

Odour Assessment

Cleggswood Farm, Littleborough



Presented to: Mr Harvey Ashworth

Issued: October 2025

Lucion Contract Reference:133840

Report Details

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Report Title	Odour Assessment
Site Address	Cleggswood Farm, Littleborough
Contract Reference	133840
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
1	Draft	October 2025	-	Megan Hall Air Quality Consultant	Jethro Redmore Air Quality Consultant	S J Slater Associate

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Executive Summary

Site and Report Context	Lucion Delta-Simons Ltd ("Lucion") was instructed by Harvey Ashworth (the 'Client') to undertake an Odour Assessment in support of a naturally ventilated cattle shed (the 'Proposed Development') on land at Cleggswood Farm, Littleborough (the 'Site'). The Proposed Development has the potential to results in odour emissions and associated impacts at sensitive locations. As such, an Odour Assessment has been undertaken to quantify effects in the vicinity of the Proposed Development. This report presents the findings of the assessment, which addresses the potential for odour impacts from Proposed Development.
Summary	Potential odour releases were defined based on the size and nature of the Proposed Development. 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 relevant criteria.
Conclusions and Recommendations	Based on the results of the assessment, potential odour emissions from the Proposed Development are not considered to represent a constraint to planning consent for the scheme.
This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report.	

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1.0 Introduction

1.1 Appointment

- 1.1.1 Lucion Delta-Simons Ltd ("Lucion") was instructed by Harvey Ashworth (the 'Client') to undertake an Odour Assessment in support of a new naturally ventilated cattle shed (the 'Proposed Development') on land at Cleggswood Farm, Littleborough (the 'Site').

1.2 Site Location and Context

- 1.2.1 The Site is located on land at Cleggswood Farm, Littleborough, at approximate National Grid Reference (NGR): 393955, 415540. Reference should be made to Figure 1 for a map of the Site and surrounding area.
- 1.2.2 It is proposed to construct a new naturally ventilated cattle shed that will house 180 beef cattle. The livestock will be housed continuously throughout the year and fattened to a weight of 200kg. Farmyard manure (FYM) will be stored within a designated field heap, with an approximate area of 150m², located adjacent to the Proposed Development. The FYM will be stored within the field over the wet period and spread to land when conditions are appropriate.
- 1.2.3 The Proposed Development has the potential to result in odour emissions and associated impacts at sensitive locations. As such, an Odour Assessment has been undertaken to quantify effects in the vicinity of the Site. this is detailed in the following report.
- 1.2.4 The standard limitations associated with this assessment are presented in **Appendix A**.
- 1.2.5 A glossary of terms used in this report is provided in **Appendix B**.

2.0 Odour Background

2.1 Odour Definition

2.1.1 The Institute of Air Quality Management (IAQM) guidance¹ 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) guidance²) is a useful reminder of the factors that will determine the degree of odour pollution. These are described by the IAQM³ as follows:

- **Frequency of detection** - frequent odour incidents are more likely to result in complaints;
- **Intensity** - the individual's perception of the strength of the odour;
- **Duration** - the overall duration that individuals are exposed to an odour over time;
- **Odour 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,
- **Location** - 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.

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.

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.

2.3 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 non-intensive agricultural activities, is that provided in Section 79 of the Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

"Any dust, steam, odour 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). 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, the EA has issued guidance on odour⁴ which contains indicative benchmark levels for use in the assessment of potential impacts from regulated facilities.

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 average recorded in the year. 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**.

Table 1 - Odour Benchmark Levels

Relative Offensiveness of Odour	Benchmark Level as 98 th %ile of 1-hour Means (ou _E /m ³)
Most offensive odours: • Process involving decaying animal or fish • Process involving septic effluent or sludge • Biological landfill odours	1.5

⁴ H4: Odour Management, EA, 2011.

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

2.4.3 Odour emissions from the Proposed Development would be classified as 'moderately offensive' in accordance with the EA criteria specified in **Table 1**. As such, an assessment criterion of 3.0ou_E/m³ 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, Department for Environment, Food and Rural Affairs (DEFRA) have provided the following descriptors⁵:

- 1ou_E/m³ is the point of detection;
- 3ou_E/m³ is a faint odour; and,
- 10ou_E/m³ is a distinct odour.

2.4.5 An odour at a strength of 1ou_E/m³ 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 population⁶). It is important to note that these values are based on laboratory measurements and in the general environment other factors affect our senses 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 as those from traffic, vegetation, grass mowing etc, can provide background odour concentrations from 5 to 60ou_E/m³ or more⁷;
- The recognition threshold may be about 3ou_E/m³⁸, 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 Framework⁹ (NPPF) was published in December 2024 and amended in February 2025. The document sets out the Government's planning policies for England and how these are expected to be applied.

⁵ Odour Guidance for Local Authorities, DEFRA, 2010.

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, 2024.

- 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 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."

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

2.6 Local Planning Policy

- 2.6.1 The Core Strategy 2016-2028¹⁰ is a key document in the Rochdale Local Plan and was adopted by Rochdale Borough Council (RBC) in October 2016. It sets out the strategic planning framework for the borough's future development needs up to 2028. Review of the document indicated the following policies of relevance to the assessment:

"G9 - Reducing the impact of pollution, contamination and land instability

We will reduce all forms of pollution, contamination and land instability in the borough, by:

[...]

b. Requiring that development does not have impacts that lead to an unacceptable increase in air, water, noise, light or other pollution;

[...]

g. Using planning conditions or obligations to control pollution from new development, or the impact of pollution on new development."

"DM1 - General development requirements

All development proposals, including changes of use of land and buildings, extensions and alterations, will be expected to demonstrate that they:

[...]

d. Mitigate against any impacts due to noise, air, dust, light and odour pollution, traffic generation or inadequate access, where such mitigation is identified as being necessary;

[...]"

- 2.6.2 The above policies were taken into consideration throughout the undertaking of the assessment.

- 2.6.3 The Places for Everyone Plan (PfEP)¹¹ was produced by the Greater Manchester Combined Authority (GMCA) and was adopted by RBC on 21st March 2024. Review of the PfEP was undertaken. No policies of relevance were identified for use in this assessment.

¹⁰ Rochdale Adopted Core Strategy, RBC, 2016.

¹¹ PfEP, GMCA, 2024.

2.7 Institute of Air Quality Management Guidance

- 2.7.1 The IAQM published the 'Guidance on the Assessment of Odour for Planning'¹² document on 20th May 2014. This was updated in 2018 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 throughout this report where relevant.

¹² Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

3.0 Methodology

3.1 Introduction

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

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

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

3.2 Odour Sources

3.2.1 Potential odour sources were identified from the proposed Site layout and information provided by the Applicant. These are summarised in **Table 2**.

Table 2 - Odour Emission Sources

Source	Source Description	Emission Characteristics
Cattle shed	Naturally ventilated building to house beef cattle	Fugitive emissions from the building
FYM field heap	FYM heap to store manure from the cattle shed	Diffuse emissions from the FYM heap

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

3.3 Odour Emission Rates

3.3.1 Estimates of odour emissions rates for the sources in **Table 2** were identified for use in the assessment based on monitoring results reported for similar operations. These are summarised in **Table 3**.

Table 3 - Odour Emission Rates

Source	Odour Emission Rate	Unit	Reference
Cattle shed	12.0	ouE/s/livestock unit (LU) ^(a)	Vereins Deutscher Ingenieure ^(b)
FYM field heap	0.8	ouE/m ² /s	Odournet UK Ltd ^(c)

Note: (a) One LU equal to 500kg live weight.

(b) VDI 3894 Part 2, Emissions and their Impact from Livestock Operations. Method to Determine the Separation Distance for Odour; Vereins Deutscher Ingenieure, 2012.

(c) Odour Impact Assessment for a proposed Biomass AD Facility near Kenninghall, Norfolk, produced by Odournet UK Ltd, 2010.

3.4 Dispersion Modelling

- 3.4.1 Dispersion modelling was undertaken using ADMS-6 (v.0.2.5), which is development 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.
- 3.4.2 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 emission rates;
 - Terrain information;
 - Meteorological data;
 - Roughness length (z_0); and,
 - Monin-Obukhov length.
- 3.4.4 These are detailed in the following Sections.

Modelling Scenarios

- 3.4.5 The scenarios considered in the modelling are summarised in **Table 4**.

Table 4 - Modelling Scenarios

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

Process Conditions

- 3.4.6 The data shown in **Table 3** was utilised with additional information provided by the Applicant to define emissions within the dispersion model. The relevant inputs are summarised in the following Sections.

Cattle Housing

- 3.4.7 Releases from the proposed cattle shed were represented by a single volume source within the model. The odour release rate per tonne of live weight is 12.0ou_E/s. The maximum weight of the cattle to be housed within the shed will be 600kg. As such, the emission rate was factored in order to derive the correct values for use in the assessment. The results are summarised in **Table 5**.

Table 5 - Factored Odour Emission Data

Parameter	Unit	Value
Emission rate	ou _E /s/per animal	14.4

- 3.4.8 The total odour emission rate for the cattle shed was calculated by multiplying the number of housed cattle by the relevant value shown in **Table 5**. The results are summarised in **Table 6**.

Table 6 - Total Odour Emission Rates - Cattle Shed

Parameter	Unit	Value
Number of animals	-	180
Factored odour emission rate	ou _E /s/per animal	14.4
Total odour emission rate	ou _E /s	2,592

3.4.9 The total odour emission rate shown in **Table 6** was divided by the building volume in order to derive the volume specific release for input into the model. The results are summarised in **Table 7**, along with the other relevant modelling parameters.

Table 7 - Model Inputs - Cattle Shed

Parameter	Unit	Value
Source depth	m	7.66
Total building volume	m ³	6,623.8
Volume specific emission rate	ou _E /m ³ /s	0.391

3.4.10 The cattle shed will be utilised all year around. As such, emissions were assumed to be constant, 24-hours per day, 365-days per year.

Manure Storage Emissions

3.4.11 Releases from the FYM field heap were represented by a single area source within the model. A summary of the input parameters is provided in **Table 8**.

Table 8 - Model Inputs - FYM Field Heap

Parameter	Unit	Value
Source height	m	1.0
Source area	m ²	149.4
Emission rate	ou _E /m ² /s	0.8

3.4.12 Manure is expected to be stored over the wet period before being spread to land when weather conditions are appropriate. However, releases were assumed to be constant, 24-hours per day, 365-days per year in order to provide a worst-case representation of emissions.

Assessment Area

3.4.13 The assessment area was defined based on the Proposed Development location, anticipated pollutant dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 393233, 414827 to 394733, 416327. 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.

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

3.4.15 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 on the spectrum between high and low sensitivity a receptor lies, taking into account the principles summarised in **Table 9**.

Table 9 - Odour Receptor Sensitivity

Sensitivity	Description
High	Surrounding land where: • Users can reasonably expect enjoyment of a high level of amenity; or, • 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 dwelling, 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/industrial premisses and playing/recreation fields
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, farm, footpaths and roads

3.4.16 The identified sensitive receptors and associated sensitivity are summarised in **Table 10**.

Table 10 - Sensitive Receptor Locations

Receptor		Sensitivity	NGR (m)	
			x	y
R1	Residential - Higher Lakewood	High	393856	415453
R2	Residential - Higher Lakewood	High	393827	415481
R3	Residential - Hollingworth Road	High	393683	415419
R4	Residential - Brown Brow Hill	High	393387	415412
R5	Residential - Hollingworth Road	High	393546	415708
R6	Residential - Hollingworth Road	High	393529	415792

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

R7	Residential - Unnamed Road	High	393695	415862
R8	Residential - Hollingworth Road	High	393645	415988
R9	Residential - Hollingworth Road	High	393715	416047
R10	Residential - Inghams Lane	High	393835	416113
R11	Residential - Ealees Brook	High	394256	416197
R12	Residential - Owlett Mews	High	394508	415937
R13	Residential - The Farm House	High	394694	415556
R14	Residential - Brearley	High	394573	415339
R15	Residential - Rakewood Road	High	394099	415041
R16	Residential - Rakewood Road	High	393984	415303

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

Terrian Data

3.4.18 Ordnance Survey OS Terrian 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 method suggested by CERC¹⁴.

Meteorological Data

3.4.19 Meteorological data used in the assessment was taken from Bingley meteorological station over the period of 1st January 2019 to 31st December 2023 (inclusive). Bingley meteorological station is located at NGR: 408874, 435015, which is approximately 24.4km north-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.

3.4.20 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 Appendix C for wind roses of the utilised meteorological records.

Roughness Length

3.4.21 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 and meteorological site. This value is considered appropriate for the morphology of both areas and is suggested within ADMS-6 as being suitable for 'agricultural areas (max)'.

Monin-Obukhov Length

3.4.22 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 and meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-6 as being suitable for 'rural areas'.

Modelling Uncertainty

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

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

- 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.

3.4.24 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 site-specific meteorological data sets 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. Terrian data was included and processed using the method outlined by CERC;
- Emissions rates - The emission rates were derived from monitoring conducted at similar facilities. As such, they are considered to be representative of potential releases during normal operation;
- Process conditions - Operational parameters were provided by the Applicant to describe operations at the Site. As such, these are considered to be representative of anticipated operating conditions;
- 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.

3.4.25 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 guidance¹⁵. The relevant assessment matrix is summarised in **Table 11**.

Table 11 - Odour Impact

Odour Exposure Level as 98 th %ile of 1-hour Means (ouE/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

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

0.5 - 1.5	Negligible	Negligible	Negligible
Less than 0.5	Negligible	Negligible	Negligible

3.5.2 The IAQM guidance¹⁶ 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 effect 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 **not significant**. This has been considered to determine the overall significance of potential odour effects associated with the Proposed Development.

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 12**. 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 12 - Predicted Odour Concentrations

Receptor		Predicted 98 th %ile 1-hour Mean Odour Concentration (ou _E /m ³)				
		2019	2020	2021	2022	2023
R1	Residential - Higher Lakewood	0.55	0.63	0.77	0.72	0.68
R2	Residential - Higher Lakewood	0.67	0.67	0.96	0.67	0.92
R3	Residential - Hollingworth Road	0.27	0.29	0.45	0.27	0.42
R4	Residential - Brown Brow Hill	0.05	0.06	0.08	0.05	0.09
R5	Residential - Hollingworth Road	0.19	0.15	0.17	0.17	0.23
R6	Residential - Hollingworth Road	0.20	0.14	0.15	0.18	0.20
R7	Residential - Unnamed Road	0.23	0.10	0.12	0.18	0.14
R8	Residential - Hollingworth Road	0.20	0.08	0.10	0.15	0.11
R9	Residential - Hollingworth Road	0.16	0.07	0.07	0.10	0.09
R10	Residential - Inghams Lane	0.12	0.07	0.06	0.11	0.10
R11	Residential - Ealees Brook	0.18	0.09	0.14	0.12	0.14
R12	Residential - Owlett Mews	0.09	0.05	0.08	0.08	0.10
R13	Residential - The Farm House	0.19	0.24	0.24	0.26	0.24
R14	Residential - Brearley	0.25	0.20	0.32	0.30	0.25
R15	Residential - Rakewood Road	0.04	0.02	0.04	0.03	0.04
R16	Residential - Rakewood Road	0.14	0.11	0.16	0.15	0.18

- 4.1.2 As indicated in **Table 12**, predicted odour concentrations were below the odour benchmark of 3.0ou_E/m³ at all receptor locations for all modelling years.
- 4.1.3 Reference should be made to Figure 4 to Figure 8 for graphical representation 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 13**.

Table 13 - Predicted Odour Impacts

Receptor		Odour Exposure Level as 98 th %ile of 1-hour mean (ou_E/m^3)	Receptor Sensitivity	Significance of Impact
R1	Residential - Higher Lakewood	0.5 - 1.5	High	Negligible
R2	Residential - Higher Lakewood	0.5 - 1.5	High	Negligible
R3	Residential - Hollingworth Road	Less than 0.5	High	Negligible
R4	Residential - Brown Brow Hill	Less than 0.5	High	Negligible
R5	Residential - Hollingworth Road	Less than 0.5	High	Negligible
R6	Residential - Hollingworth Road	Less than 0.5	High	Negligible
R7	Residential - Unnamed Road	Less than 0.5	High	Negligible
R8	Residential - Hollingworth Road	Less than 0.5	High	Negligible
R9	Residential - Hollingworth Road	Less than 0.5	High	Negligible
R10	Residential - Inghams Lane	Less than 0.5	High	Negligible
R11	Residential - Ealees Brook	Less than 0.5	High	Negligible
R12	Residential - Owlett Mews	Less than 0.5	High	Negligible
R13	Residential - The Farm House	Less than 0.5	High	Negligible
R14	Residential - Brearley	Less than 0.5	High	Negligible
R15	Residential - Rakewood Road	Less than 0.5	High	Negligible
R16	Residential - Rakewood Road	Less than 0.5	High	Negligible

4.2.2 As indicated in **Table 13**, the significance of odour impacts as a result of the Proposed Development was predicted to be **negligible** at all receptor locations.

4.2.3 The IAQM guidance¹⁷ states that only if the impact is greater than **slight**, the effect is considered **significant**. As such, impacts are considered to be **not significant**, in accordance with the stated methodology.

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

5.0 Conclusions

- 5.1.1 Lucion was commissioned to provide an Odour Assessment in support of a new naturally ventilated cattle shed on land at Cleggswood Farm, Littleborough.
- 5.1.2 The Proposed Development has the potential to result in odour emissions and associated impacts at sensitive locations. As such, an Odour Assessment has been undertaken to quantify effects in the vicinity of the Site.
- 5.1.3 Potential odour releases were defined based on the size and nature of the Proposed Development. These were represented within a dispersion model produced using ADMS-6. 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 odour benchmark at all receptor locations for all modelling years. The significance of predicted impacts was defined as **negligible** at all 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 are not considered to represent a constraint to planning consent for the Proposed Development.

Figure 1 – Site Location Plan

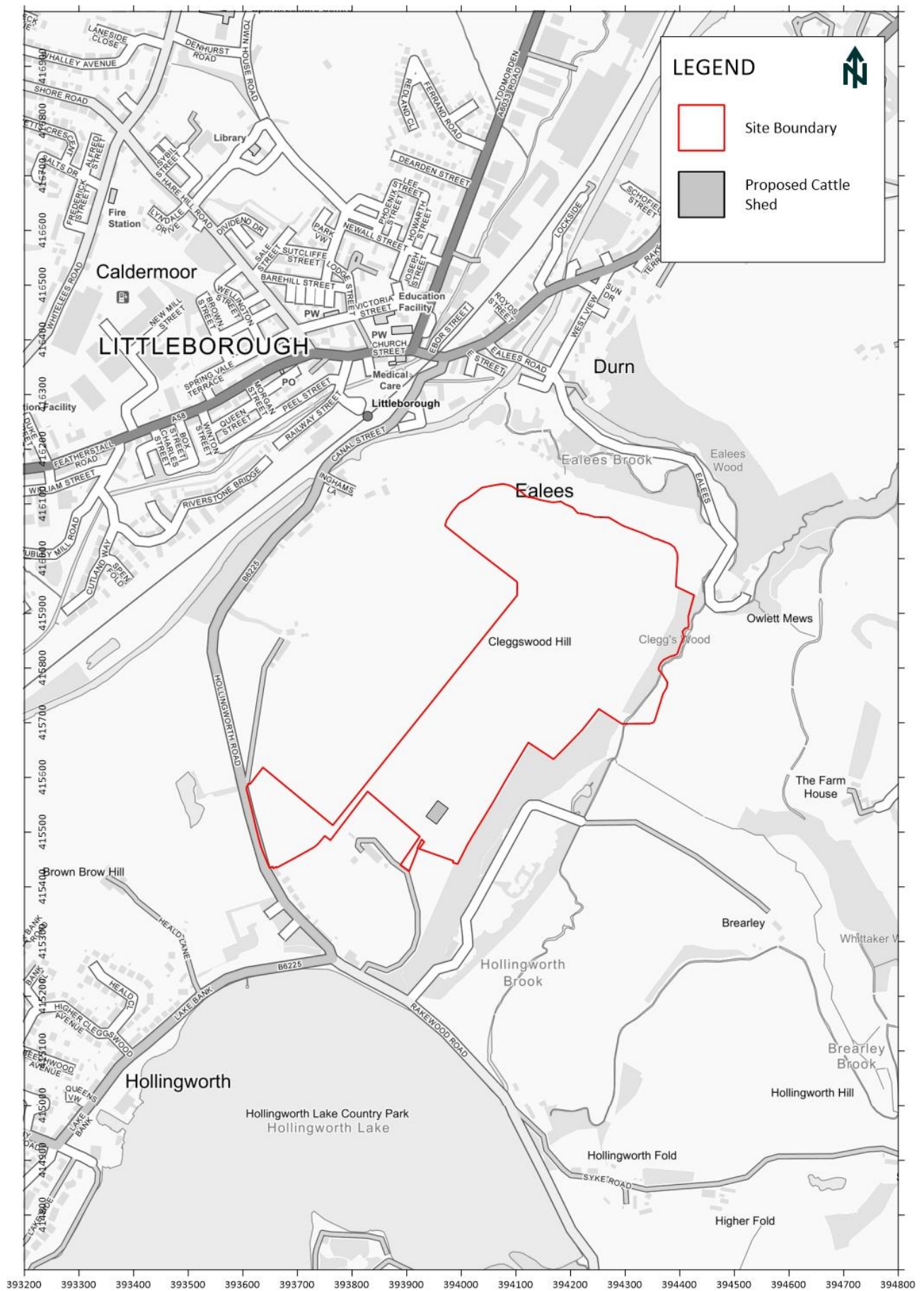


Figure 2 – ADMS-6 Inputs

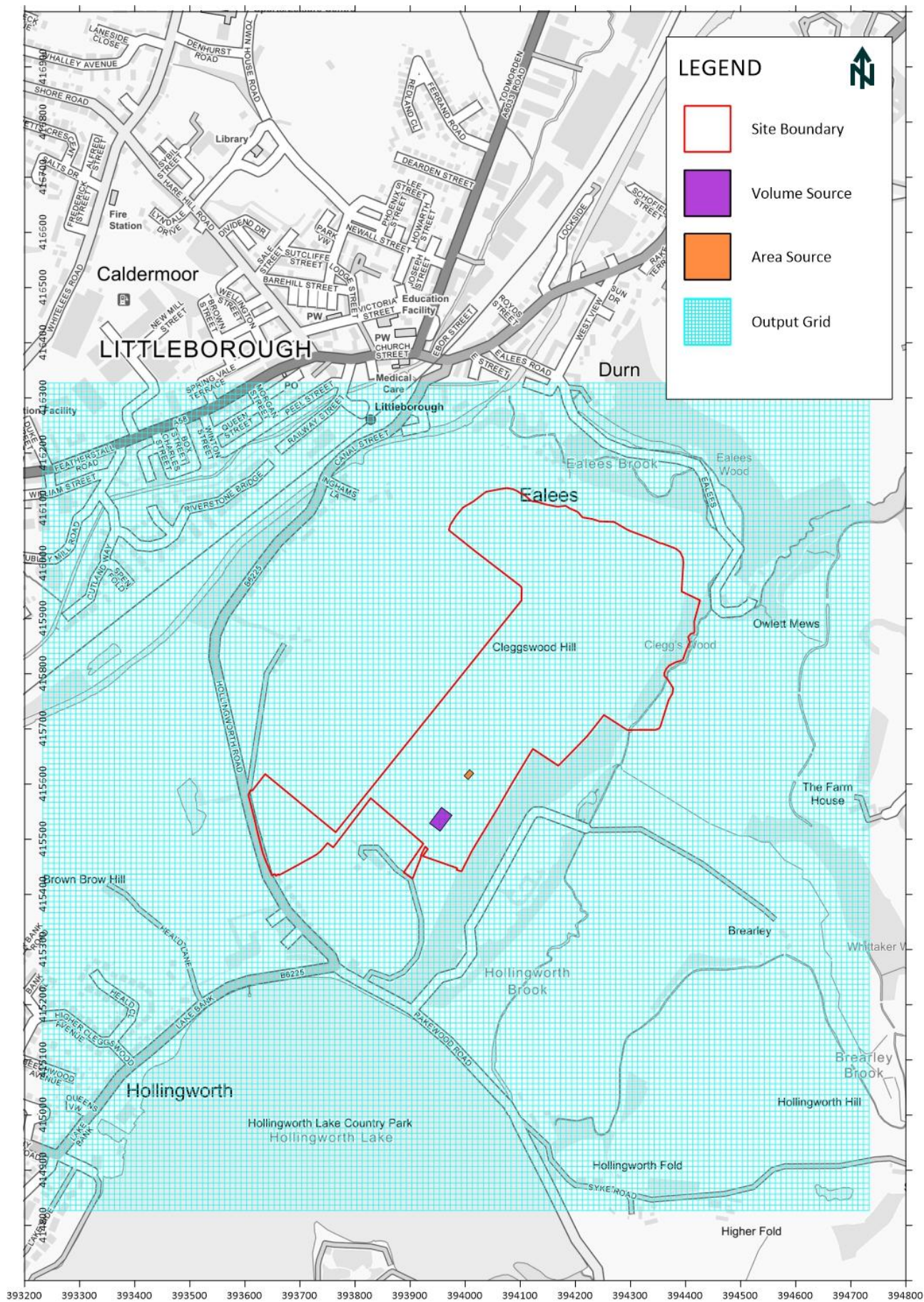
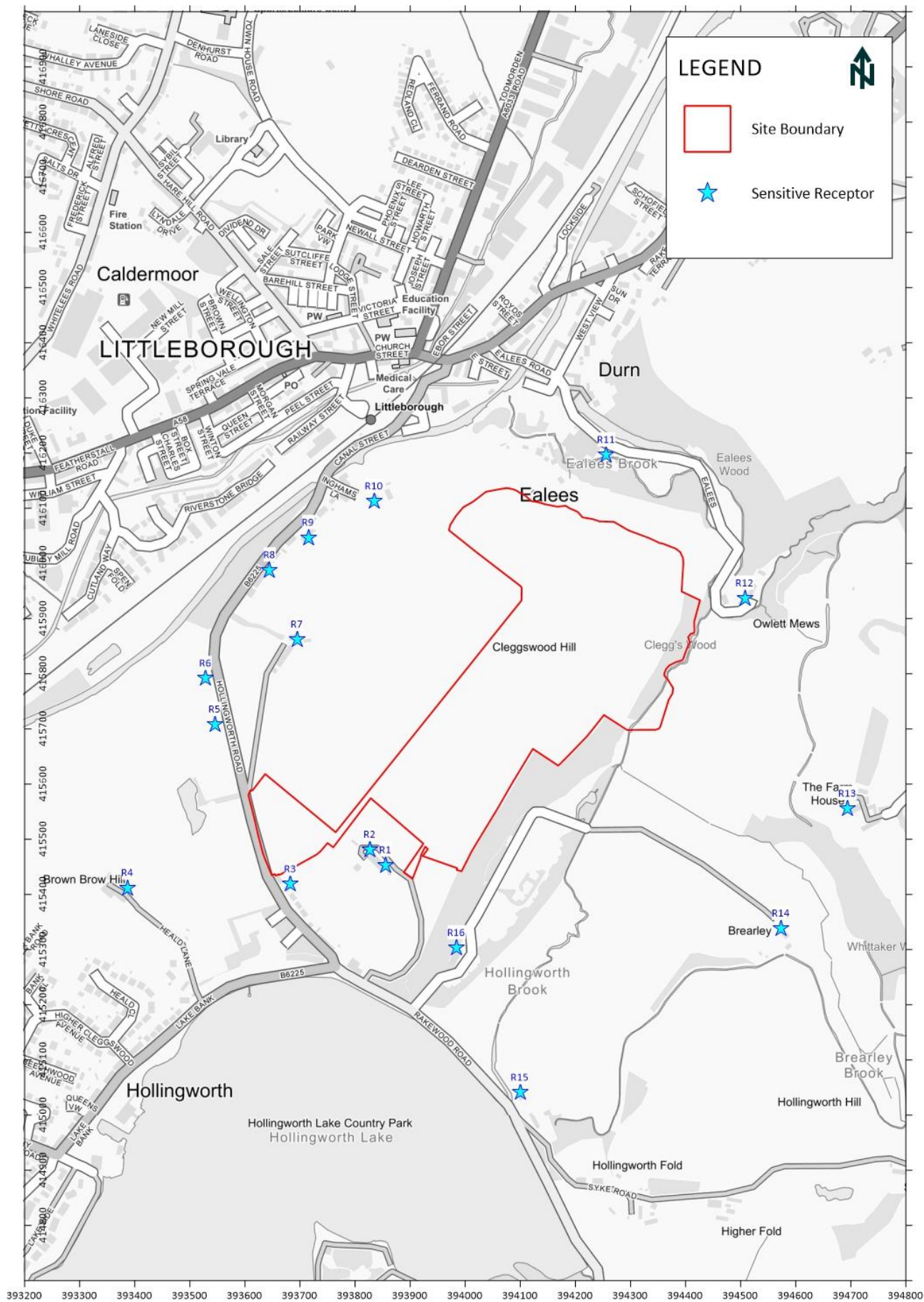
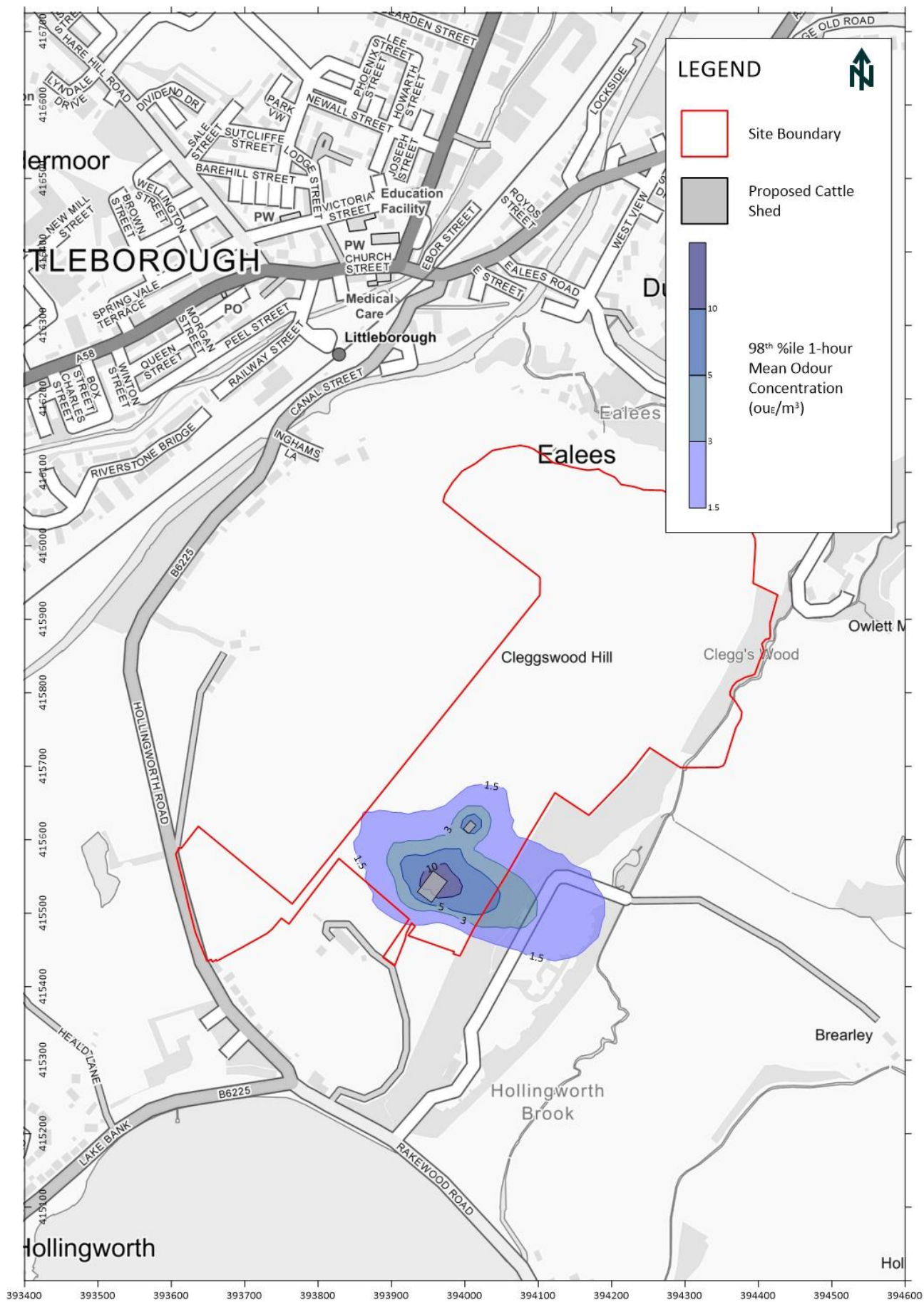


Figure 3 – Sensitive Receptor Locations

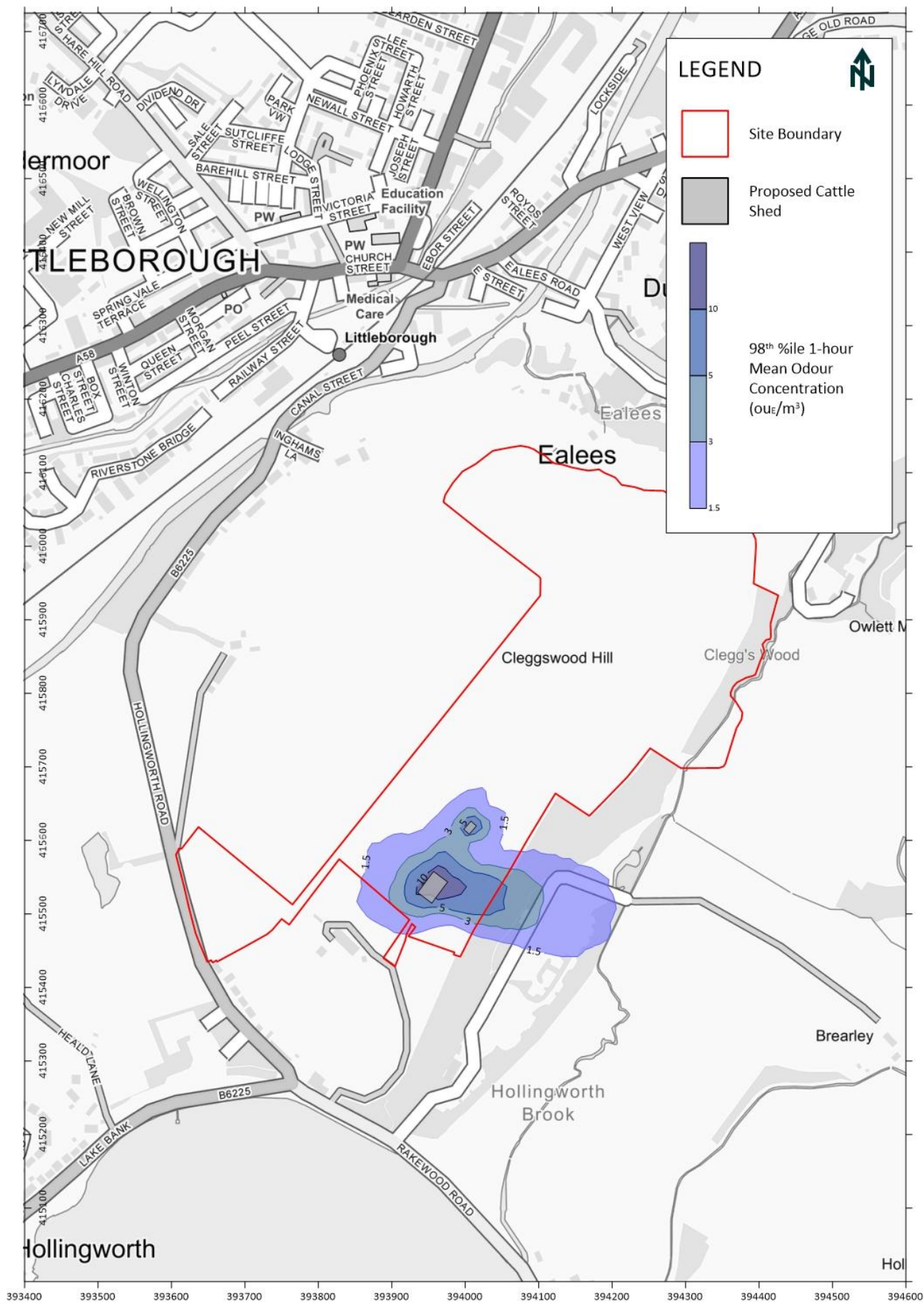


**Figure 4 – Predicted 98th %ile 1-hour Mean Odour
Concentrations (ou_E/m³) 2019 Meteorological Data**

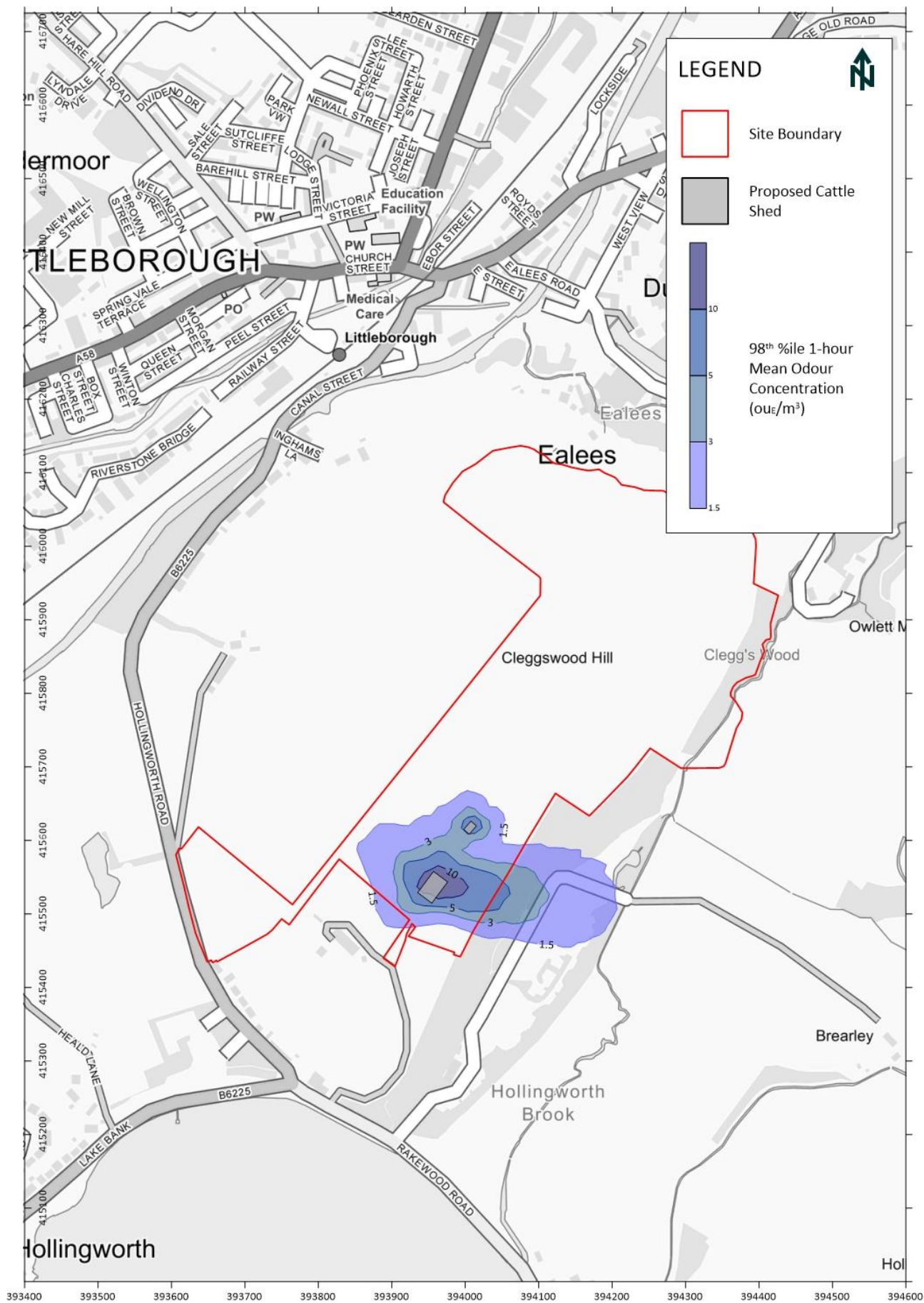


**Figure 5 – Predicted 98th %ile 1-hour Mean Odour
Concentrations (ou_E/m³) 2020 Meteorological Data**

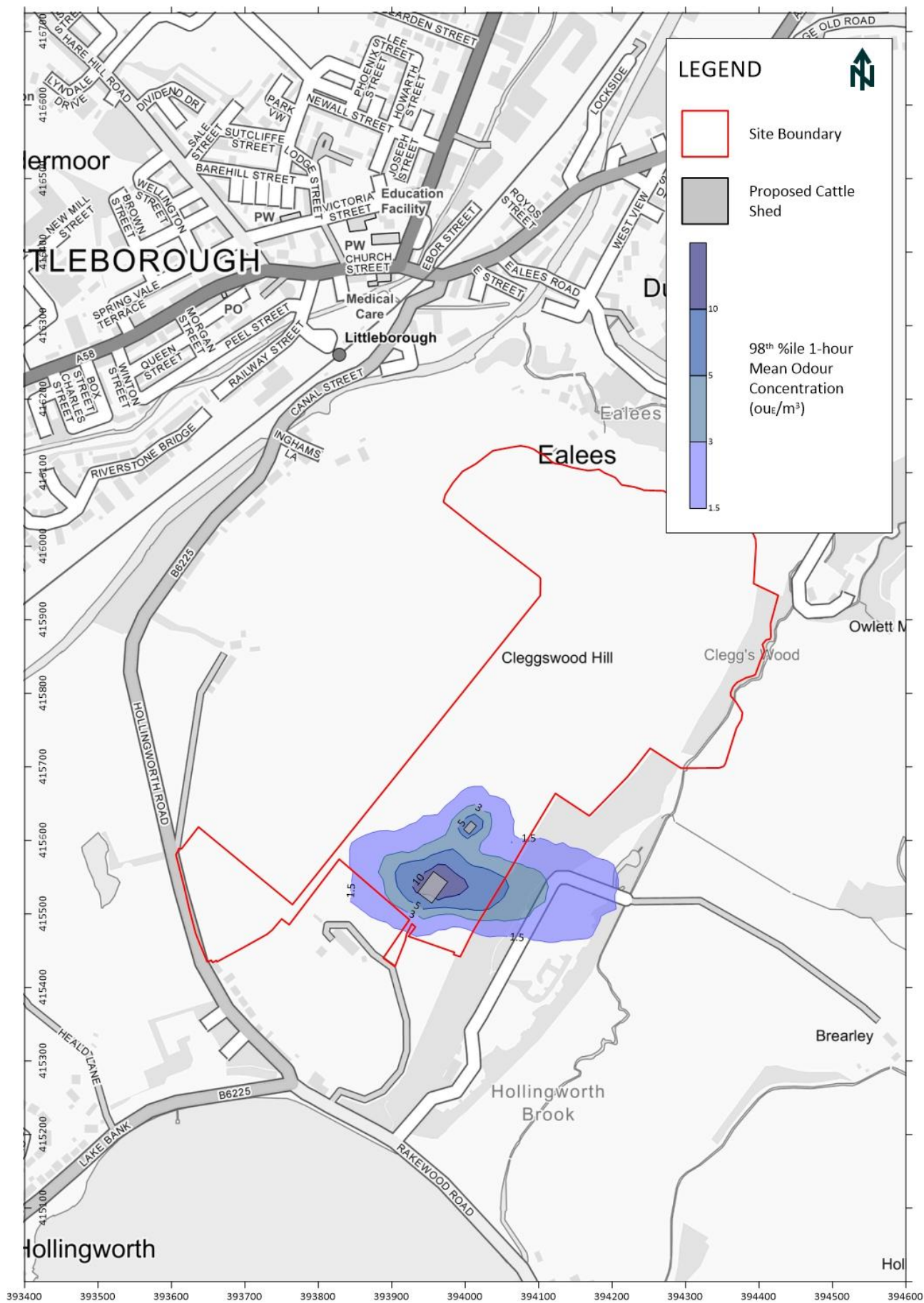
**Figure 6 – Predicted 98th %ile 1-hour Mean Odour
Concentrations (ou_E/m³) 2021 Meteorological Data**



**Figure 7 – Predicted 98th %ile 1-hour Mean Odour
Concentrations (ou_E/m³) 2022 Meteorological Data**



**Figure 8 – Predicted 98th %ile 1-hour Mean Odour
Concentrations (ou_E/m³) 2023 Meteorological Data**



Appendix A - Limitations

Limitations

The recommendations contained in this Report represent Lucion's professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Lucion does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Lucion obtained, reviewed and evaluated information in preparing this Report from the Client and others. Lucion's conclusions, opinions and recommendations has been determined using this information. Lucion does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Lucion has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

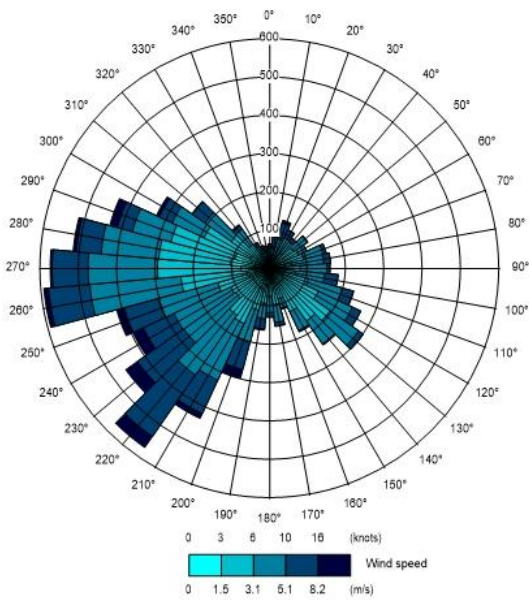
This Report was prepared by Lucion for the sole and exclusive use of the Client and for the specific purpose for which Lucion was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Lucion and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Lucion does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Lucion from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.

Appendix B - Glossary

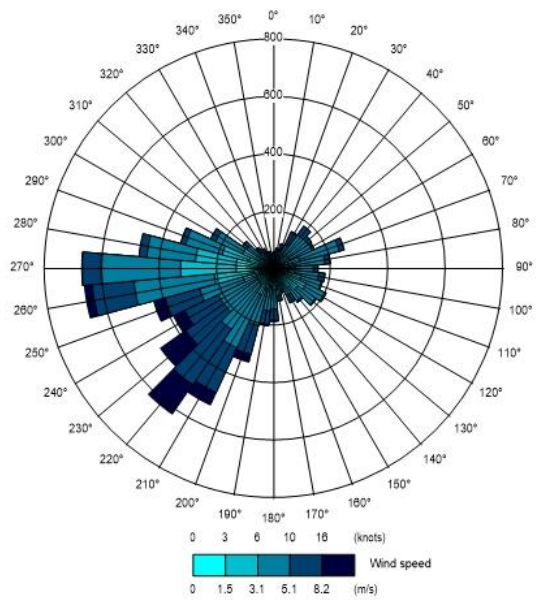
Glossary

Term	Definition
BPM	Best Practicable Means
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
FYM	Farmyard Manure
GMCA	Greater Manchester Combined Authorities
IAQM	Institute of Air Quality Management
LU	Livestock Unit
NGR	National Grid Reference
NPPF	National Planning Policy Framework
OU _E	European Odour Units
PfEP	Places for Everyone Plan
RBC	Rochdale Borough Council
z ₀	Roughness Length
%ile	Percentile

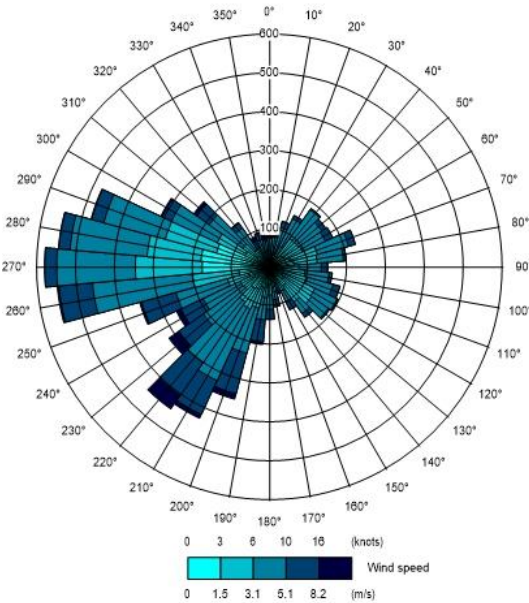
Appendix C - Wind Roses of Bingley 2019 - 2023 Meteorological Data



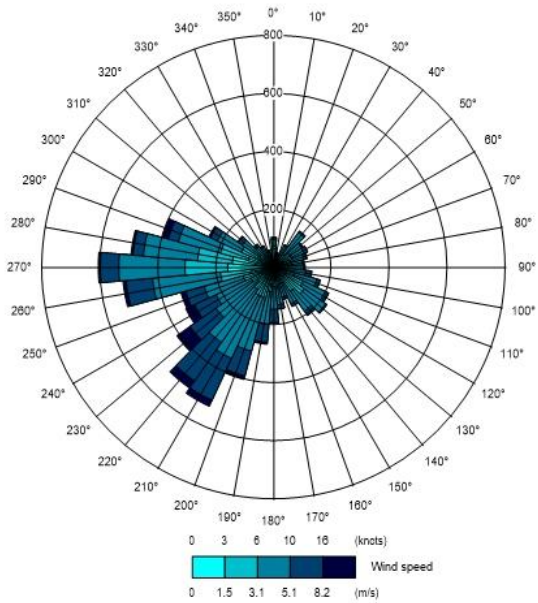
2019 Meteorological Data



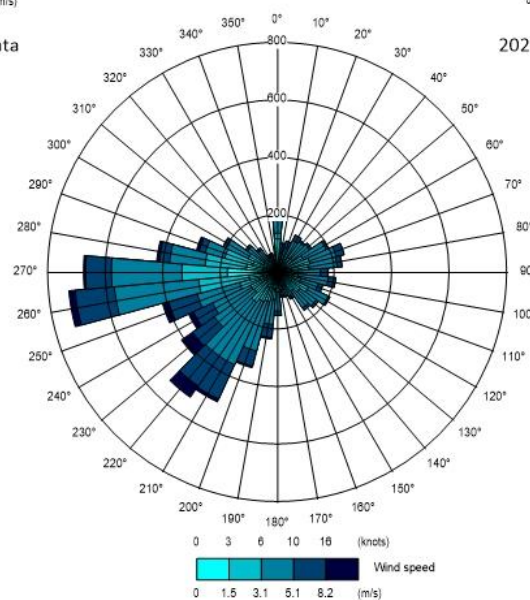
2020 Meteorological Data



2021 Meteorological Data



2022 Meteorological Data



2023 Meteorological Data