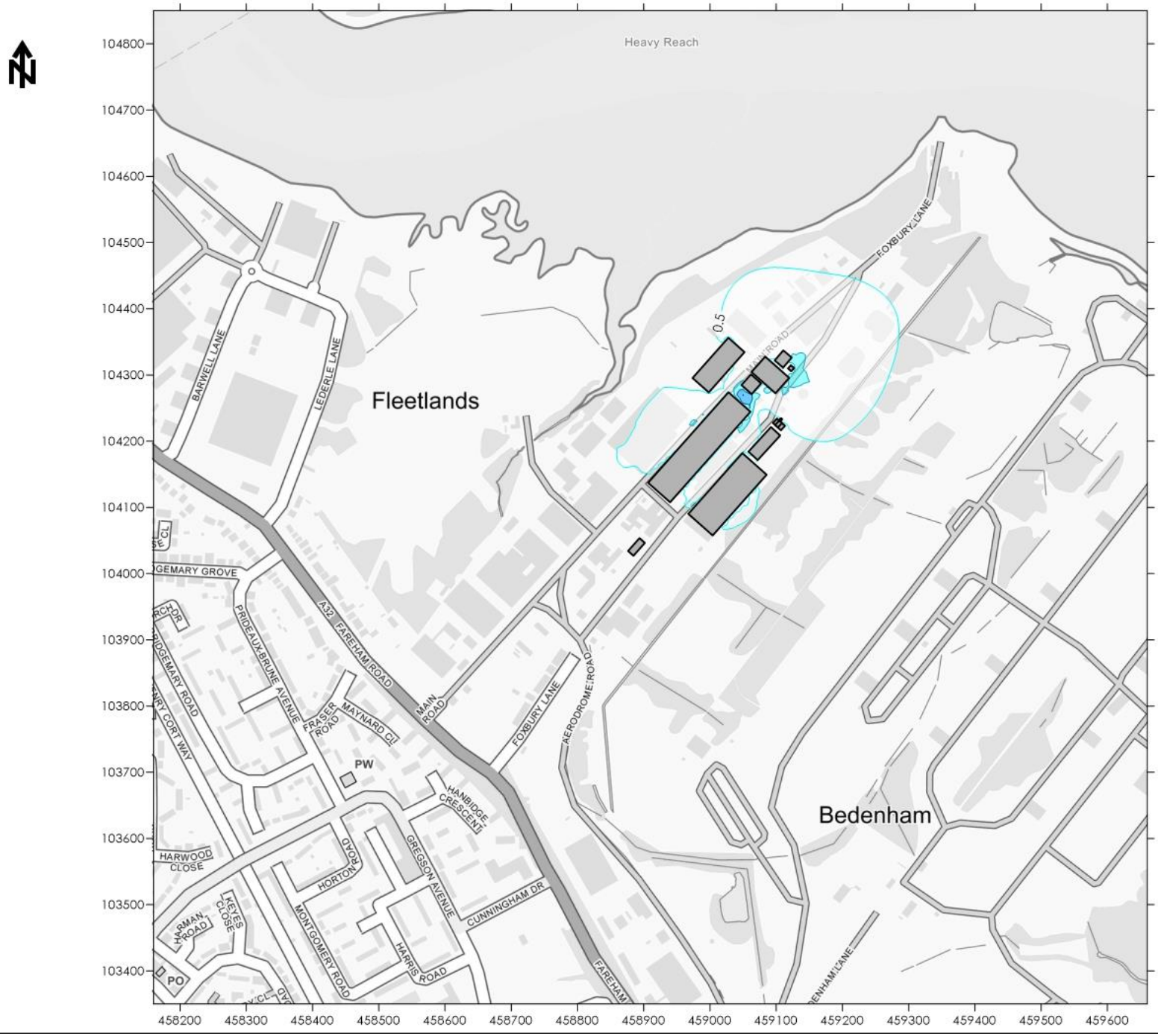

Legend

Building

0.8

0.7

0.6

0.5

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

Title

Figure 8 - Predicted Annual Mean C_6H_6 Concentration ($\mu g/m^3$)
2022 Meteorological Data

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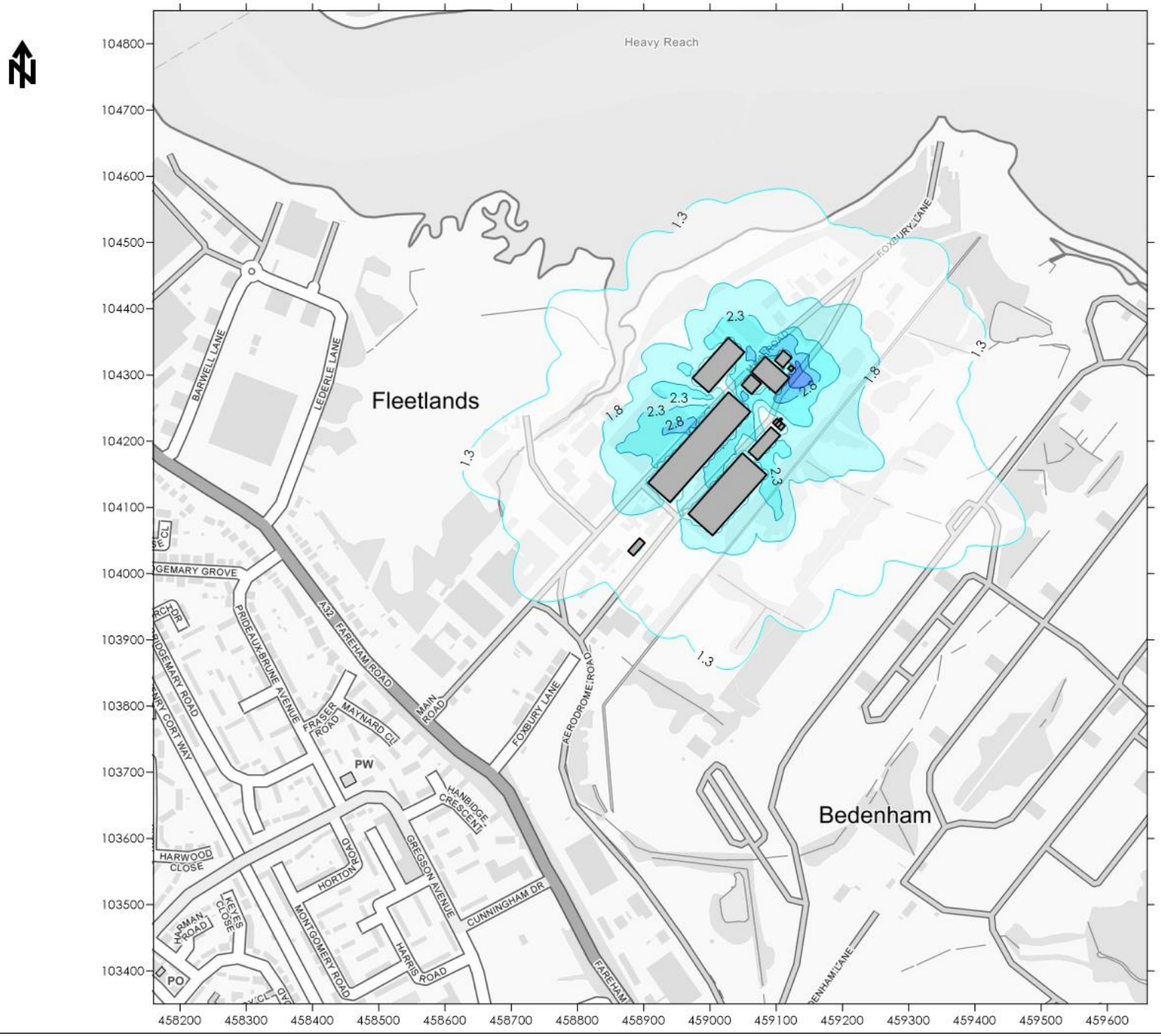

Legend

Building

Predicted 24-hr Mean C_6H_6 Concentration ($\mu g/m^3$)

3.8
3.3
2.8
2.3
1.8
1.3

Title

Figure 9 - Predicted 24-hr Mean C_6H_6 Concentration ($\mu g/m^3$)
2020 Meteorological Data

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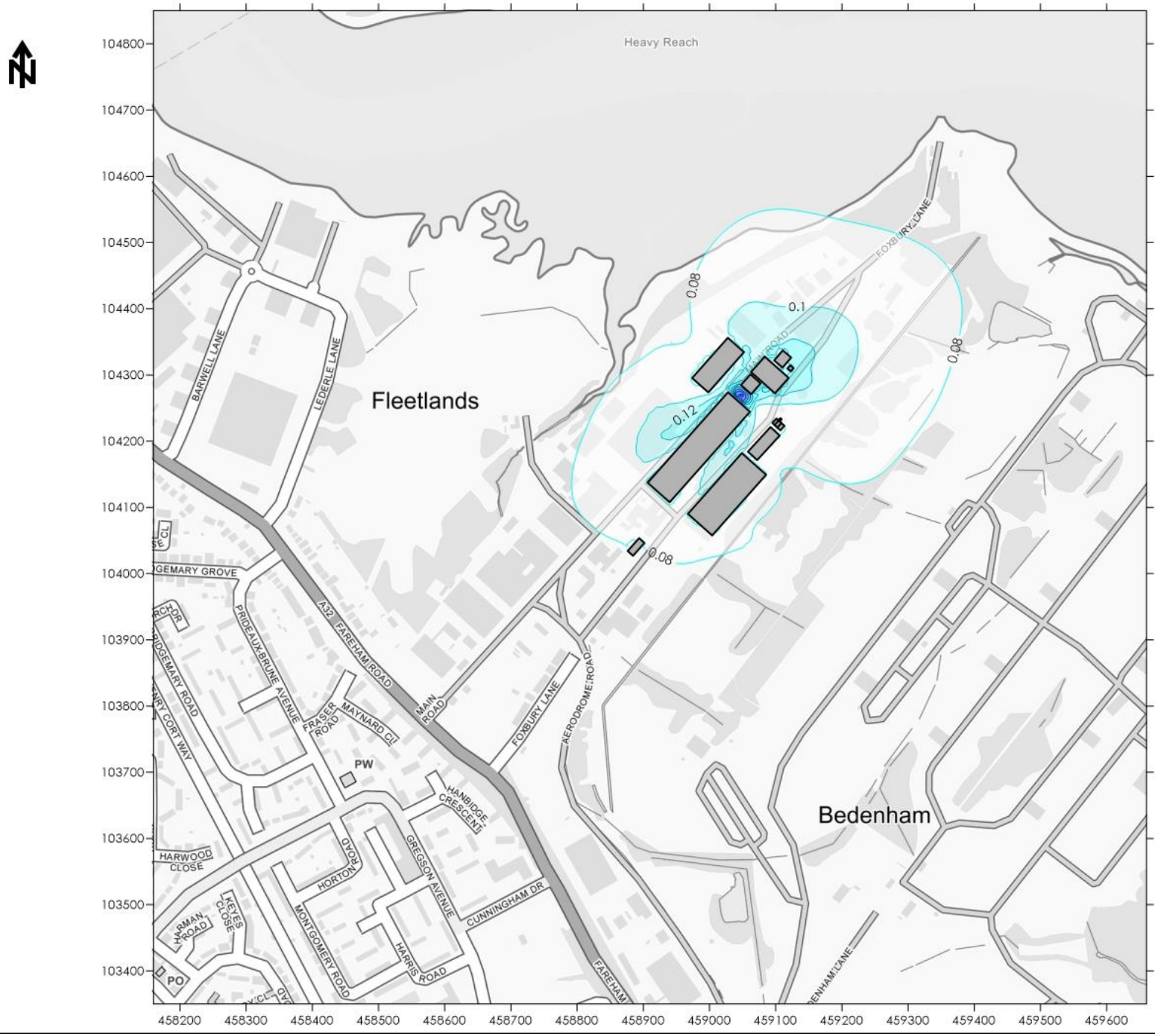

Legend

Building

Predicted Annual Mean Cd Concentration (ng/m³)

0.24
0.22
0.2
0.18
0.16
0.14
0.12
0.1
0.08

Title

Figure 10 - Predicted Annual Mean Cd Concentration (ng/m³)
2022 Meteorological Data

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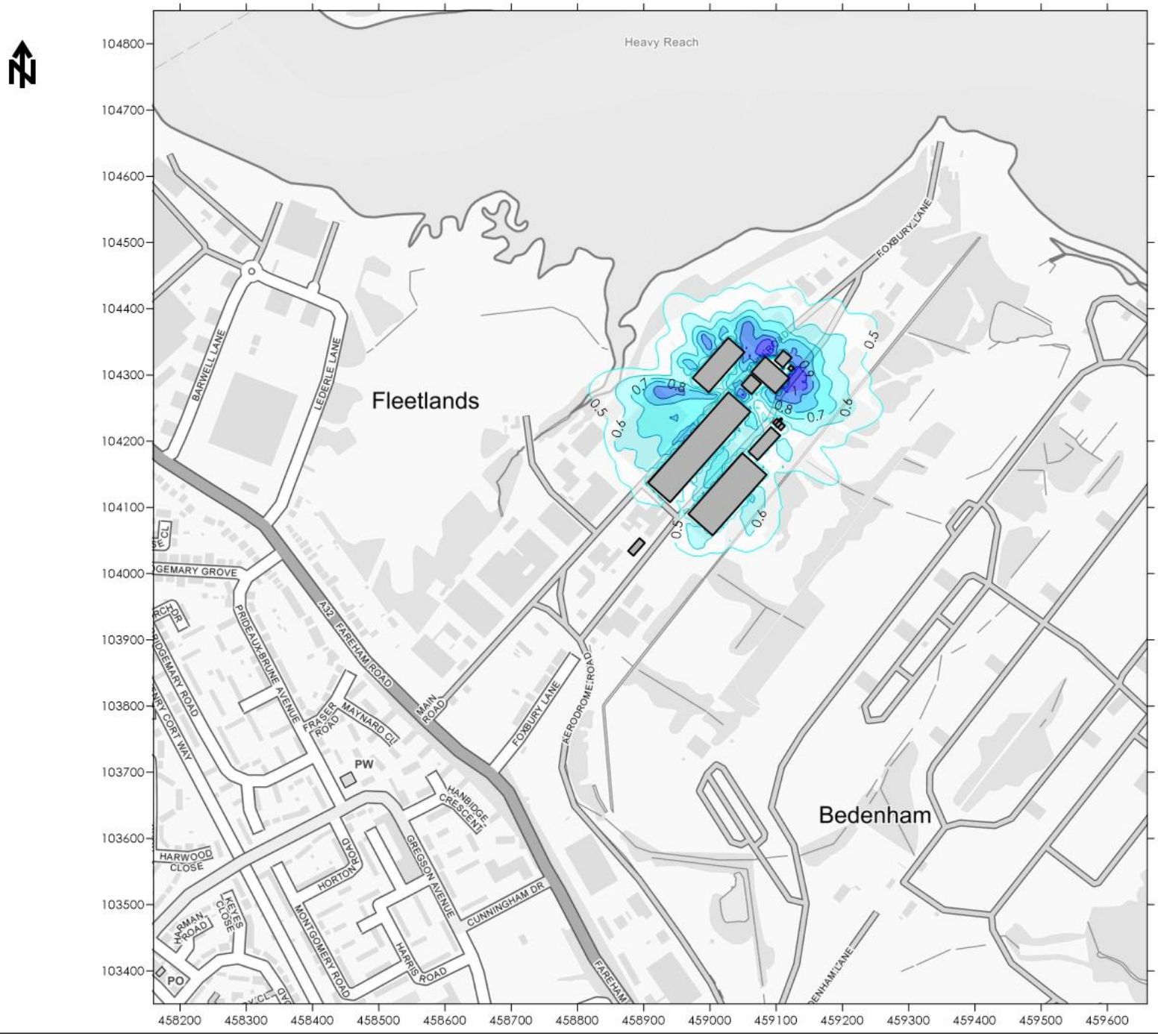

Legend

Building

Predicted 24-hr Mean Cd Concentration (ng/m³)

1
0.9
0.8
0.7
0.6
0.5

Title

Figure 11 - Predicted 24-hr Mean Cd Concentration (ng/m³)
2020 Meteorological Data

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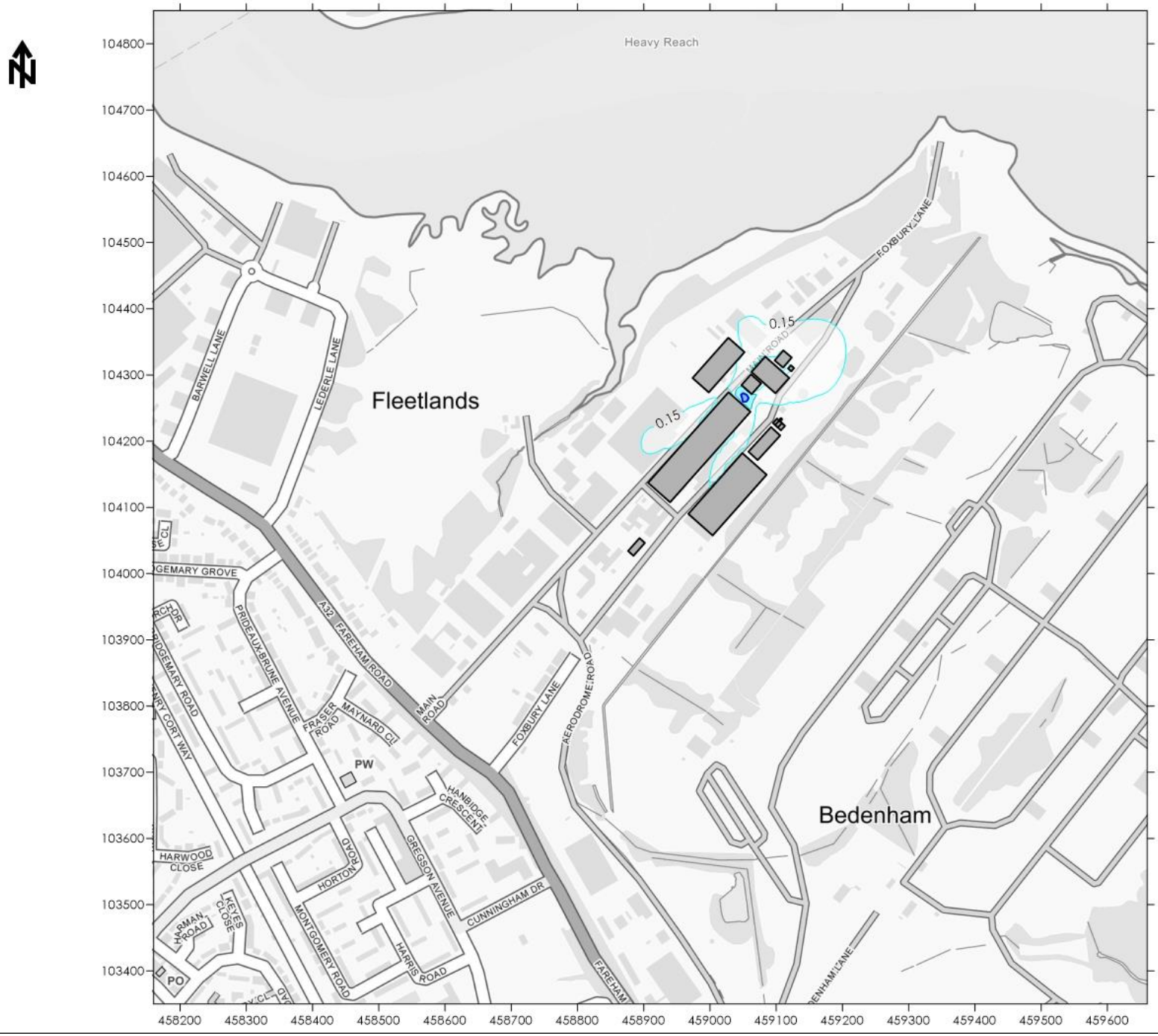

Legend

Building

Predicted Annual Mean Cr VI Concentration (ng/m³)

0.3

0.25

0.2

0.15

Title

Figure 12 - Predicted Annual Mean Cr VI Concentration (ng/m³)
2022 Meteorological Data

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Legend

Building

Predicted 24-hr Mean Cr III Concentration (ng/m³)

50
45
40
35
30
25

Title

Figure 13 - Predicted 24-hr Mean Cr III Concentration (ng/m³)
2020 Meteorological Data

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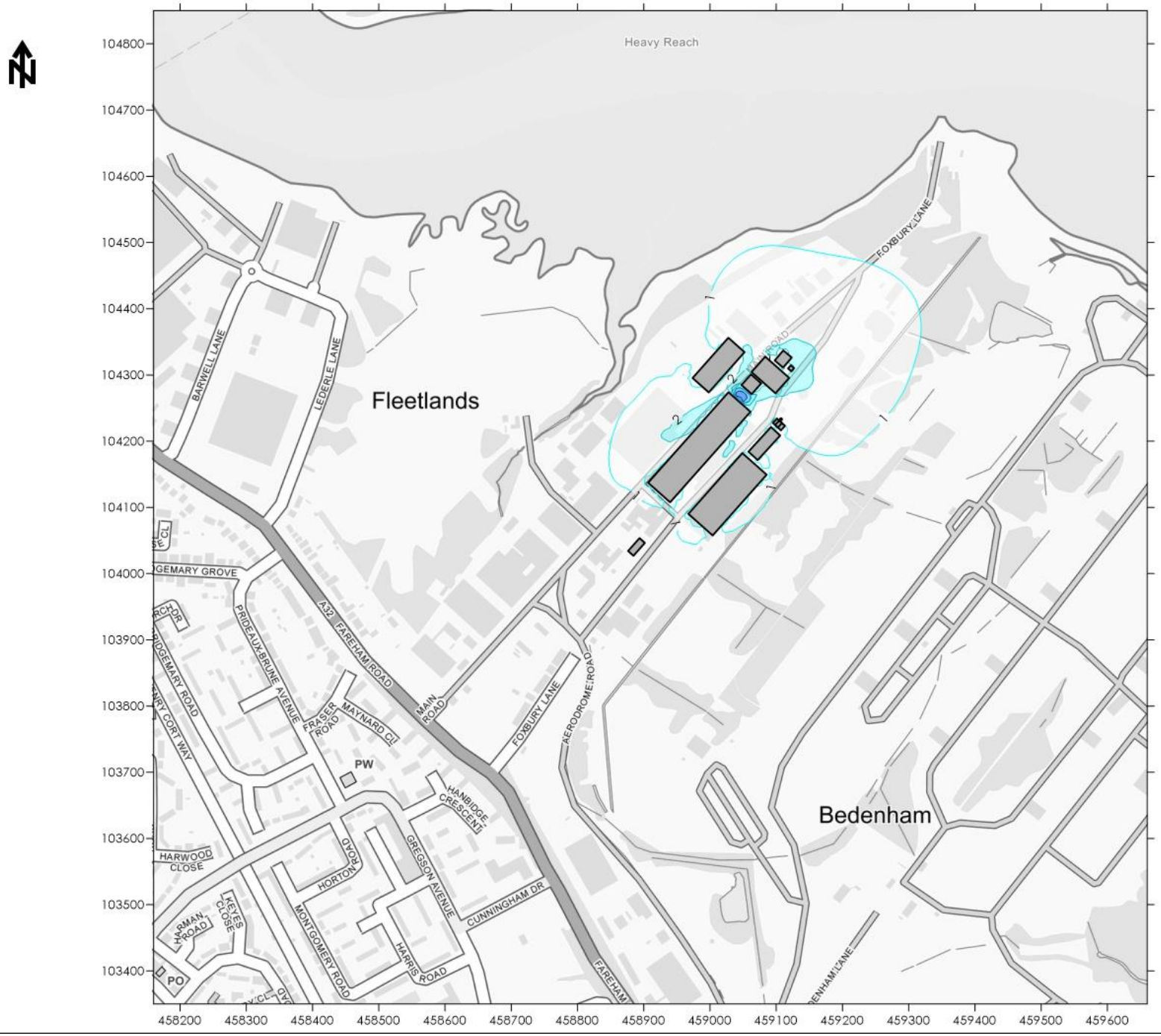

Legend

Building

Predicted Annual Mean Ni Concentration (ng/m³)

6
5
4
3
2
1

Title

Figure 14 - Predicted Annual Mean Ni Concentration (ng/m³)
2022 Meteorological Data

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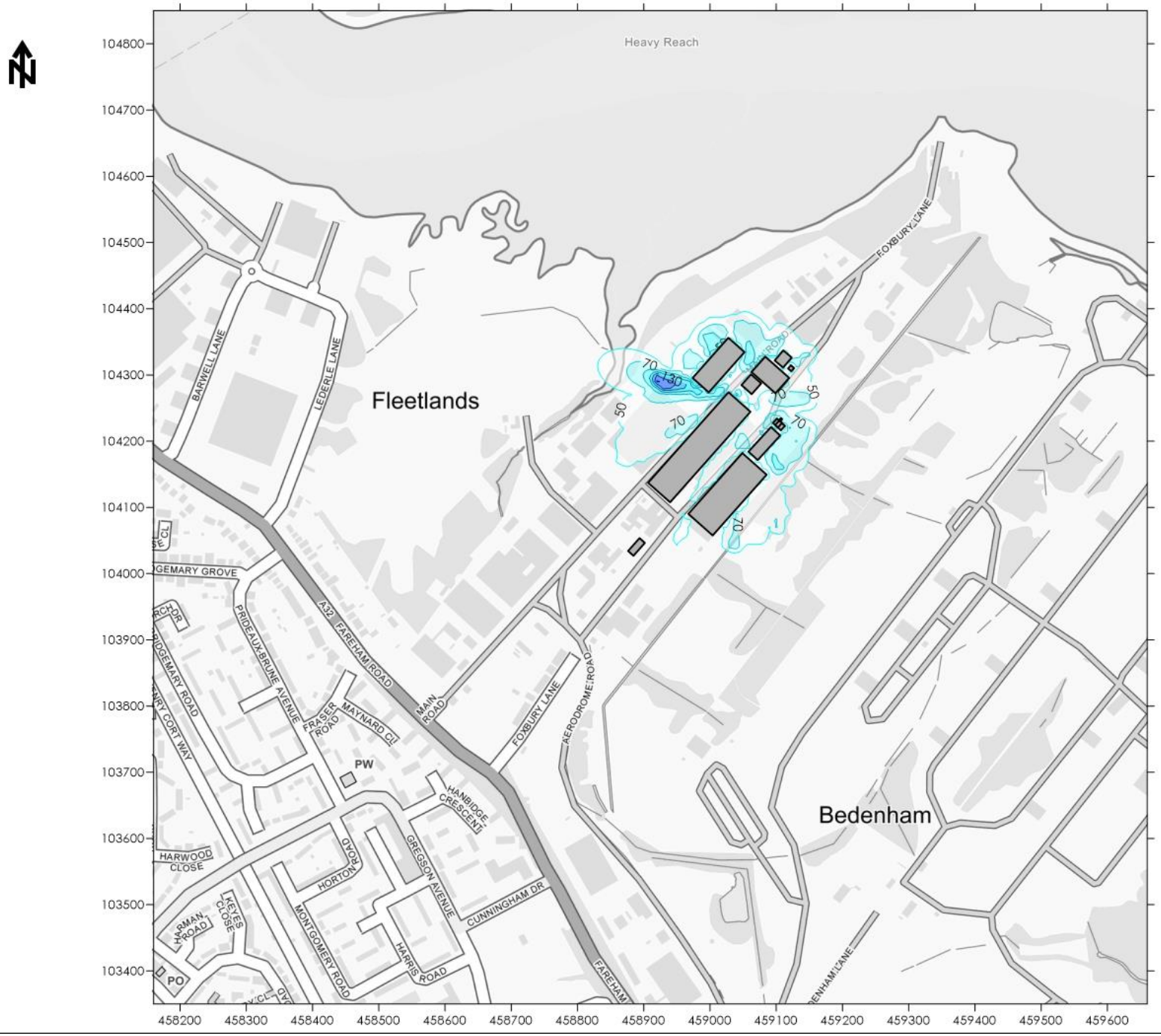

Legend

Building

Predicted 1-hr Mean Ni Concentration (ng/m³)

170
150
130
110
90
70
50

Title

Figure 15 - Predicted 1-hr Mean Ni Concentration (ng/m³)
2022 Meteorological Data

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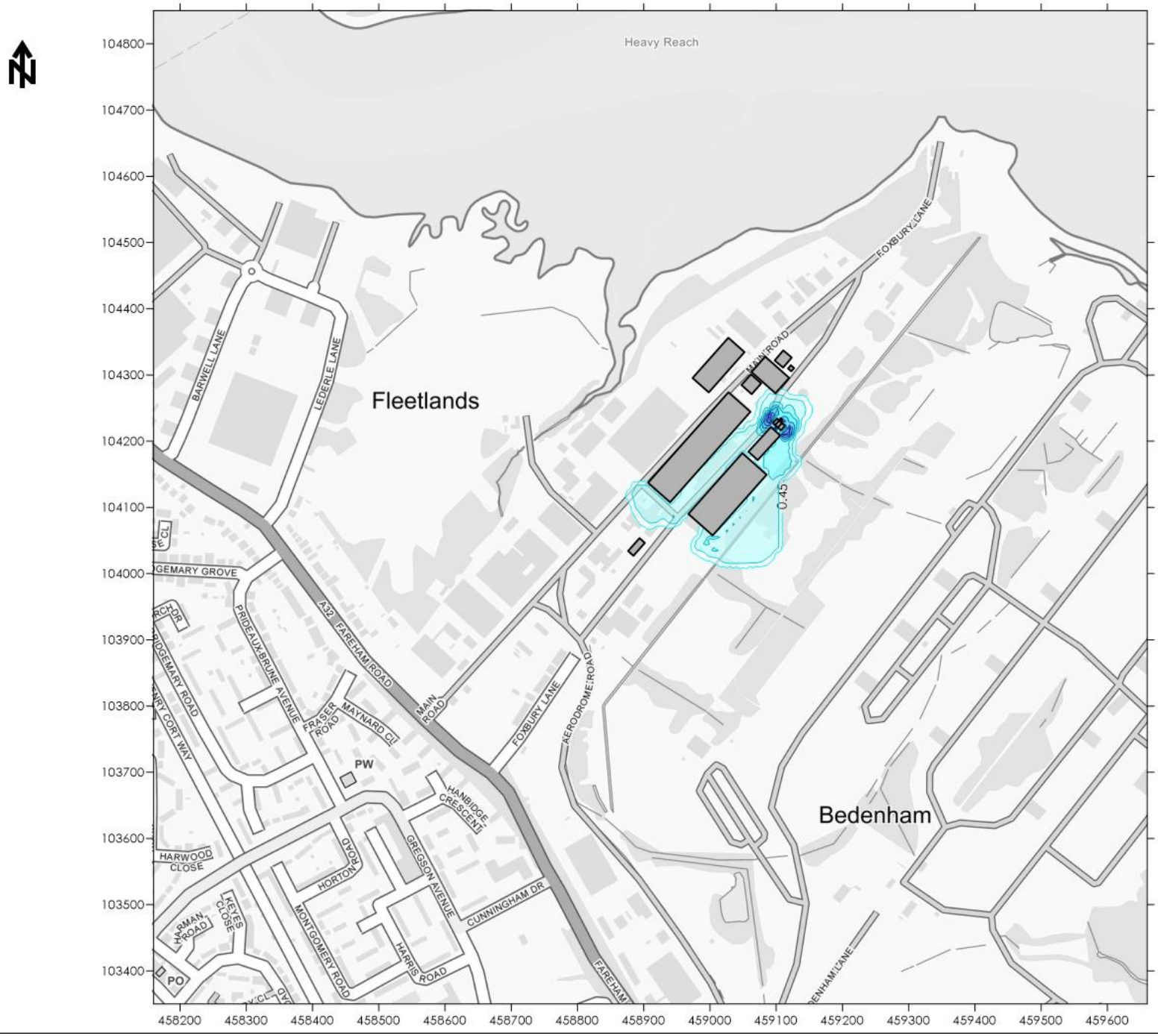

Legend

Building

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

0.57
0.55
0.53
0.51
0.49
0.47
0.45

Title

Figure 16 - Predicted 100th %ile 1-hour Mean HCl Concentrations (µg/m³) 2022 Meteorological Data

Project

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StandardAero, Gosport

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