Odour Assessment

Lower House Farm, Preston

Client: K H & B Knowles

Reference: 5343-1r1

Date: 3rd March 2022

Report Issue

Report Title: Odour Assessment - Lower House Farm, Preston

Report Reference: 5343-1

Field	Report Version			
	1	2	3	4
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Executive Summary

Redmore Environmental Ltd was commissioned by K H & B Knowles to undertake an Odour Assessment in support of a proposed covered slurry lagoon on land at Lower House Farm, Preston.

The proposals comprise the construction of a covered earth banked lagoon which will be used to store cattle slurry. Odour emissions from the lagoon have the potential to cause impacts at sensitive locations in the vicinity of the site. As such, an Odour Assessment was undertaken to quantify effects as a result of the development.

Potential odour releases were defined based on the size and nature of the proposed lagoon. Impacts at sensitive receptors were quantified using dispersion modelling, the results compared with the relevant benchmark level and the significance assessed in accordance with the appropriate guidance.

Predicted odour concentrations were below the relevant benchmark level at all sensitive locations in the vicinity of the site for all modelling years. Resultant impacts were classified as not significant in accordance with the stated criteria. As such, potential odour emissions are not considered to represent a constraint to planning consent for the development.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by K H & B Knowles to undertake an Odour Assessment in support of a proposed covered slurry lagoon on land at Lower House Farm, Preston.

1.1.2 The proposals comprise the construction of a covered earth banked lagoon which will be used to store cattle slurry. Odour emissions from the lagoon have the potential to cause impacts at sensitive locations in the vicinity of the site. As such, an Odour Assessment was undertaken to quantify effects as a result of the development.

1.2 Site Location and Context

1.2.1 The proposed development is located on land at Lower House Farm, Preston, at approximate National Grid Reference (NGR): 347618, 437477. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise the construction of an earth banked lagoon which has the capacity to store 3,650 tonnes of slurry. The lagoon will feature a cover in order to provide containment of materials and prevent rain ingress.

1.2.3 Fugitive odour emissions from the lagoon have the potential to cause impacts at sensitive locations in the vicinity of the site and have therefore been assessed within this 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 a nuisance:

- 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 nuisance, 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 and installations not controlled under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as the proposed slurry lagoon, 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 premises 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). Enforcement can insist that there be no odour beyond the boundary of the works. The only defence is to show that the

process to which the nuisance has been attributed and its operation are being controlled according to best practicable means.

2.3.3 The legislative controls described above were considered as necessary throughout the undertaking of the assessment.

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, the EA has issued guidance on odour[4] which contains indicative benchmark levels for use in the assessment of potential impacts from industrial facilities. Although it is acknowledged the site is not regulated by the EA, the document is considered a suitable source of data in lieu of other information.

2.4.2 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 is the 175th highest hourly average recorded in the year. This parameter reflects the previously described FIDOR 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.

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

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

Relative Offensiveness of Odour	Benchmark Level as 98th %ile of 1-hour Means (ou_E/m^3)
Less offensive odours: • Brewery • Confectionery • Coffee roasting • Bakery	6.0

2.4.3 Odours from the proposed lagoon would be classified as 'moderately offensive' as they are associated with livestock rearing operations. As such, an assessment criterion of $3.0ou_E/m^3$ as the 98th %ile of 1-hour mean concentrations has been utilised throughout this report.

2.4.4 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.

2.4.5 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

5 Odour Guidance for Local Authorities, DEFRA, 2010.

6 Odour Guidance for Local Authorities, DEFRA, 2010.

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 July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

2.5.2 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:

> "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"

2.5.3 Chapter 12 of the NPPF details objectives in relation to achieving well-designed places. 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

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, 2021.

where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesions and resilience."

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

2.6 Local Planning Policy

2.6.1 The Wyre Local Plan (2011 - 2031)[10] was adopted by Wyre Council (WC) on 28th February 2019. This sets out the planning approach and policies for Wyre. Review of the document identified the following policy of relevance to the assessment:

"CDMP1 Environmental Protection

1. Development will be permitted where in isolation or in conjunction with other planned or committed developments it can be demonstrated that the development:

a) Will be compatible with adjacent existing uses or uses proposed in this plan and it would not lead to significant adverse effects on health, amenity, safety and the operation of surrounding uses and for occupants or users of the development itself, with reference to noise, vibration, odour, light, dust, other pollution or nuisance, Applications will be required to be accompanied, where appropriate by relevant impact assessments and mitigation proposals;

[…]."

2.6.2 The implications of the above policy have been taken into consideration throughout the undertaking of the assessment.

2.7 Institute of Air Quality Management Guidance

2.7.1 The IAQM have published 'Guidance on the Assessment of Odour for Planning V1.1'[11]. This specifically deals with assessing odour impacts for planning purposes, namely potential

[10] Wyre Local Plan 2011-2031, WC, 2019.

[11] Guidance on the Assessment of Odour for Planning V1.1, IAQM, 2018.

effects on amenity. The assessment methodology outlined in the document has been utilised throughout this report where relevant.

3.0 METHODOLOGY

3.1 Introduction

3.1.1 Operation of the proposed slurry lagoon may result in fugitive odour emissions. Associated impacts were therefore assessed in accordance with the following stages:

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

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

3.2 Odour Sources

3.2.1 The proposed slurry lagoon has a rectangular footprint of approximately 70m by 50m with a maximum storage capacity of 3,650 tonnes. Cattle slurry has the potential to produce odour emissions. This was therefore considered throughout the assessment.

3.3 Odour Emission Rates

3.3.1 There are no emission limit values for odour and since the lagoon is not operational, it was not possible to monitor site specific emissions. In the absence of such information, estimations of future releases from the store were made to inform the dispersion model. These were based on odour monitoring data reported for cattle slurry storage. As such, they are considered to provide representative inputs for an assessment of this nature. A summary of the data is provided in Table 2.

Table 2 Odour Emission Rates

Source	Odour Emission Rate	Unit	Reference
Cattle slurry - summer	3.62	$ou_E/m^2/s$	L. Valli et al.(1)

NOTES: (1) Odour emissions from livestock production facilities, L. Valli, G. Moscatelli, N.Labartino, Centro Ricerche Produzioni Animali, Chemical Engineering Transactions, Vol.15, 2008.

3.3.2 The SCAIL-Agriculture update: Sniffer ER26 guidance[12] indicates that a 90% reduction in emission rates can be applied for covered lagoons. However, for the purpose of the assessment, no reduction was applied and it was assumed that the lagoon is uncovered and slurry is constantly exposed to atmosphere. This ensured a robust appraisal of potential impacts.

3.4 Dispersion Modelling

3.4.1 Dispersion modelling was undertaken using ADMS-5.2 (v5.2.4.0), which is developed by Cambridge Environmental Research Consultants (CERC) Ltd. ADMS-5 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.

3.4.2 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.

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

- Assessment area;
- Process conditions and emissions rates;
- Terrain information;
- Building dimensions;
- Meteorological data;
- Roughness length (z_0); and,
- Monin-Obukhov length.

3.4.4 These are detailed in the following Sections.

[12] SCAIL-Agriculture update: Sniffer ER26: Final Report, Sniffer, 2014.

Modelling Scenarios

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

Table 3 Assessment Scenarios

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

Emissions

3.4.6 Emissions from the proposed lagoon were represented by a single area source in the model. A summary of the input parameters is provided in Table 4.

Table 4 Model Inputs - Slurry Lagoon

Parameter	Unit	Value
Source type	-	Area
Number of sources	-	1
Position	-	As shown in Figure 2
Source height	m	0
Source area	m^2	3,518
Emission temperature	°C	Ambient
Emission rate	$ou_E/m^2/s$	3.62

3.4.7 It was assumed that the slurry lagoon is uncovered, constantly full and emissions occur 24-hours per day, 365-days per year. The amount of slurry will vary through operation of the store. As such, the assumption that the maximum quantity is constantly present on site is considered to provide a conservative over estimation of potential emissions and associated impacts.

Assessment Area

3.4.8 The assessment area was defined based on the development location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 346860, 436720 to 348360 to 438220. One Cartesian grid with a resolution of 10m was used within the model to produce data suitable for contour plotting using the Surfer software package.

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

3.4.10 A desk-top study was undertaken in order to identify any sensitive receptor locations in the vicinity of the site that required specific consideration during the assessment. The sensitivity of each receptor was defined based upon the guidance provided within the IAQM document 'Guidance on the Assessment of Odour for Planning V1.1'[13]. The IAQM recommend that the assessor uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the principles summarised in Table 5.

Table 5 Odour Receptor Sensitivity

Sensitivity	Description
High	Surrounding land where: • Users can reasonably expect enjoyment of a high level of amenity; and, • People would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land Examples may include residential dwellings, hospitals, schools/education and tourist/cultural
Medium	Surrounding land where: • Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or, • People would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land Examples may include places of work, commercial/retail premises and playing/recreation fields

[13] Guidance on the Assessment of Odour for Planning V1.1, IAQM, 2018.

Sensitivity	Description
Low	Surrounding land where: • The enjoyment of amenity would not reasonably be expected; or, • There is transient exposure, where the people would reasonably be expected to present only for limited periods of time as part of the normal pattern of use of the land Examples may include industrial use, farms, footpaths and roads

3.4.11 The identified sensitive receptors and associated sensitivity are summarised in Table 6.

Table 6 Sensitive Receptor Locations

Receptor		Sensitivity	NGR (m)	
			X	Y
R1	Residential - Cinder Lane	High	348268.0	436894.4
R2	Residential - Lewth Farm	High	348082.4	436798.7
R3	Residential - Lewth Lane	High	347442.2	436933.9
R4	Residential - Lewth Lane	High	347323.6	436961.8
R5	Residential - Preston Road	High	347050.3	437176.3
R6	Residential - Woods Lane	High	347503.0	438169.3
R7	Residential - Lower House Farm	High	347928.0	437157.0

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

Terrain Data

3.4.13 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[14].

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

Meteorological Data

3.4.14 Meteorological data used in the assessment was taken from Blackpool Airport meteorological station over the period 1st January 2015 to 31st December 2019 (inclusive). Blackpool Airport is located at NGR: 332308, 430915, which is approximately 17.1km south-west of the site. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

3.4.15 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.

Roughness Length

3.4.16 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-5 as being suitable for 'agricultural areas (max)'.

3.4.17 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-5 as being suitable for 'root crops'.

Monin-Obukhov Length

3.4.18 The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 1m was used to describe the modelling extents. This value is considered appropriate for the nature of the area and is suggested within ADMS-5 as being suitable for a 'rural location'.

3.4.19 A minimum Monin-Obukhov length of 30m was used to describe the meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-5 as being suitable for 'cities and large towns'.

Modelling Uncertainty

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

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

3.4.21 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-5 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 to allow for inter-year variability. 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. Terrain data was included and processed using the method outlined by CERC;
- Emission rates - Emission rates were derived from monitoring results for 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.

3.4.22 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.

3.5 Significance of Odour Impacts

3.5.1 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[15]. The relevant assessment matrix is summarised in Table 7.

Table 7 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	Substantial	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

3.5.2 The IAQM guidance[16] 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**. This has been considered to determine the overall significance of potential odour impacts associated with the facility.

15 Guidance on the Assessment of Odour for Planning V1.1, IAQM, 2018.

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

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 8. 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 8 Predicted Odour Concentrations

Receptor		Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)				
		2015	2016	2017	2018	2019
R1	Residential - Cinder Lane	0.09	0.11	0.10	**0.12**	0.10
R2	Residential - Lewth Farm	0.10	**0.13**	**0.13**	0.12	0.11
R3	Residential - Lewth Lane	0.20	**0.24**	0.13	**0.24**	0.22
R4	Residential - Lewth Lane	0.25	**0.37**	0.13	0.26	0.25
R5	Residential - Preston Road	0.28	**0.49**	0.15	0.26	0.23
R6	Residential - Woods Lane	0.11	0.11	0.13	0.13	**0.15**
R7	Residential - Lower House Farm	0.29	0.37	0.36	**0.40**	0.35

4.1.2 As indicated in Table 8, predicted odour concentrations were below 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.

4.2 Impact Significance

4.2.1 The significance of predicted odour impacts at the sensitive receptors is summarised in Table 9.

Table 9 Predicted Odour Impacts

Receptor		Odour Exposure Level as 98th %ile of 1-hour Means (ou_E/m^3)	Receptor Sensitivity	Significance of Impact
R1	Residential - Cinder Lane	Less than 0.5	High	Negligible
R2	Residential - Lewth Farm	Less than 0.5	High	Negligible
R3	Residential - Lewth Lane	Less than 0.5	High	Negligible
R4	Residential - Lewth Lane	Less than 0.5	High	Negligible
R5	Residential - Preston Road	Less than 0.5	High	Negligible
R6	Residential - Woods Lane	Less than 0.5	High	Negligible
R7	Residential - Lower House Farm	Less than 0.5	High	Negligible

4.2.2 As indicated in Table 9, the significance of odour impacts as a result of the development was predicted to be **negligible** at all sensitive receptor locations.

4.2.3 The IAQM guidance[17] states that only if the impact is **moderate** or **substantial**, the effect is considered **significant**. As such, impacts are considered **not significant**, in accordance with the stated methodology.

4.2.4 Based on the dispersion modelling results, it is not anticipated that significant odour impacts will occur at any sensitive location as a result of the proposed development.

[17] Guidance on the Assessment of Odour for Planning V1.1, IAQM, 2018.

5.0 CONCLUSION

5.1.1 Redmore Environmental Ltd was commissioned by K H & B Knowles to undertake an Odour Assessment in support of a proposed covered slurry lagoon on land at Lower House Farm, Preston.

5.1.2 The proposals comprise the construction of a covered earth banked lagoon which will be used to store cattle slurry. Odour emissions from the lagoon have the potential to cause impacts at sensitive locations in the vicinity of the site. As such, an Odour Assessment was undertaken to quantify effects as a result of the development.

5.1.3 Potential odour releases were defined based on the size and nature of the proposed lagoon. These were represented within a dispersion model produced using ADMS-5. Impacts at sensitive receptors in the vicinity of the site were quantified, the results compared with the relevant odour benchmark levels and the significance assessed in accordance with the IAQM guidance.

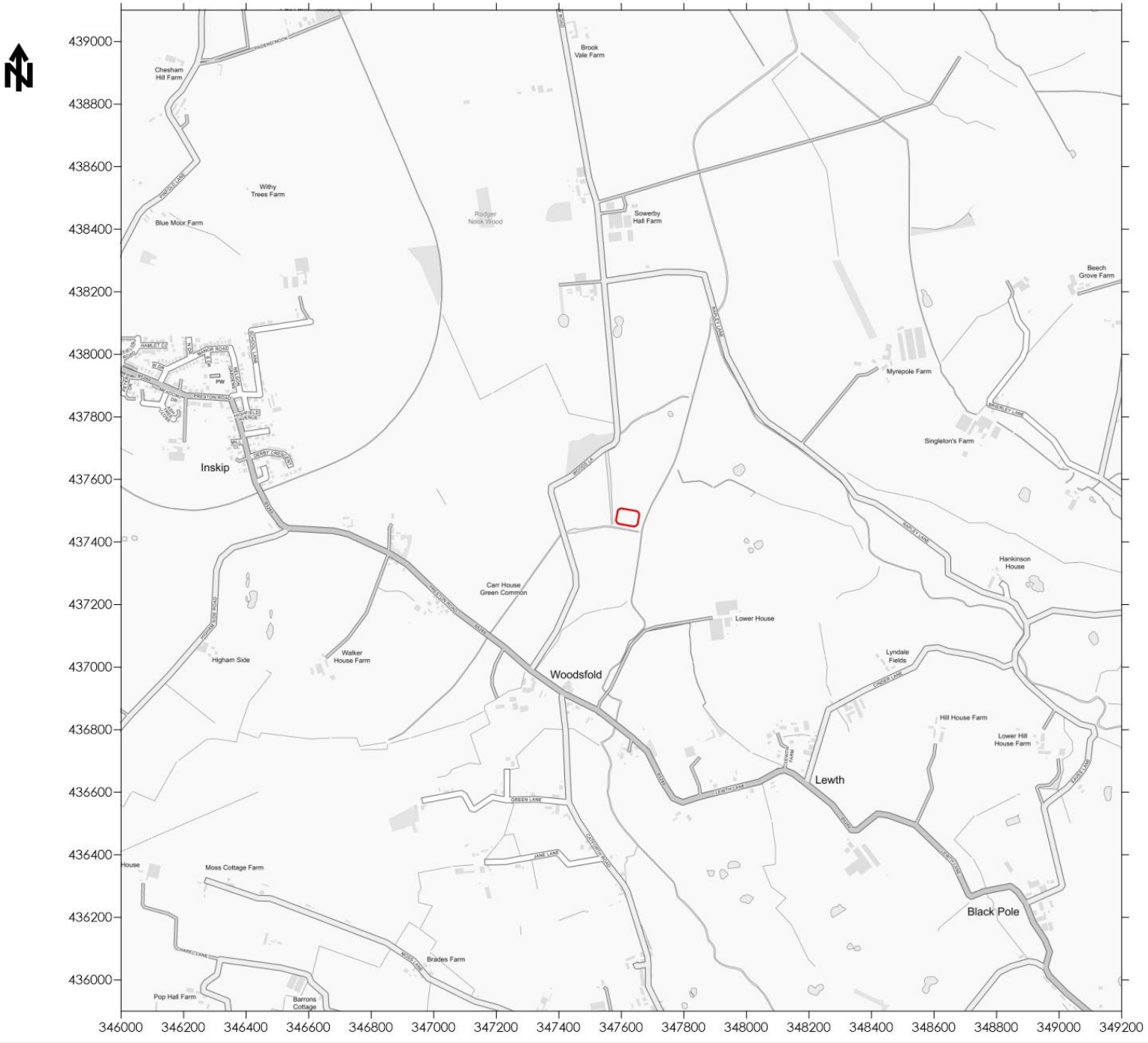
5.1.4 Predicted odour concentrations were below the relevant EA odour benchmark level at all receptor locations for all modelling years. The significance of predicted impacts was defined as **negligible** at all sensitive receptor locations. In accordance with the stated guidance, the overall odour effects as a result of the proposed development are considered to be **not significant**.

5.1.5 Based on the assessment results, potential odour emissions from the proposed lagoon are not considered to represent a constraint to planning consent for the development.

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 Framework
WC	Wyre Council
z_0	Roughness length
%ile	Percentile

Figures



Legend

Site Boundary

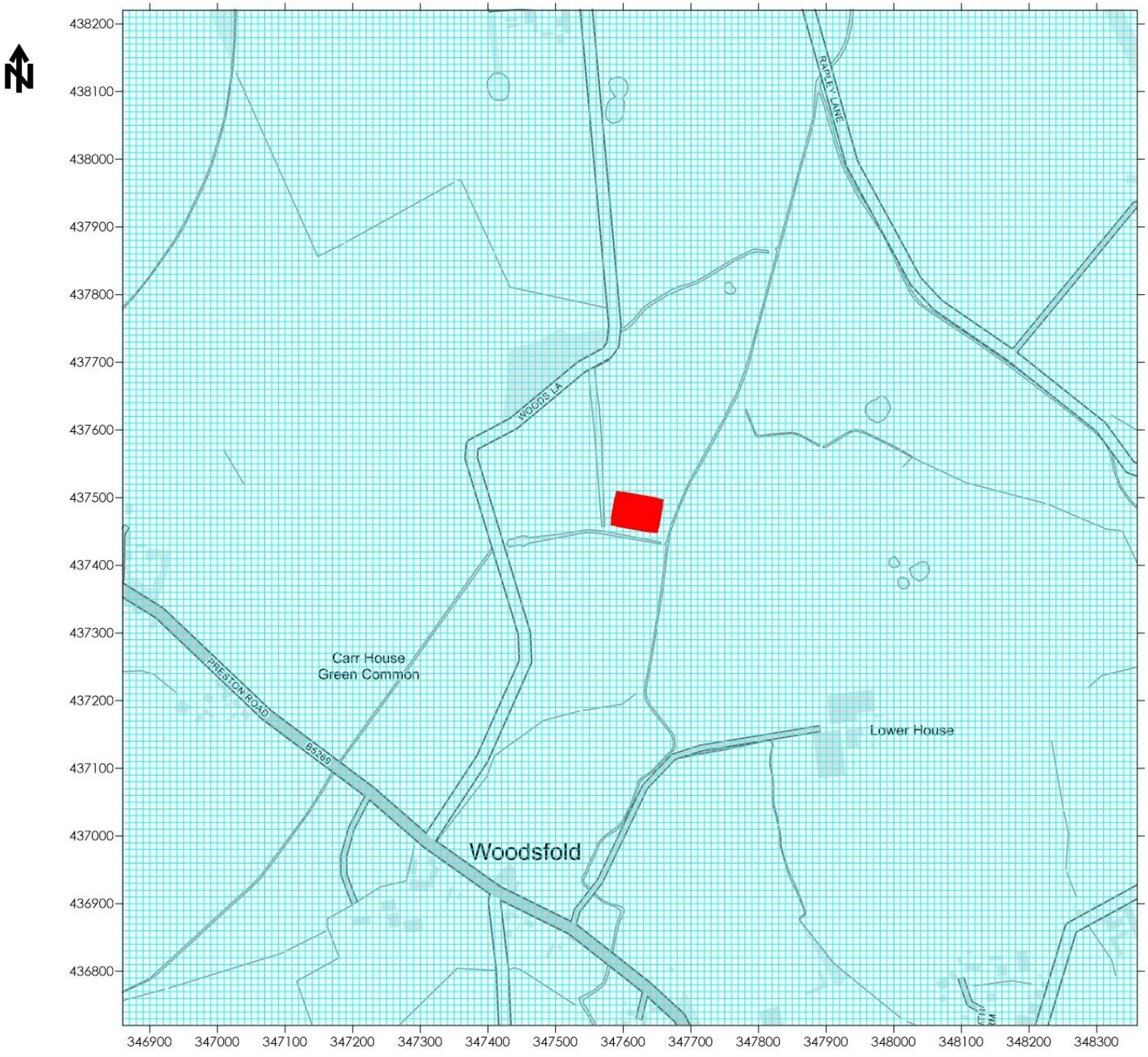
Title
Figure 1 - Site Location Plan

Project
Odour Assessment
Lower House Farm, Preston

Project Reference
5343-1

Client
K H & B Knowles

Redmore environmental
www.red-env.co.uk | 0161 7060075



Legend

Output Grid

Area Source

Title
Figure 2 - ADMS-5 Inputs

Project
Odour Assessment
Lower House Farm, Preston

Project Reference
5343-1

Client
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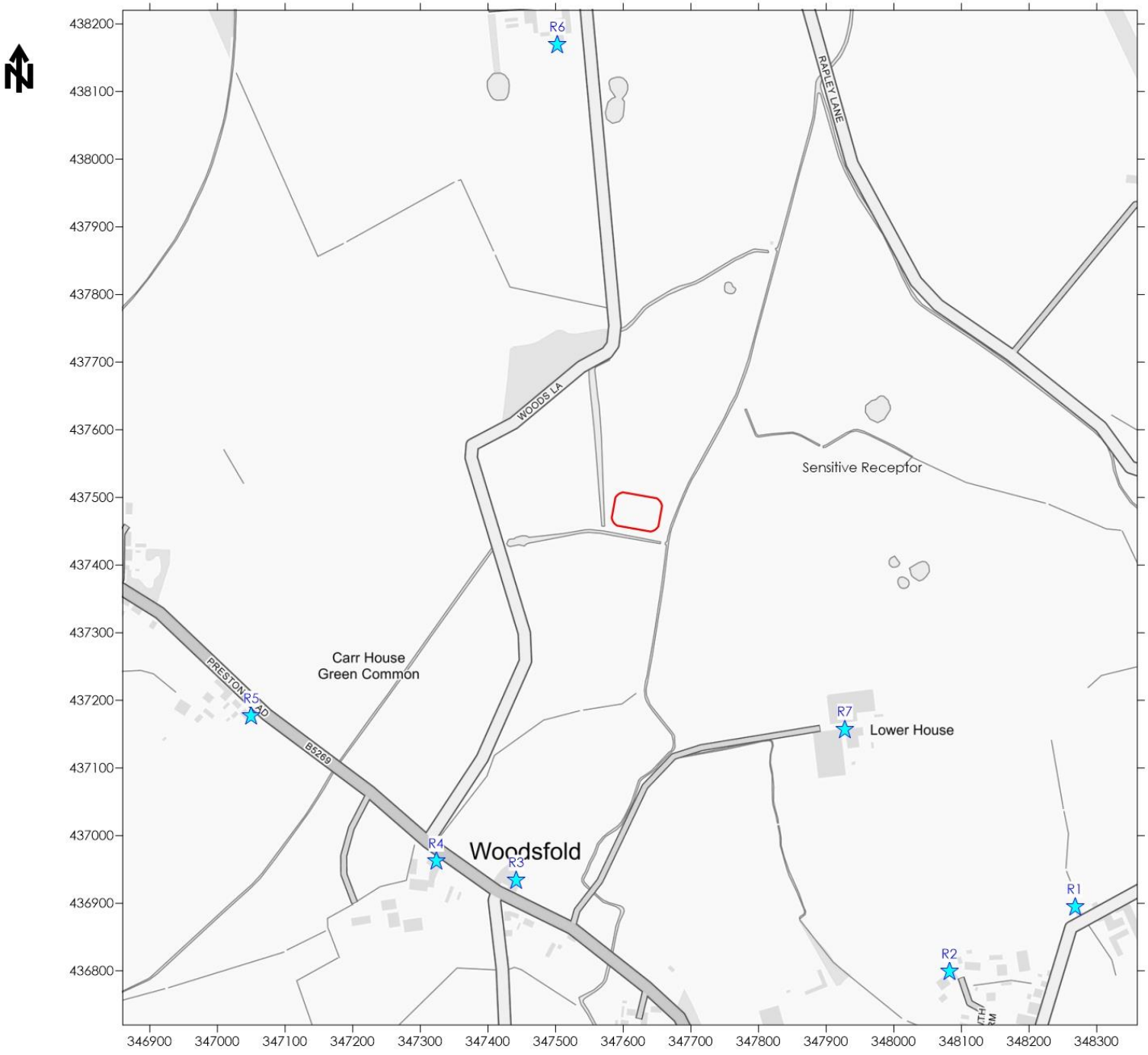

Legend

Site Boundary

Sensitive Receptor

Title
Figure 3 - Sensitive Receptor Locations

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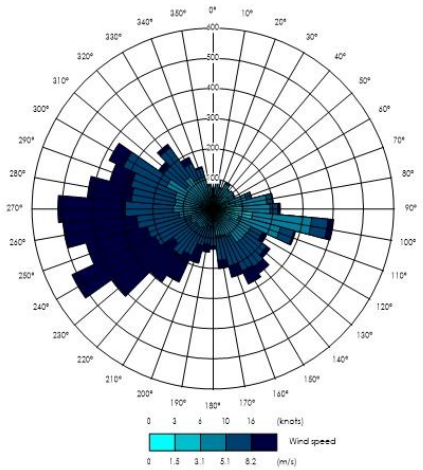
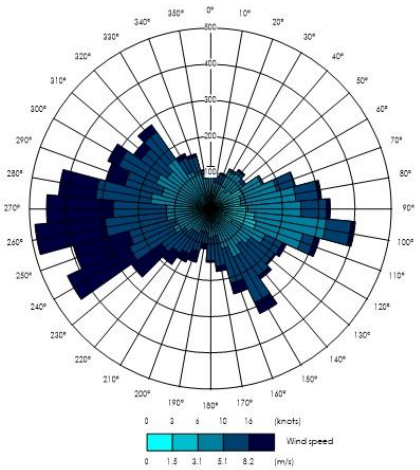
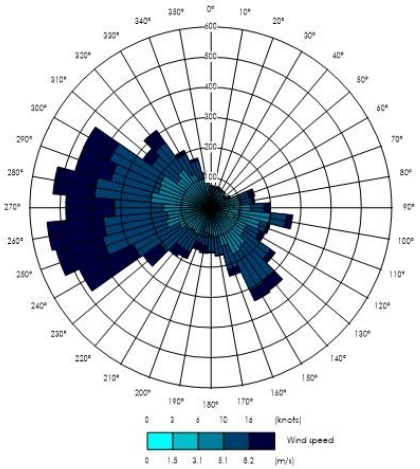


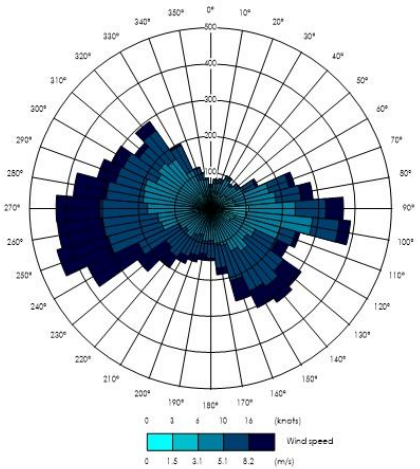
2015 Meteorological Data



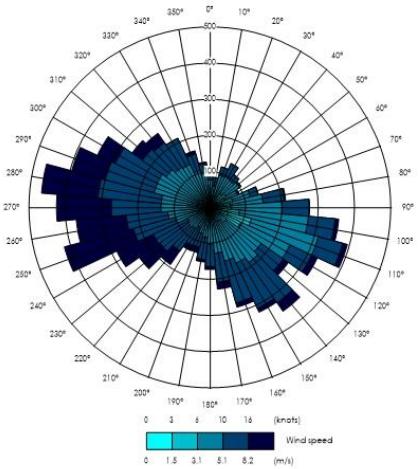
2016 Meteorological Data



2017 Meteorological Data



2018 Meteorological Data



2019 Meteorological Data

Legend

Title
Figure 4 - Wind Roses of 2015 to 2019 Blackpool Airport Meteorological Data

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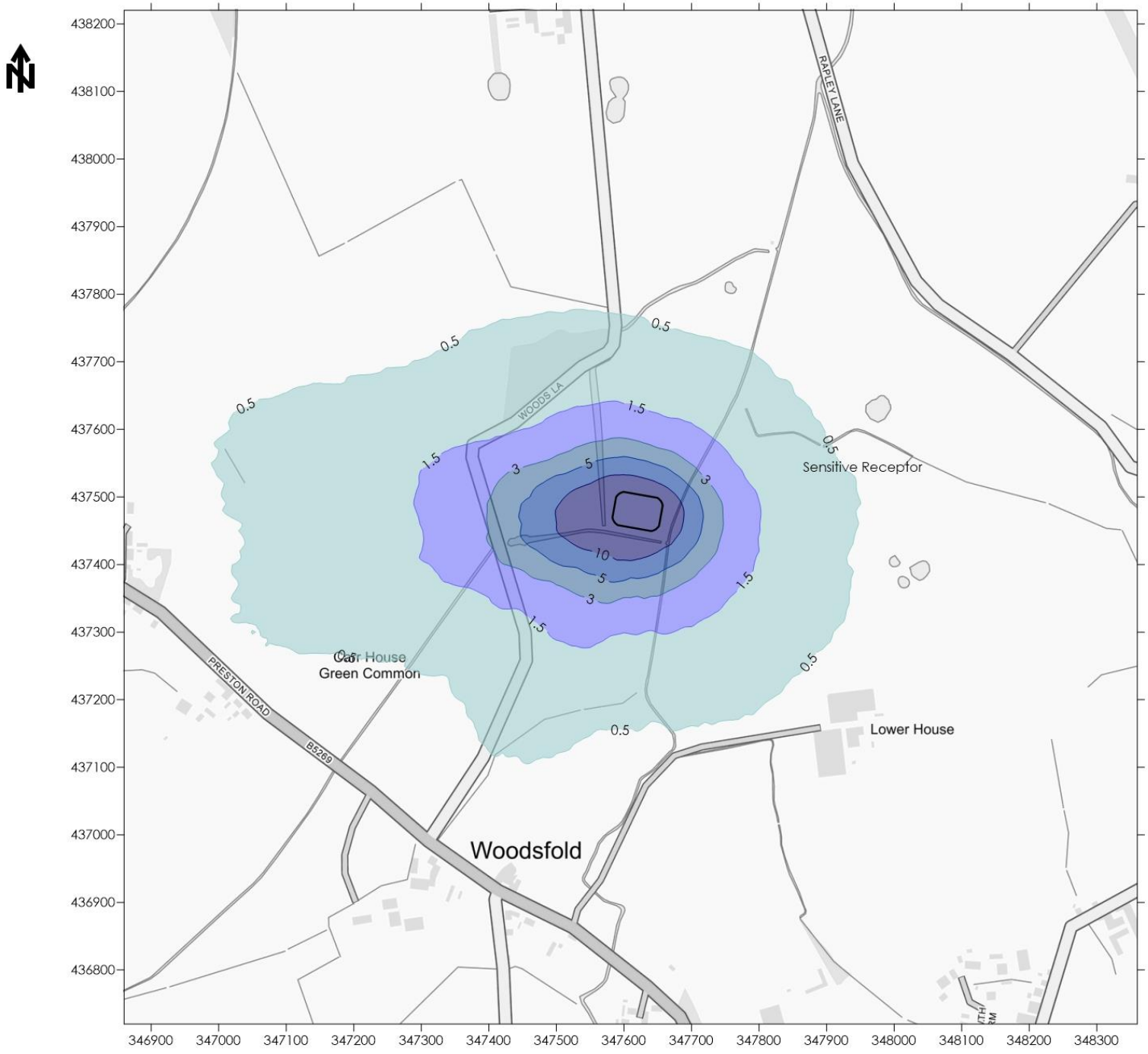

Legend

Site Boundary

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

10
5
3
1.5
0.5

Title

Figure 5 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2015 Meteorological Data

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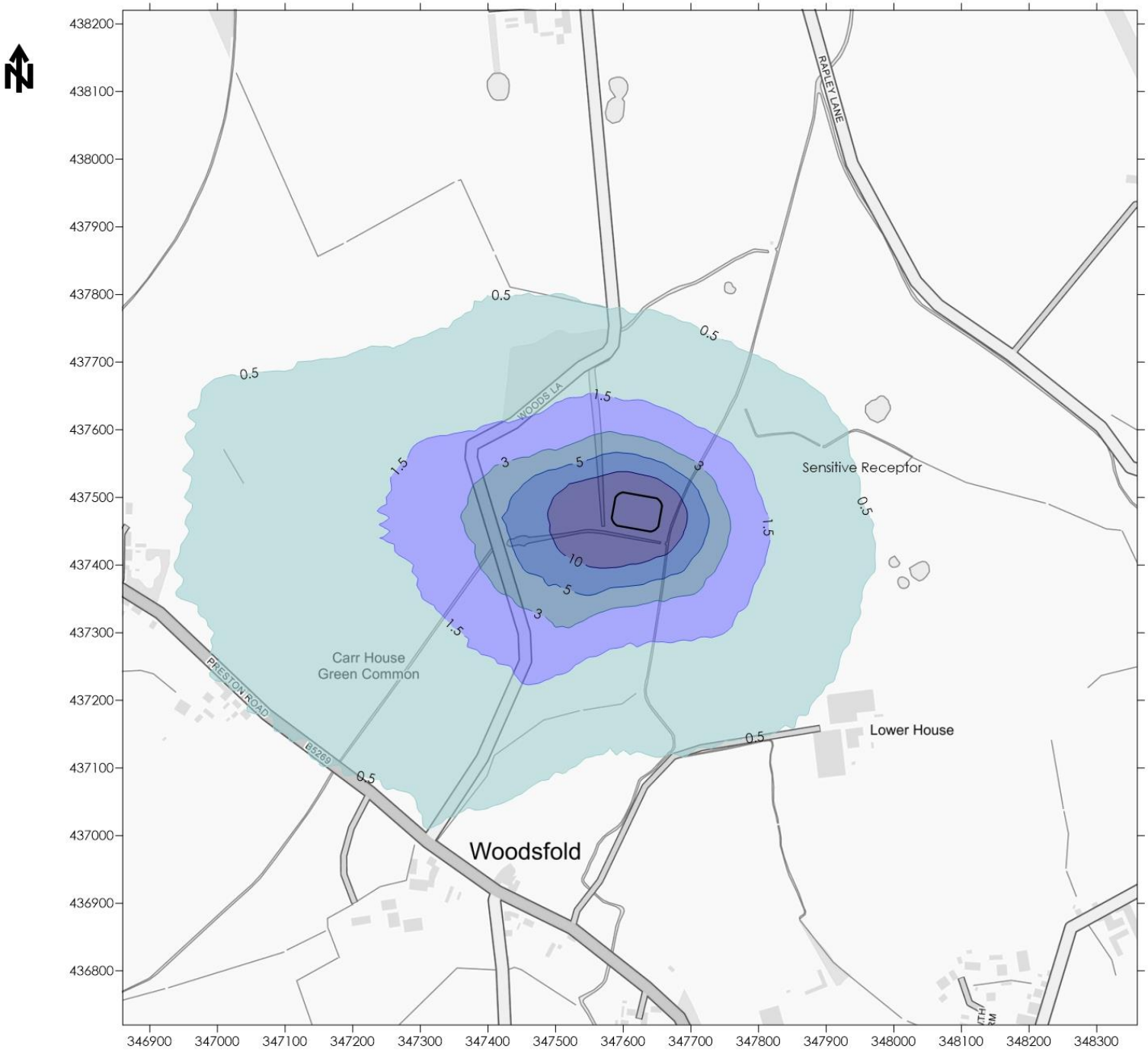

Legend

Site Boundary

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

10
5
3
1.5
0.5

Title

Figure 6 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2016 Meteorological Data

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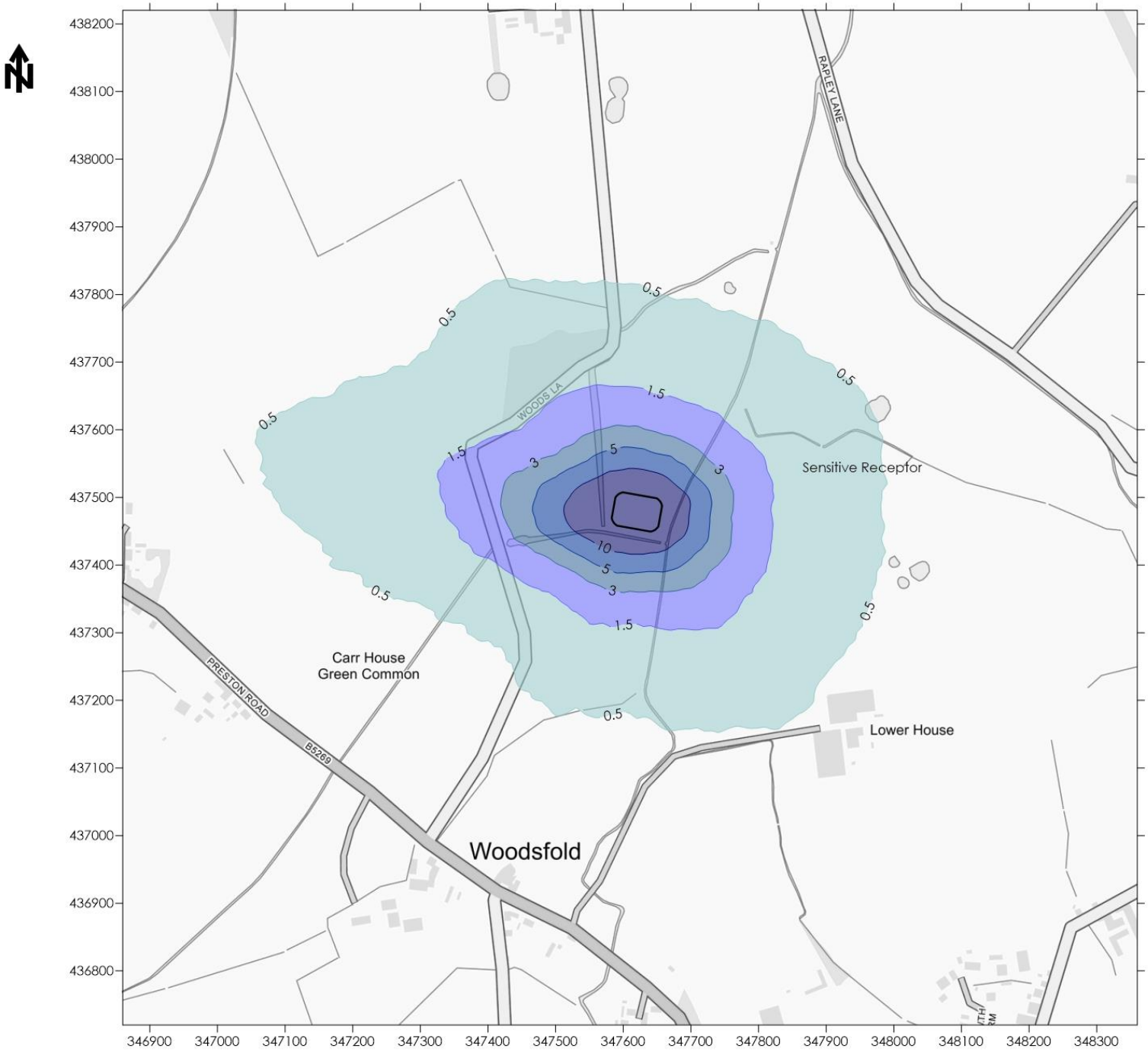

Legend

Site Boundary

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

10
5
3
1.5
0.5

Title

Figure 7 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2017 Meteorological Data

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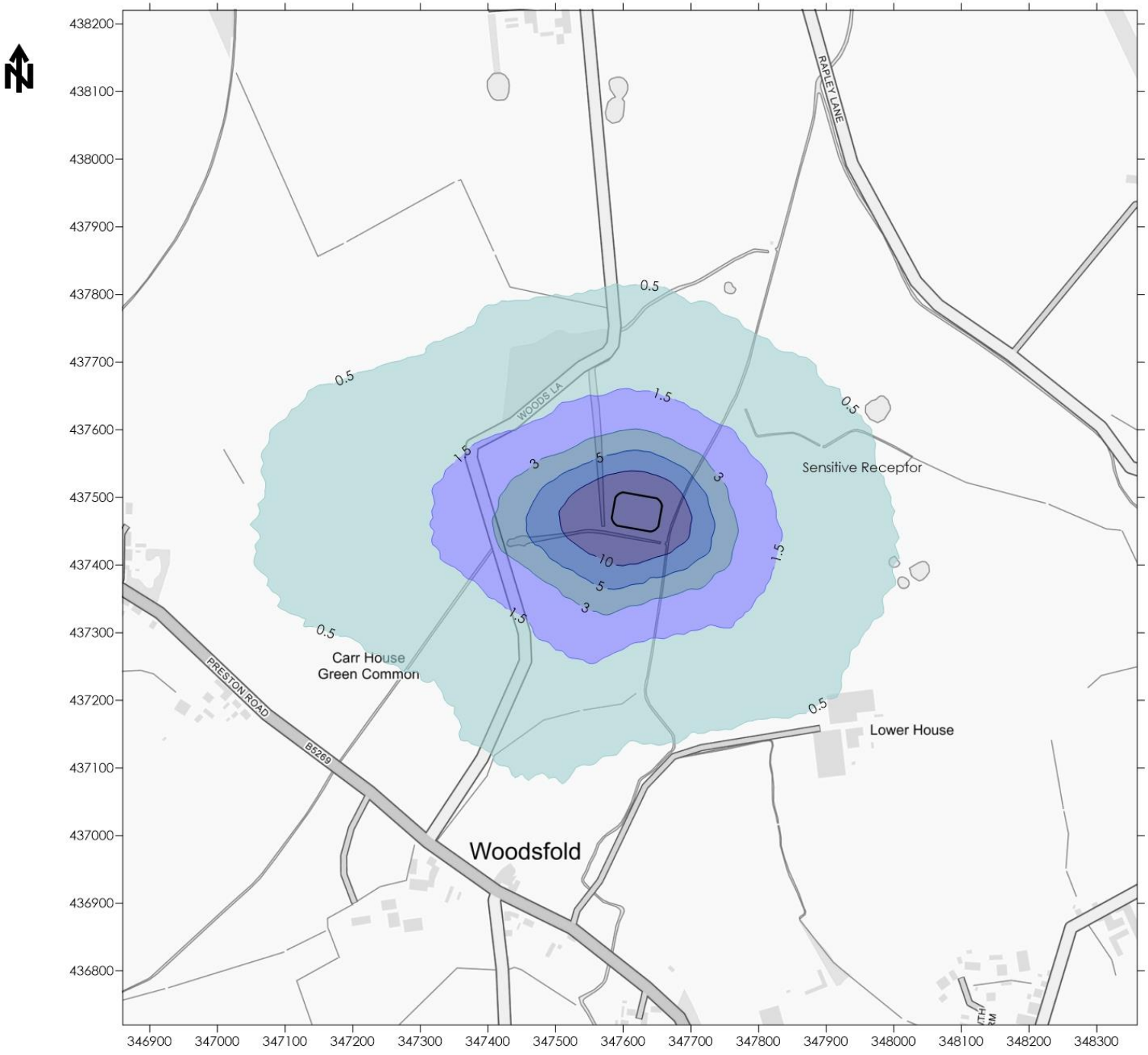

Legend

Site Boundary

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

10
5
3
1.5
0.5

Title

Figure 8 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2018 Meteorological Data

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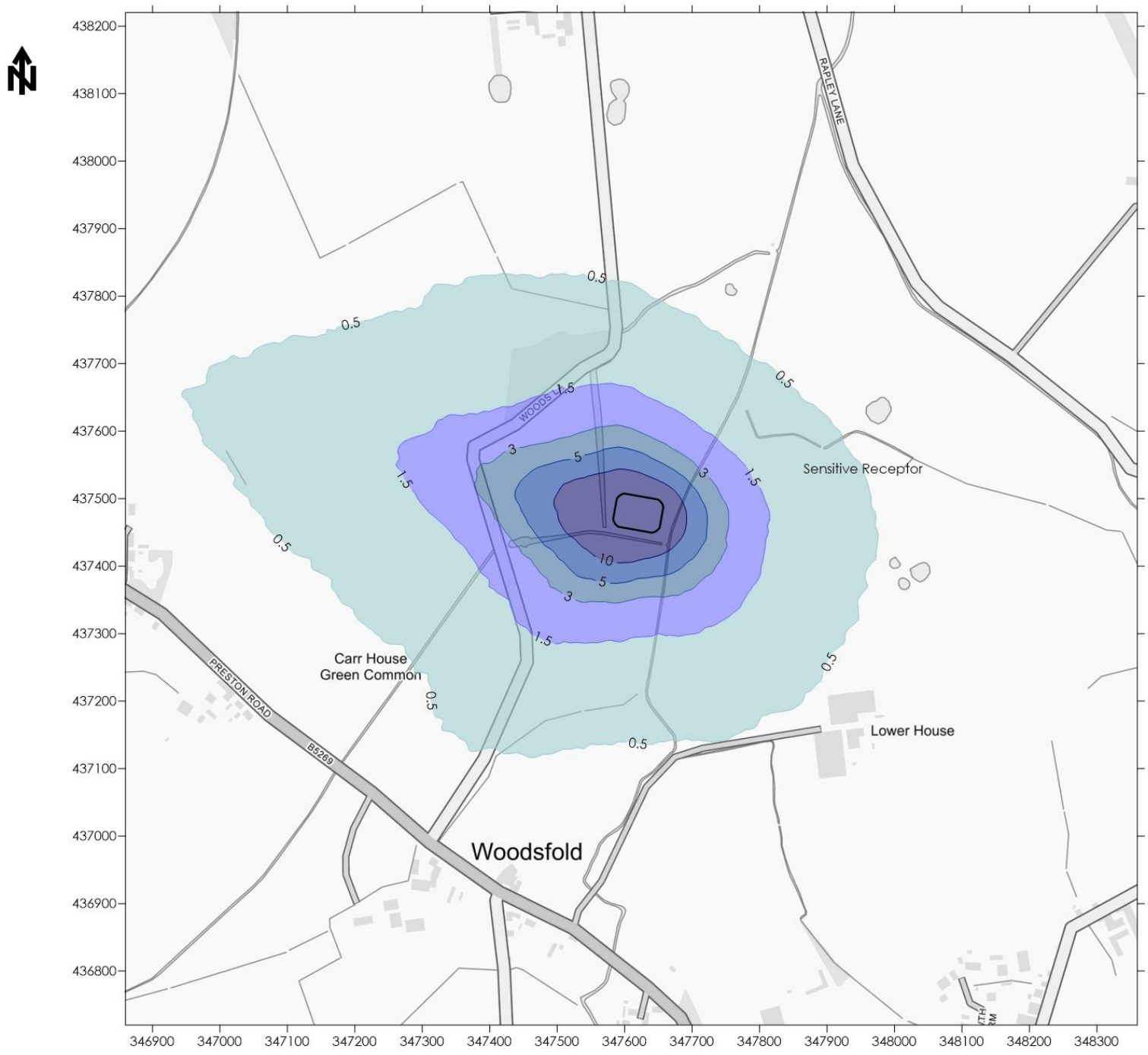

Legend

Site Boundary

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

10
5
3
1.5
0.5

Title

Figure 9 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2019 Meteorological Data

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