Odour Assessment

Broadford Lane, Chobham

Client: Surrey Heath Borough Council

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Executive Summary

Redmore Environmental Ltd was commissioned by eps consulting on behalf of Surrey Heath Borough Council ('the Client') to undertake an Odour Assessment for a parcel of land south of Broadford Lane, Chobham.

The Client is in the process of determining whether the site is suitable for allocation within the emerging Local Plan for up to 16new pitches for Gypsy, Traveller and Travelling Showpeople.

The site is located adjacent to Wastewater Treatment Works operated by Thames Water. Odour emissions from the facility have the potential to cause loss of amenity for future residents of the development. An Odour Assessment was therefore undertaken to quantify effects across the site and consider feasibility for the proposed end-use.

Emissions from the relevant sources were defined based on the nature and size of the facility, as well as library data provided by UK Water Industry Research. Impacts at sensitive receptors were quantified using dispersion modelling, the results compared with the relevant odour benchmark level and the significance assessed in accordance with the appropriate guidance.

Predicted odour concentrations were above the relevant benchmark across the site for all modelling years. Resultant impacts were also classified as significant in accordance with the relevant guidance criteria.

Recommendations to further investigate conditions at the site were provided. These may be considered in order to advance the understanding of potential odour impacts on future occupants of the proposed pitches.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by eps consulting on behalf of Surrey Heath Borough Council ('the Client') to undertake an Odour Assessment for a parcel of land south of Broadford Lane, Chobham, which is being considered for allocation for Gypsy and Traveller use within the emerging Surrey Heath Local Plan.

1.1.2 The site is located adjacent to Chobham Wastewater Treatment Works (WwTWs), which is operated by Thames Water (TW). Odour emissions from the facility have the potential to cause loss of amenity for future residents of the development. An Odour Assessment was therefore undertaken to quantify effects across the site and consider feasibility for the proposed end-use.

1.2 Site Location and Context

1.2.1 The site is located off Broadford Lane, Chobham, at approximate National Grid Reference (NGR): 497474, 161095. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The Client is in the process of determining whether the site is suitable for allocation for Gypsy and Traveller use within the emerging Local Plan. The site was included within the Surrey Heath Local Plan: Preferred Options (2019 – 2038) – Further Gypsy and Traveller and Travelling Showpeople Allocations Regulation 18 consultation, which was undertaken between August – September 2022. Whilst the consultation identifies the site as having potential capacity for up to 16 pitches, provisional indicative development plans prepared following the consultation show two possible options for the development ranging between 10 and 13 pitches.

1.2.3 The site is located adjacent to Chobham WwTWs. There is potential for odours from the WwTWs to cause loss of amenity for future residents. As such, an Odour Assessment has been undertaken to evaluate baseline conditions and consider the suitability of the site for the proposed end-use. The findings are detailed in the following report.

2.0 ODOUR BACKGROUND

2.1 Odour Definition

2.1.1 The Institute of Air Quality Management (IAQM) guidance[1] defines odour as:

> "[…] the human olfactory response (perception followed by psychological appraisal) to one, or more often a complex mixture of, chemical species in the air."

2.1.2 The stated definition is considered to be relevant in the context of this assessment.

2.2 Odour Impacts

2.2.1 The magnitude of odour impact depends on a number of factors and the potential for complaints varies due to the subjective nature of odour perception. The **FIDOL** acronym (also stated as **FIDOR** in Environment Agency (EA) guidance[2]) is a useful reminder of the factors that will determine the degree of odour pollution. These are described by the IAQM[3] as follows:

- **F**requency - how often an individual is exposed to odour;
- **I**ntensity - the individual's perception of the strength of the odour;
- **D**uration - The overall duration that individuals are exposed to an odour over time;
- **O**dour unpleasantness - Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/ intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score; and,
- **L**ocation - The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

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1 Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

2 H4: Odour Management, EA, 2011.

3 Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

2.2.2 It is important to note that even infrequent emissions may cause loss of amenity if odours are perceived to be particularly intense or offensive.

2.2.3 The **FIDOL** factors can be further considered to provide the following issues in regards to the potential for an odour emission to cause an impact:

- The rate of emission of the compound(s);
- The duration and frequency of emissions;
- The time of the day that this emission occurs;
- The prevailing meteorology;
- The sensitivity of receptors to the emission i.e. whether the odorous compound is more likely to cause an impact, such as the sick or elderly, who may be more sensitive;
- The odour detection capacity of individuals to the various compound(s); and,
- The individual perception of the odour (i.e. whether the odour is regarded as unpleasant). This is greatly subjective, and may vary significantly from individual to individual. For example, some individuals may consider some odours as pleasant, such as petrol, paint and creosote.

2.3 Odour Legislative Control

2.3.1 The main requirement with respect to odour control from premises not authorised under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as WwTWs, is that provided in Section 79 of Part III of the Environmental Protection Act (1990) The Act defines nuisance as:

> "Any dust, steam, smell or other effluvia arising on industrial, trade or business premise and being prejudicial to health or a nuisance.'

2.3.2 Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the Local Authority is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). The only defence is to show that the process to which the nuisance has been attributed and its operations are being controlled according to best practicable means (BPM). The term BPM is defined as:

- "Practicable" means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications;
- The "means" to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and structures;
- The test is to apply only so far as compatible with any duty imposed by law; and,
- The test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances.

2.3.3 It should be noted that where an operator can demonstrate that BPM is being applied, or where an agreed degree of abatement deemed to be BPM is added, this will not necessarily result in the total elimination of odours.

2.4 Odour Benchmark Levels

2.4.1 There is no statutory limit in the UK for ambient odour concentrations, whether set for individual chemical species or for mixtures. However, a number of indicative criteria have been utilised for the assessment of potential impacts. These are discussed in the following Sections.

Environment Agency Criteria

2.4.2 The EA has issued guidance on odour[4] which contains indicative benchmark levels for use in the assessment of potential impacts from facilities regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments.

2.4.3 Benchmark levels are stated as the 98th percentile (%ile) of hourly mean concentrations in European odour units (ou_E) over a year for odours of different offensiveness. In practice this means that for 2% of the year, or 175-hours, concentrations will be higher than this value, whilst for 98% of the year, or 8,585-hours, they will be lower. This parameter reflects the previously described **FIDOL** factors, where an odour is likely to be noted on several occasions above a particular threshold concentration before an annoyance occurs. EA odour benchmark levels are summarised in Table 1.

[4] H4: Odour Management, EA, 2011.

Table 1 Odour Benchmark Levels

Relative Offensiveness of Odour	Benchmark Level as 98th %ile of 1-hour Means (ou_E/m^3)
Most offensive odours: • Processes involving decaying animal or fish • Processes involving septic effluent or sludge • Biological landfill odours	1.5
Moderately offensive odours: • Intensive livestock rearing • Fat frying (food processing) • Sugar beet processing • Well aerated green waste composting	3.0
Less offensive odours: • Brewery • Confectionery • Coffee roasting • Bakery	6.0

Wastewater Industry Research

2.4.4 In addition to the levels shown in Table 1, the wastewater industry has published an in-depth study through the United Kingdom Waste Industry Research (UKWIR) into the correlation between modelled odour impacts and human response (dose-effect). This was based on a review of the relationship between reported odour complaints and modelled odour impacts at nine WwTWs in the UK with ongoing odour complaints. The findings of this research (and subsequent UKWIR research) indicated the following:

- At modelled exposures of below 5ouE/m3 as 98th %ile of 1-hour means, complaints are relatively rare, at only 3% of the total registered;
- At modelled exposures between 5ouE/m3 and 10ouE/m3 as a 98th %ile of 1-hour means, a significant proportion of total registered complaints occur, 38% of the total; and,
- The majority of complaints occur in areas of modelled exposure greater than 10ouE/m3 as a 98th %ile of 1-hour means, 59% of the total.

Chartered Institute of Water and Environmental Management

2.4.5 The Chartered Institute of Water and Environmental Management (CIWEM) has released a Position Statement on the Control of Odour which provides guidance on likely responses to odour concentrations. These are summarised in Table 2.

Table 2 CIWEM Odour Guidance

Odour Concentration as 98th %ile of 1-hour Means (ou_E/m^3)	Response
Less than 3	Complaints are unlikely to occur and exposure below this level are unlikely to constitute significant pollution or significant detriment to amenity unless the locality is highly sensitive or the odour highly unpleasant in nature
5 - 10	Complaints may occur and depending on the sensitivity of the locality and nature of the odour this level may constitute a nuisance
Greater than 10	Complaints are highly likely and odour exposure at these levels represents an actionable nuisance

Planning Case Law

2.4.6 A 5 ou_E/m^3 impact criterion has accepted as being appropriate for avoidance of significant risk of annoyance and a low risk of nuisance in a number of planning applications involving WwTWs (e.g. Newbiggin, JS Bloor Ltd, Leighton Linsalde, etc).

Department for Environment, Food and Rural Affairs

2.4.7 In order to provide some context to the odour benchmark values, the Department for Environment, Food and Rural Affairs (DEFRA) have provided the following descriptors[5]:

- $1ou_E/m^3$ is the point of detection;
- $5ou_E/m^3$ is a faint odour; and,
- $10ou_E/m^3$ is a distinct odour.

5 Odour Guidance for Local Authorities, DEFRA, 2010.

2.4.8 An odour at a strength of 1ou_E/m^3 is in reality so weak that it would not normally be detected outside the controlled environment of an odour laboratory by the majority of people (that is individuals with odour sensitivity in the "normal" range - approximately 96% of the population[6]). It is important to note that these values are based on laboratory measurements and in the general environment other factors affect our sense of odour perception. These include:

- The population is continuously exposed to a wide range of background odours at a range of different concentrations, and usually people are unaware of there being any background odours at all due to normal habituation. Individuals can also develop a tolerance to background and other specific odours. In an odour laboratory the determination of detection threshold is undertaken by comparison with non-odorous air, and in carefully controlled, odour-free, conditions. Normal background odours such as those from traffic, vegetation, grass mowing etc, can provide background odour concentrations from 5 to 60ou_E/m^3 or more[7];
- The recognition threshold may be about 3ou_E/m^3 [8], although it might be less for offensive substances or higher if the receptor is less familiar with the odour or distracted by other stimuli; and,
- An odour which fluctuates rapidly in concentration is often more noticeable than a steady odour at a low concentration.

2.5 National Planning Policy

2.5.1 The revised National Planning Policy Framework[9] (NPPF) was published in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied.

2.5.1 The purpose of the planning system is to contribute to the achievement of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives, including the following of relevance to odour:

6 Odour Guidance for Local Authorities, DEFRA, 2010.

7 Odour Guidance for Local Authorities, DEFRA, 2010.

8 Odour Guidance for Local Authorities, DEFRA, 2010.

9 NPPF, Ministry of Housing, Communities and Local Government, 2023.

"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

2.5.2 Chapter 12 of the NPPF details objectives in relation to achieving well-designed place. It states that:

"Planning policies and decisions should ensure that developments:

[…]

f) create places that are safe, inclusive and accessible and which promote health and well-being, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesions and resilience."

2.5.3 The implications of the NPPF have been considered throughout this assessment.

2.6 Local Planning Policy

2.6.1 The Surrey Heath Local Plan currently consists of the Core Strategy and Development Management Policies 2011 - 2028[10], which was adopted by Surrey Heath Borough Council (SHBC) on 1st February 2012, and the Surrey Heath Local Plan 2000[11], which was adopted on 8th December 2000. Review of these documents did not reveal any planning policies of relevance to this assessment.

[10] Core Strategy and Development Management Policies 2011 - 2028, SHBC, 2012.

[11] Surrey Heath Local Plan 2000, SHBC, 2000.

2.7 Institute of Air Quality Management Guidance

2.7.1 The IAQM published the 'Guidance on the Assessment of Odour for Planning'[12] on 20th May 2014. This was updated in 2018[13] and specifically deals with assessing odour impacts for planning purposes, namely potential effects on amenity. The assessment methodology outlined in the guidance has been utilised in throughout this report where relevant.

[12] Guidance on the Assessment of Odour for Planning, IAQM, 2014.

[13] Guidance on the Assessment of Odour for Planning, IAQM, 2018.

3.0 METHODOLOGY

3.1 Introduction

3.1.1 The WwTWs may result in odour emissions during normal operation. Associated impacts were assessed in accordance with the following stages:

- Identification of odour sources;
- Identification of odour emission rates;
- Dispersion modelling of odour emissions; and,
- Comparison of the modelling results with the relevant criteria.

3.1.2 The following Sections outline the methodology and inputs used for the assessment.

3.2 Dispersion Model

3.2.1 Dispersion modelling was undertaken using ADMS-6.0 (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.

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

3.2.3 The model requires input data that details the following parameters:

- Source and emissions data;
- Assessment area;
- Terrain information;
- Building dimensions;
- Meteorological data;

- Roughness length (z_0); and,
- Monin-Obukhov length.

3.2.4 These are detailed in the following Sections.

3.3 Odour Sources

3.3.1 Potential odour sources associated with operation of the WwTWs were identified based on aerial photography. These are summarised in Table 3.

Table 3 Odour Sources

Source		Source Description	Total Exposed Area (m^2)
1	Grit Skip	1 rectangular skip	7.5
2	Inlet Works	Inlet chamber and channels	67.5
3	Primary Settlement Tank	2 circular tanks	176.7
4	Filter Bed	3 large circular beds	804.2
5	Final Settlement Tank	2 circular tanks	176.7
6	Activated Sludge Tank	1 rectangular tank	377.0
7	Filter Bed	3 small circular beds	415.5
8	Sludge Tank	1 circular tank	95.0

3.3.2 A summary of the model inputs used to represent the sources shown in Table 3 is provided in Table 4.

Table 4 Source Input Data

Source		Source Type	Modelled Area (m^2)
1	Grit Skip	Area	7.6
2	Inlet Works	Area	70.4
3	Primary Settlement Tank	Area	172.2
4	Filter Bed	Area	783.7
5	Final Settlement Tank	Area	172.2
6	Activated Sludge Tank	Area	377.0
7	Filter Bed	Area	404.9
8	Sludge Tank	Area	92.6

3.3.3 Reference should be made to Figure 2 for a map of the source locations.

3.4 Odour Emission Rates

3.4.1 Emission rates for the sources were obtained from the UKWIR technical reference document 'Odour Control in Wastewater Treatment'[14] and odour monitoring results from a similar site. These are summarised in Table 5.

Table 5 Odour Emission Rates

Source		Odour Emission Rate ($ou_E/m^2/s$)	Reference
1	Grit Skip	50.0	UKWIR(1)
2	Inlet Works	50.0	UKWIR(1)
3	Primary Settlement Tank	1.9	UKWIR(1)
4	Filter Bed	0.5	Bedford STW(2)
5	Final Settlement Tank	0.7	UKWIR(1)
6	Activated Sludge Tank	4.0	UKWIR(1)
7	Filter Bed	0.5	Bedford STW(2)

[14] Odour Control in Wastewater - A Technical Reference Document, UKWIR, 2001.

Source		Odour Emission Rate ($ou_E/m^2/s$)	Reference
8	Sludge Tank	40	UKWIR[1]

NOTES: (1) Odour Control in Wastewater - A Technical Reference Document, UKWIR, 2001.
(2) Odour monitoring at Bedford STW, Silsoe Odours.

3.4.2 The emission rates shown in Table 5 were multiplied by the areas shown in Table 4 to determine the total release per source. These were then entered into ADMS-6, allowing for any differences between modelled and actual areas.

3.4.3 It should be noted that in order to provide a robust assessment of potential impacts, it was assumed that the grit skip is full at all times. This is considered to represent a worst-case assumption as there will be periods when the skip does not operate at full capacity and therefore the exposed surface of potentially odorous material will be lower.

3.5 Modelling Scenarios

3.5.1 The scenarios considered in the modelling assessment are summarised in Table 6.

Table 6 Assessment Scenarios

Parameter	Modelled As	
	Short Term	Long Term
Odour	98th %ile 1-hour mean	-

3.6 Assessment Area

3.6.1 The assessment area was defined based on the site location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 497387, 160921 to 497727, 161261. One Cartesian grid with a resolution of 10m was used within the model to produce data suitable for contour plotting using the Surfer software package.

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

3.6.3 Discrete receptor locations were included in the model based on informal plans for the west and east portions of the land. These are summarised in Table 7.

Table 7 Discrete Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Eastern Site - Potential Pitch	497581.3	161166.0
R2	Eastern Site - Potential Pitch	497559.5	161160.9
R3	Eastern Site - Potential Pitch	497540.6	161156.3
R4	Eastern Site - Potential Pitch	497522.5	161152.0
R5	Eastern Site - Potential Pitch	497501.3	161146.9
R6	Eastern Site - Potential Pitch	497482.6	161142.5
R7	Western Site - Potential Pitch	497497.1	161106.5
R8	Western Site - Potential Pitch	497468.3	161145.6
R9	Western Site - Potential Pitch	497465.5	161167.0
R10	Western Site - Potential Pitch	497462.9	161188.7
R11	Western Site - Potential Pitch	497474.8	161218.7

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

3.7 Meteorological Data

3.7.1 Meteorological data used in the assessment was taken from Farnborough meteorological station over the period 1st January 2017 to 31st December 2021 (inclusive). This observation station is located at NGR: 485687, 154048, which is approximately 13.8km south-west of the facility. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

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

3.8 Roughness Length

3.8.1 The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 0.3m was used to describe the modelling extents. This value is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for 'agricultural areas (max)'.

3.8.2 A z_0 of 0.1m was used to describe the meteorological site. This value is considered appropriate for the morphology of the area and is suggested within ADMS-6 as being suitable for 'root crops'.

3.9 Monin-Obukhov Length

3.9.1 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 10m was used to describe the modelling extents and meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-6 as being suitable for 'small towns < 50,000'.

3.10 Terrain Data

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

3.11 Assessment Criteria

3.11.1 Predicted ground level odour concentrations were compared with the odour benchmark level of $3.0ou_E/m^3$ as a 98th %ile 1-hour mean, based on previous planning case law and research undertaken by UKWIR.

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

3.12 Significance of Odour Impacts

3.12.1 The significance of impacts was assessed through the interaction of the predicted 98th %ile of 1-hour mean odour concentrations and receptor sensitivity, as outlined in the IAQM guidance[16]. The relevant assessment matrix is summarised in Table 8.

Table 8 Odour Impact

Odour Exposure Level as 98th %ile of 1-hour Means (ou_E/m^3)	Receptor Sensitivity		
	Low	Medium	High
Greater than 10	Moderate	Moderate	Substantial
5 - 10	Slight	Moderate	Moderate
3 - 5	Negligible	Slight	Moderate
1.5 - 3	Negligible	Negligible	Slight
0.5 - 1.5	Negligible	Negligible	Negligible
Less than 0.5	Negligible	Negligible	Negligible

3.12.2 The IAQM guidance[17] states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

3.13 Modelling Uncertainty

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

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

16 Guidance on the Assessment of Odour for Planning, IAQM, 2018.

17 Guidance on the Assessment of Odour for Planning, IAQM, 2018.

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

- 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 a local observation station to take account of a range of conditions. The assessment was based on the worst-case year 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;
- Emission rates - Emission rates were derived from UKWIR technical guidance and odour emissions monitored at similar facilities. As such, they are considered to be representative of potential releases during normal operation;
- 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 are as accurate as possible and worst-case conditions were considered as necessary in order to ensure a robust assessment of potential pollutant concentrations.

3.13.3 Results were considered in the context of the relevant odour benchmark level and IAQM criteria. It is considered that the use of the stated measures to reduce uncertainty and the use of worst-case assumptions when necessary has resulted in model accuracy of an acceptable level.

4.0 ASSESSMENT

4.1 Predicted Odour Concentrations

4.1.1 Dispersion modelling of potential odour emissions was undertaken using the input data specified previously. Predicted odour concentrations at the discrete receptor locations are summarised in Table 9. It should be noted that the odour concentrations are presented as a 98th %ile of 1-hour mean values over the relevant assessment year. The maximum concentration across the five years of results is highlighted in **bold**.

Table 9 Predicted Odour Concentrations

Receptor		Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)				
		2017	2018	2019	2020	2021
R1	Eastern Site - Potential Pitch	24.06	29.08	**29.20**	25.34	29.08
R2	Eastern Site - Potential Pitch	22.07	27.21	**28.97**	23.59	27.15
R3	Eastern Site - Potential Pitch	19.08	23.98	**28.69**	21.79	24.30
R4	Eastern Site - Potential Pitch	15.99	19.77	**25.98**	19.77	21.06
R5	Eastern Site - Potential Pitch	14.92	16.32	**18.80**	17.49	16.46
R6	Eastern Site - Potential Pitch	14.38	16.81	**18.75**	16.81	16.81
R7	Western Site - Potential Pitch	49.12	49.38	**51.83**	45.92	49.12
R8	Western Site - Potential Pitch	15.61	15.97	**16.28**	14.62	14.62
R9	Western Site - Potential Pitch	9.67	10.03	**10.17**	9.80	9.67
R10	Western Site - Potential Pitch	7.03	8.01	**8.07**	7.30	6.89
R11	Western Site - Potential Pitch	6.13	6.19	**6.68**	6.31	6.02

4.1.2 As indicated in Table 9, predicted odour concentrations were above the EA odour benchmark of $3.0ou_E/m^3$ at all receptor locations for all modelling years.

4.1.3 Reference should be made to Figure 5 to Figure 9 for graphical representations of predicted odour concentrations throughout the assessment extents. These indicate maximum levels in close proximity to the odour sources with levels reducing sharply over a short distance.

4.2 Impact Significance

4.2.1 The significance of predicted odour impacts at the sensitive receptors is summarised in Table 10.

Table 10 Predicted Odour Impacts

Receptor		Odour Exposure Level as 98th %ile of 1-hour Means (ou_E/m^3)	Receptor Sensitivity	Significance of Impact
R1	Eastern Site - Potential Pitch	Greater than 10	High	Substantial
R2	Eastern Site - Potential Pitch	Greater than 10	High	Substantial
R3	Eastern Site - Potential Pitch	Greater than 10	High	Substantial
R4	Eastern Site - Potential Pitch	Greater than 10	High	Substantial
R5	Eastern Site - Potential Pitch	Greater than 10	High	Substantial
R6	Eastern Site - Potential Pitch	Greater than 10	High	Substantial
R7	Western Site - Potential Pitch	Greater than 10	High	Substantial
R8	Western Site - Potential Pitch	Greater than 10	High	Substantial
R9	Western Site - Potential Pitch	Greater than 10	High	Substantial
R10	Western Site - Potential Pitch	5 - 10	High	Moderate
R11	Western Site - Potential Pitch	5 - 10	High	Moderate

4.2.2 As indicated in Table 10, the significance of odour impacts as a result of emissions from the WwTWs was predicted to be **substantial** at nine receptors and **moderate** at two locations.

4.2.3 The IAQM guidance[18] states that only if the impact is **moderate** or **substantial**, the effect is considered **significant**. As such, impacts are considered **significant**, in accordance with the stated methodology.

4.2.4 Based on the dispersion modelling results, it is anticipated that significant odour impacts may occur across the site as a result of emissions from Chobham WwTWs.

[18] Guidance on the Assessment of Odour for Planning, IAQM, 2018.

4.3 Recommendations for Further Works

4.3.1 The results of the dispersion modelling identified the potential for odour effects at the site as a result of emissions from Chobham WwTWs. Recommendations for potential further work to further refine this prediction are as follows:

- Monitoring of site specific odour emissions from the WwTWs to refine the model inputs;
- Consultation with TW to further refine the modelled source inputs;
- Completion of a series of Field Odour Surveys to develop a comprehensive understanding of actual conditions at the site under a range of meteorological conditions; and,
- Investigation of potential mitigation measures in collaboration with TW that could be implemented at the WwTWs to reduce odour emissions from the site.

4.3.2 Completion of the above would allow a greater understanding of odour conditions at the site to be developed and potentially support the proposed allocation.

4.3.3 It should be noted that any further works undertaken to refine this prediction have multiple risks associated with each recommendation. Further investigations through surveys and monitoring may provide a worse outcome and the methodology and results of any works may not be deemed acceptable by TW. Any additional works should be undertaken in collaboration with any consultants approved by TW in order to minimise potential for disagreement throughout the process.

5.0 CONCLUSION

5.1.1 Redmore Environmental Ltd was commissioned by eps consulting on behalf of Surrey Heath Borough Council ('the Client') to undertake an Odour Assessment for a parcel of land south of Broadford Lane, Chobham, which is being considered as a potential allocation for Gypsy and Traveller use within the emerging Surrey Heath Local Plan.

5.1.2 The site is located adjacent to a WwTW operated by TW. Odour emissions from the facility have the potential to cause loss of amenity for future residents of the development. An Odour Assessment was therefore undertaken to quantify effects across the site and consider its feasibility for the proposed end-use.

5.1.3 Potential odour releases were defined based on the size and nature of the WwTWs. These were represented within a dispersion model produced using ADMS-6. Impacts at potential sensitive receptor locations on site were quantified, the results compared with the relevant odour benchmark level and the significance assessed in accordance with the IAQM guidance.

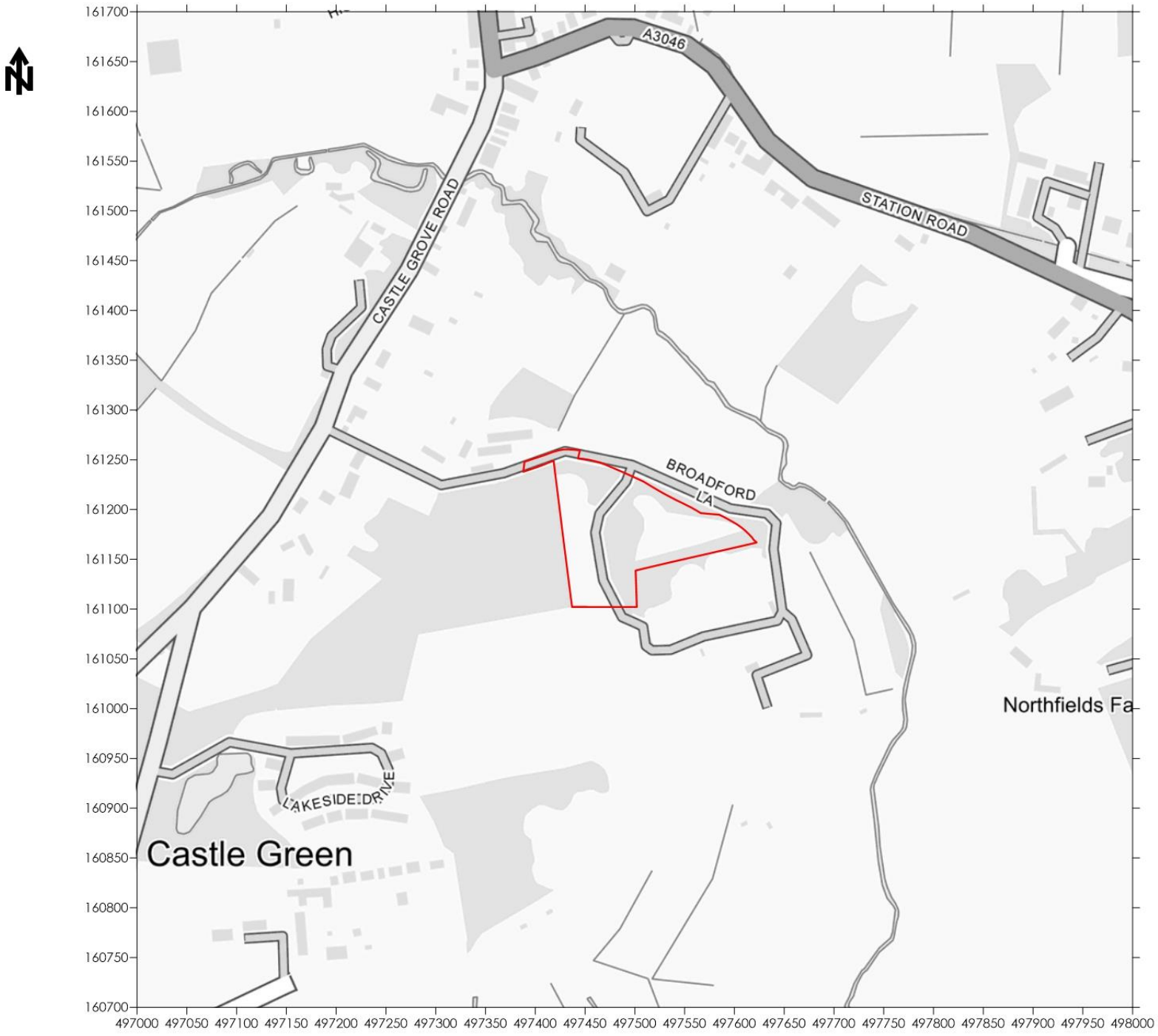
5.1.4 Predicted odour concentrations were above the relevant odour benchmark level at all discrete receptor locations for all modelling years. The significance of predicted impacts was defined as **substantial** at nine receptors and **moderate** at two locations. The overall odour effects as a result of the facility are considered to be **significant**.

5.1.5 Recommendations for potential further work to further refine the assessment results were provided. Completion of these elements would allow a greater understanding of odour conditions at the site to be developed and potentially support the proposed allocation.

6.0 ABBREVIATIONS

CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
IAQM	Institute of Air Quality Management
NGR	National Grid Reference
NPPF	National Planning Policy
ou_E	European Odour Units
SHBC	Surrey Heath Borough Council
UKWIR	United Kingdom Waste Industry Research
WwTW	Wastewater Treatment Work
z_0	Roughness Length
%ile	Percentile

Figures



Legend

Site Boundary

Title
Figure 1 - Site Location Plan

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Odour Assessment
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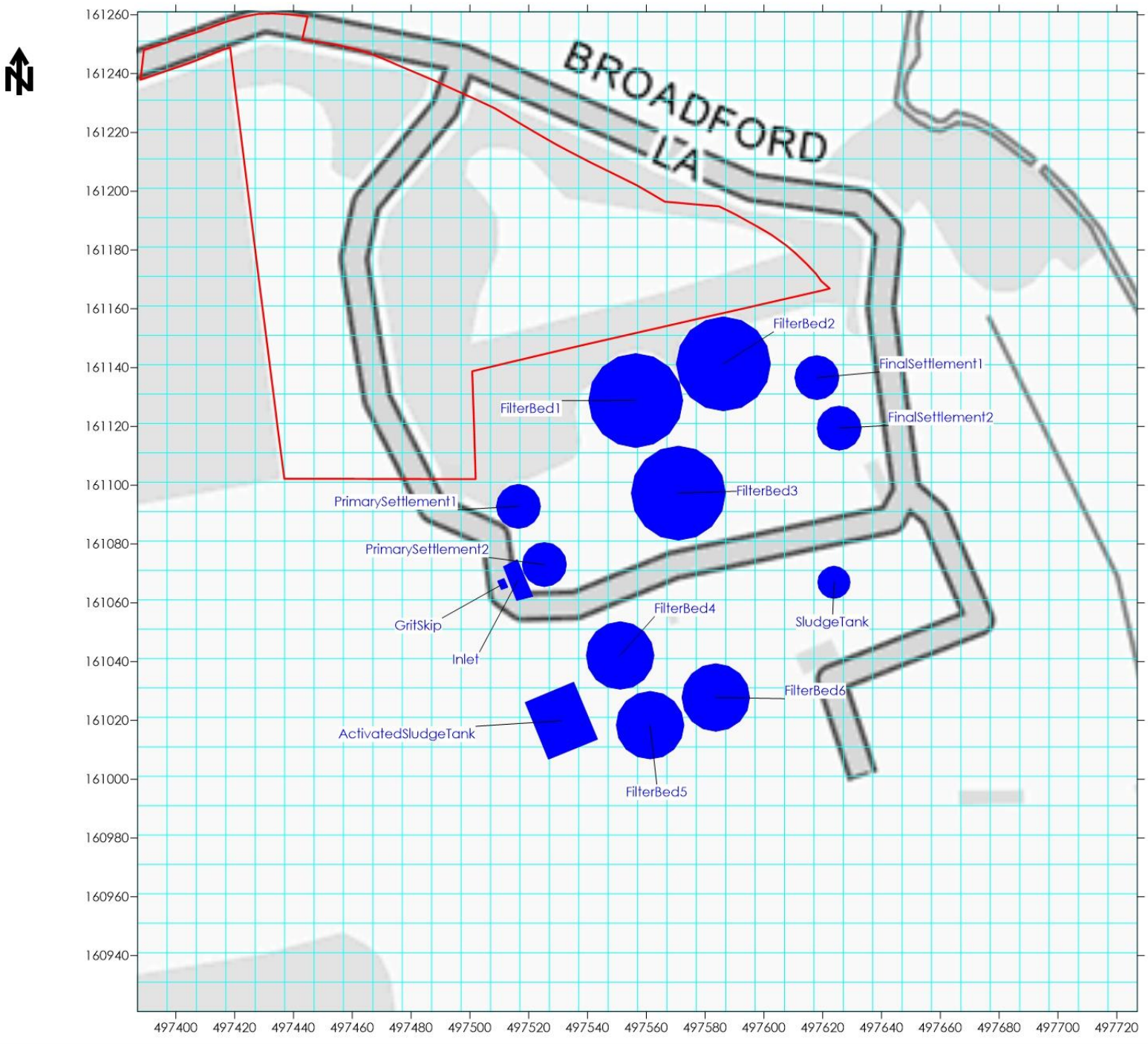

Legend

Site Boundary

Output Grid

Source

Title
Figure 2 - ADMS-6 Inputs

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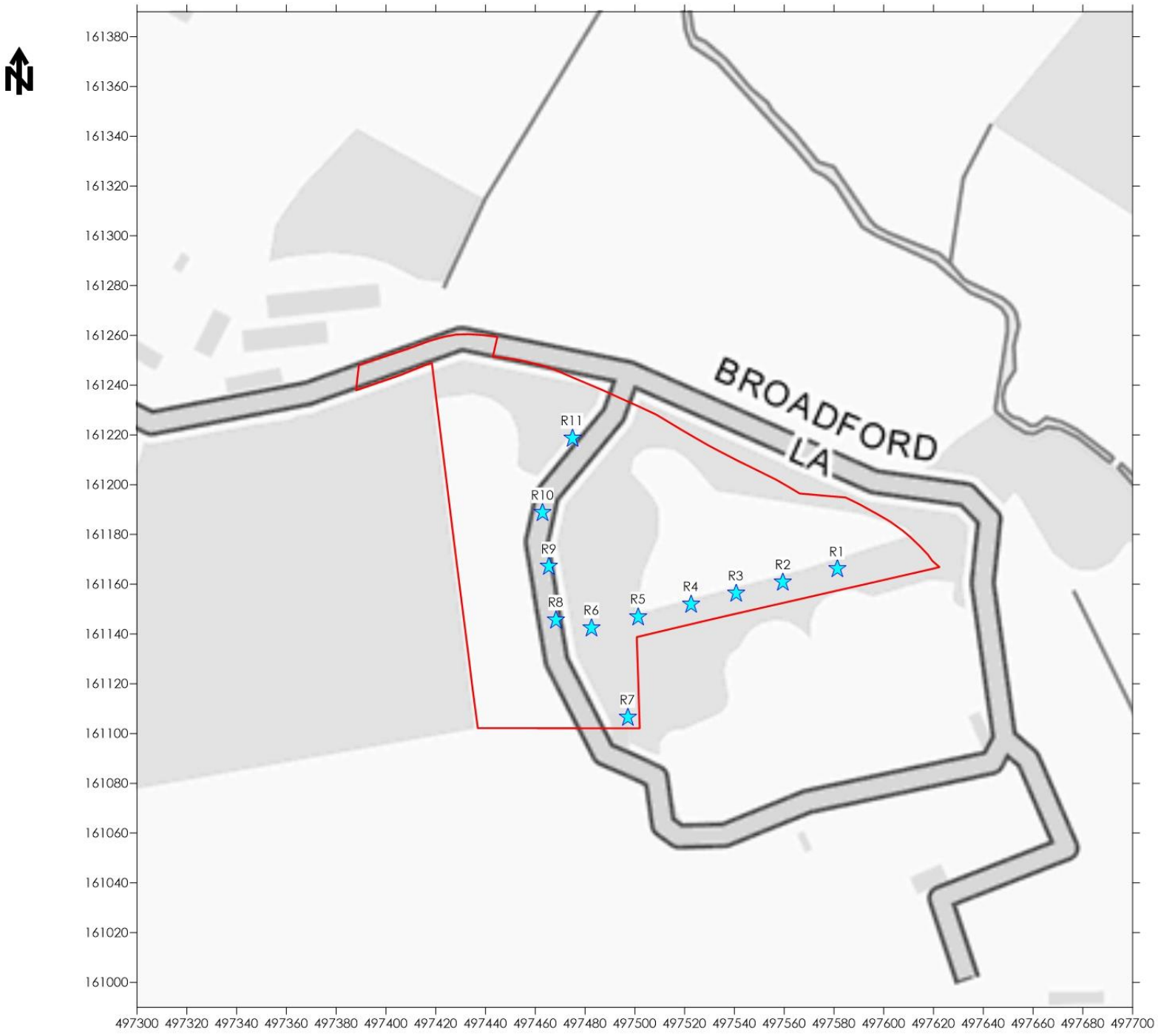

Legend

Site Boundary

Receptor

Title
Figure 3 - Sensitive Receptors

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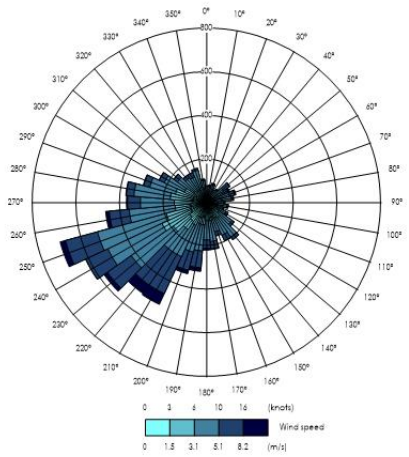
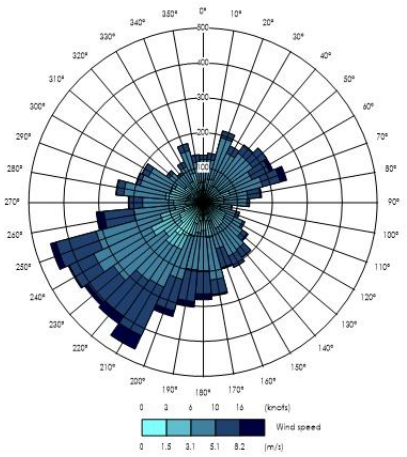


2017 Meteorological Data



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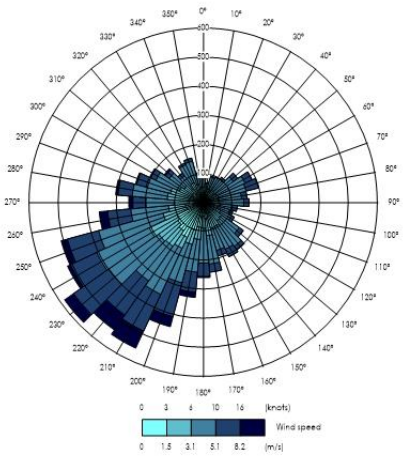

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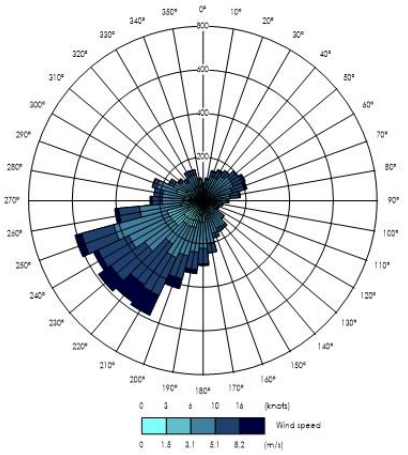
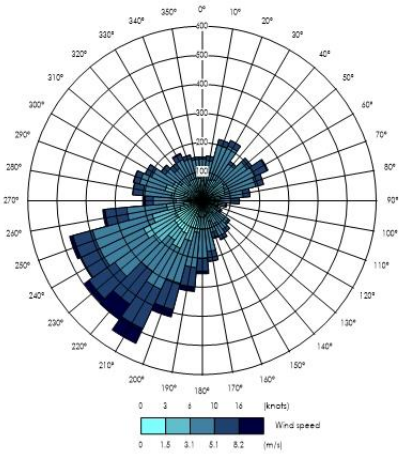


2020 Meteorological Data



2021 Meteorological Data

Legend

Title
Figure 4 - Wind Roses of 2017 to 2021 Farnborough Meteorological Station Data

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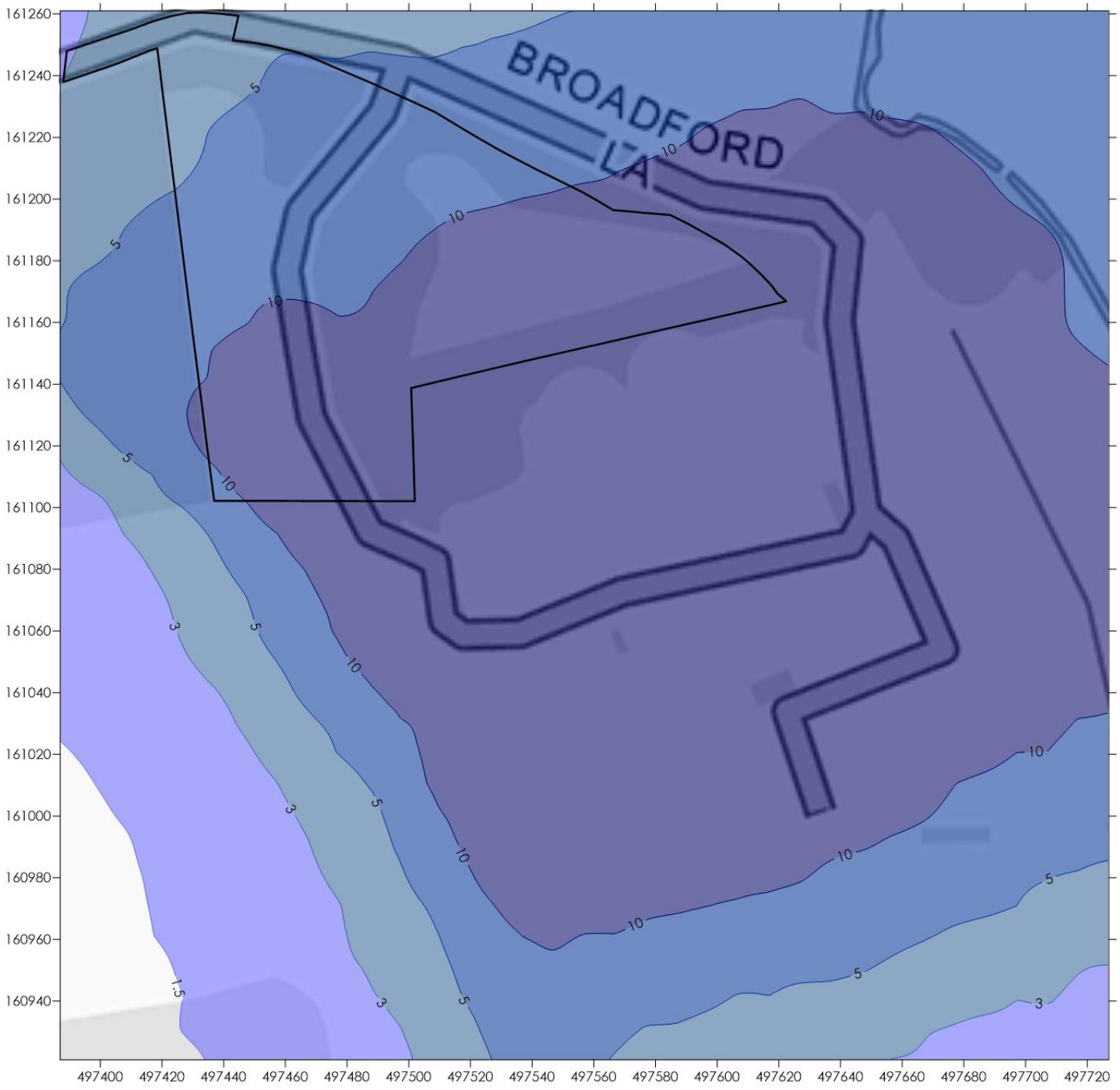

Legend

Site Boundary

Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)

10
5
3
1.5

Title

Figure 5 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2017 Meteorological Data

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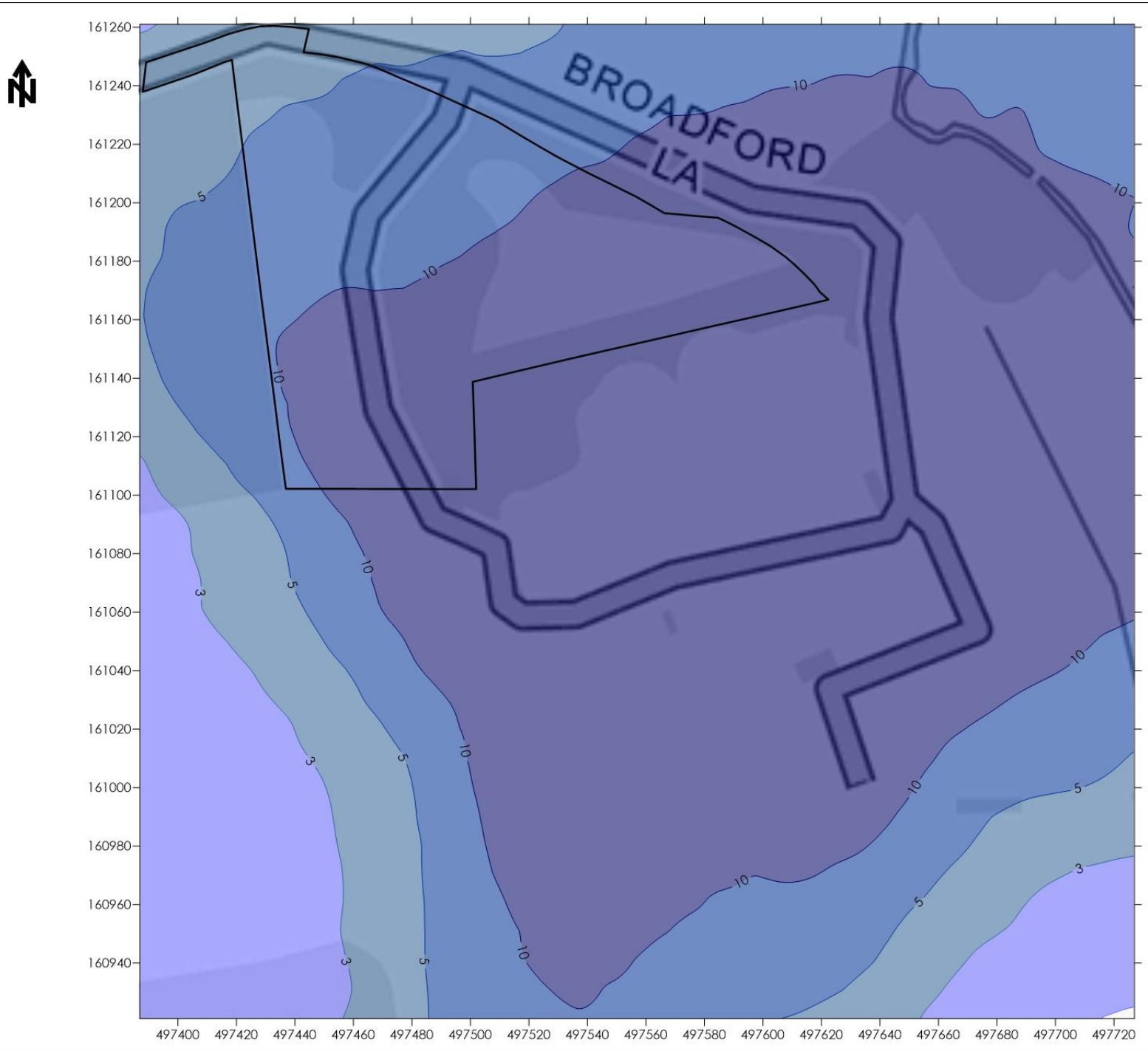

Legend

Site Boundary

Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)

10
5
3
1.5

Title

Figure 6 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2018 Meteorological Data

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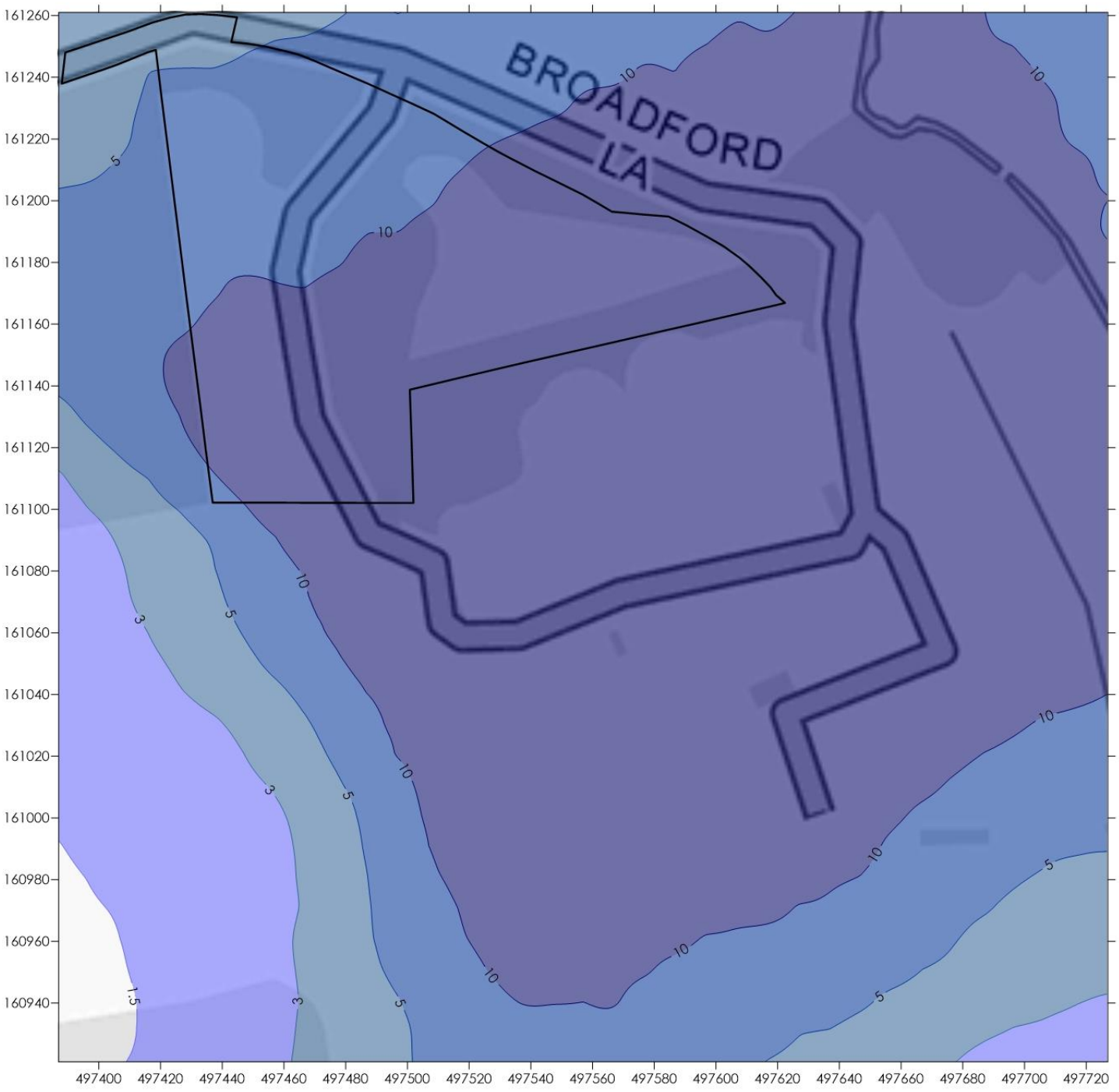

Legend

Site Boundary

Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)

10
5
3
1.5

Title

Figure 7 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2019 Meteorological Data

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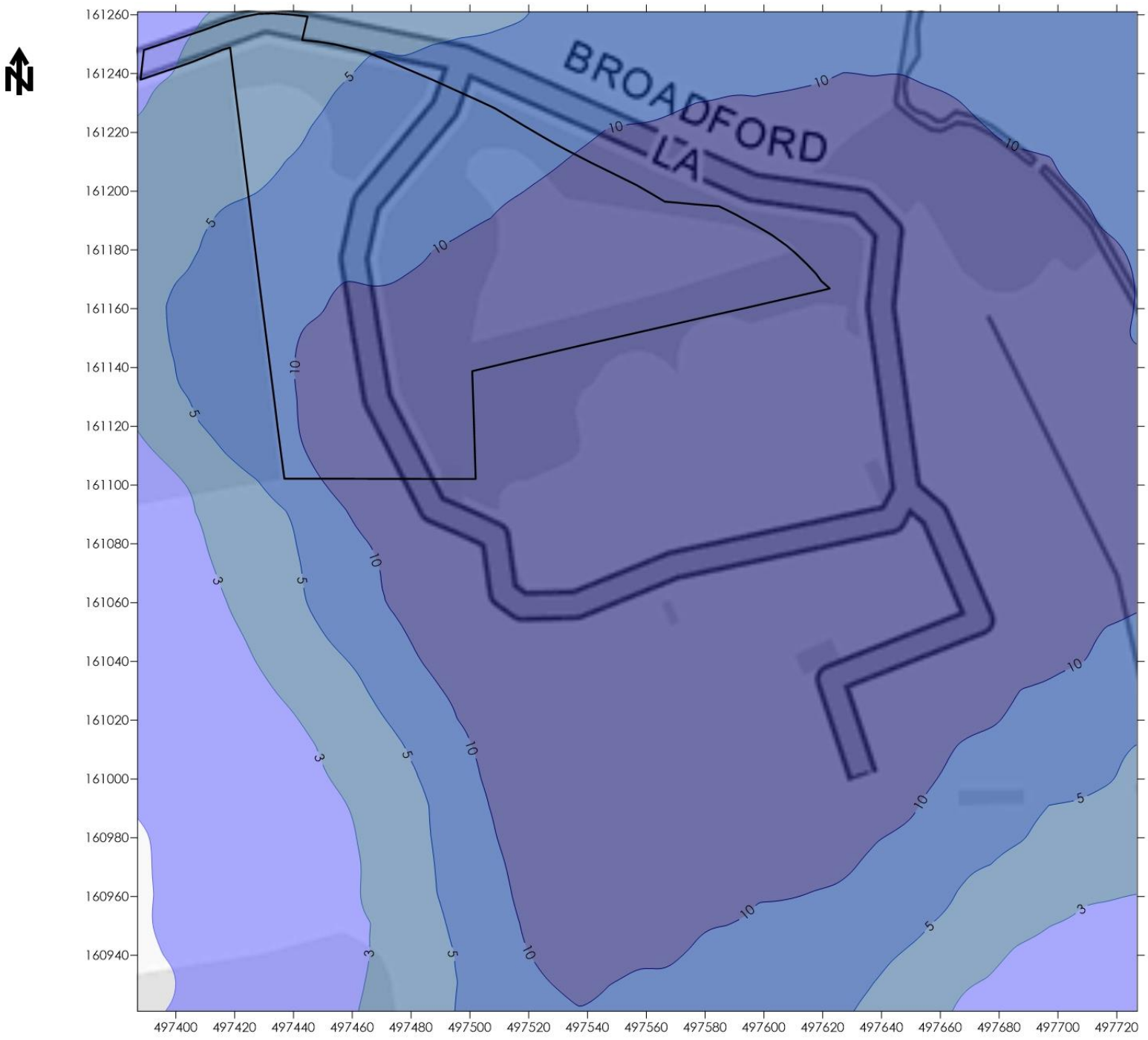

Legend

Site Boundary

Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)

10
5
3
1.5

Title

Figure 8 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2020 Meteorological Data

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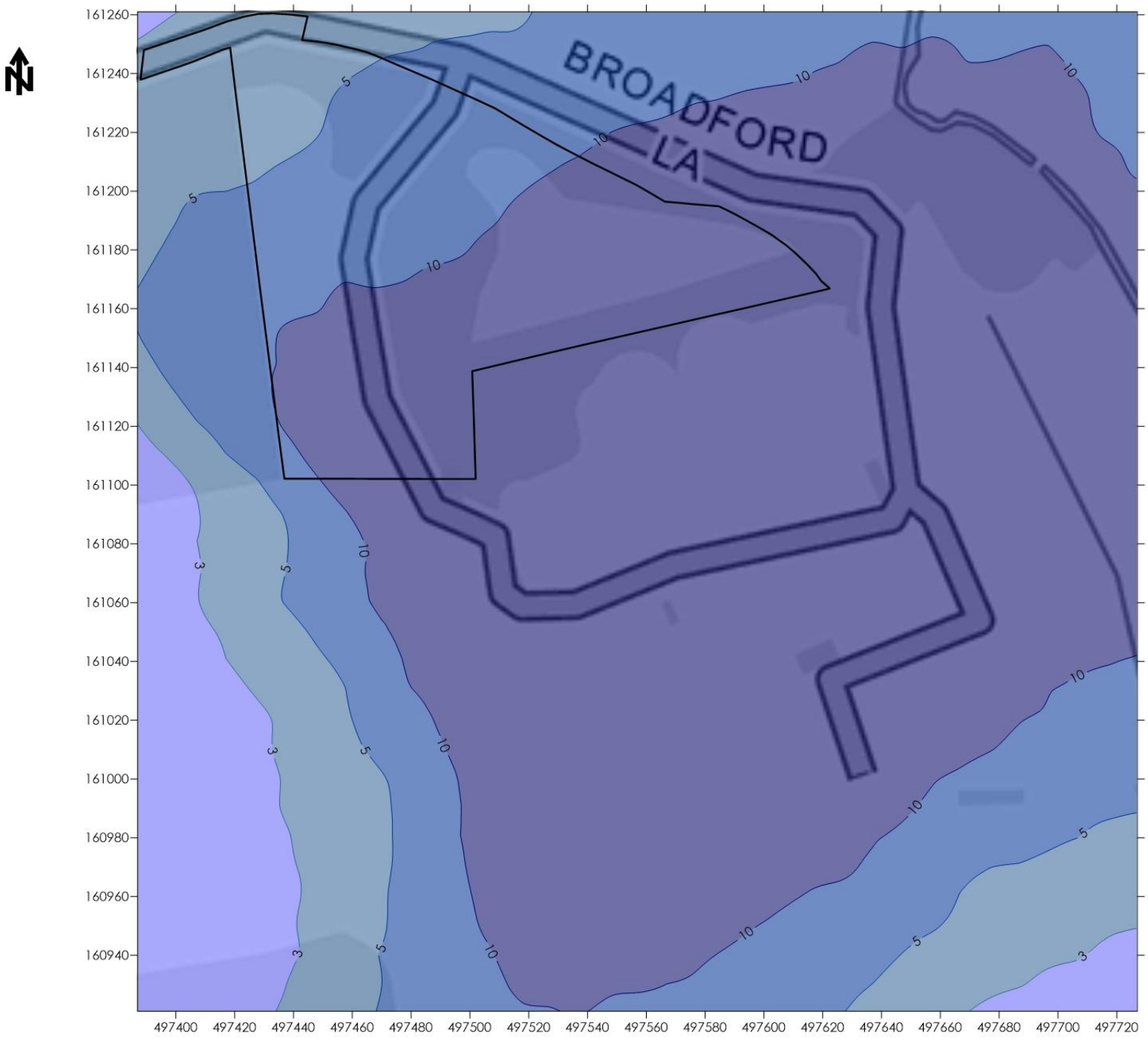

Legend

Site Boundary

Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)

10
5
3
1.5

Title

Figure 9 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2021 Meteorological Data

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