Odour Assessment

Taw Valley Creamery

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Executive Summary

Redmore Environmental Ltd was commissioned by EHS Projects Ltd to undertake an Odour Assessment in support of an Environmental Permit Variation Application for the Arla Taw Valley Creamery in North Tawton, Devon.

An Environmental Permit Variation Application is being made to the Environment Agency in order to authorise a number of changes to operations and infrastructure at the site. These include the addition of a new mozzarella manufacturing line and the installation of a replacement Wastewater Treatment Plant.

The proposed changes have the potential to alter the odour emission profile of the facility and result in impacts at sensitive locations in the vicinity of the site. An Odour Assessment was therefore undertaken to evaulate effects and identify the requirement for any additional mitigation to control impacts to an acceptable level.

An initial Screening Assessment was undertaken to identify potentially significant odour sources at the site. This indicated the risk of impacts as a result of releases from a number of emission points was not significant. Any releases that could not be screened from the assessment were considered further through dispersion modelling.

Potential odour releases from the relevant sources were defined based on the size and nature of the operations. Impacts at sensitive receptors were quantified using dispersion modelling and the results compared with the relevant odour benchmark level.

The results indicated that predicted odour concentrations were below the relevant benchmark level at all sensitive locations in the vicinity of the site for all modelling years. As such, potential odour emissions from the facility are not considered to be significant.

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by EHS Projects Ltd to undertake an Odour Assessment in support of an Environmental Permit Variation Application for the Arla Taw Valley Creamery in North Tawton, Devon.

1.1.2 Odours from a number of existing and future sources on site have the potential to cause impacts at sensitive locations. An Odour Assessment was therefore undertaken to consider effects in the vicinity of the site.

1.2 Site Location and Context

1.2.1 The Arla facility is located on land at North Tawton, Okehampton, Devon, at National Grid Reference (NGR): 265340, 101430. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The facility currently operates under an Environmental Permit (EPR/NP3638NN/V005) issued by the Environment Agency (EA). This authorises the following activities as specified under Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2016:

- Section 6.8 Part A1 (e): Treating and processing milk with the quantity of milk received being more than 200 tonnes per day (average value on annual basis); and,
- Section 5.4 Part A1 (a) (i): Biological treatment of non-hazardous wastewater.

1.2.3 An Environmental Permit Variation Application is being made to the EA in order to authorise a number of changes to operations and infrastructure at the site. These include the addition of a new mozzarella manufacturing line and the installation of a replacement Wastewater Treatment Plant (WwTP).

1.2.4 The proposed changes have the potential to alter the odour emission profile of the facility and result in impacts at sensitive locations in the vicinity of the site. An Odour Assessment has therefore been undertaken to evaulate effects and identify the requirement for any

additional mitigation to control impacts to an acceptable level. This is detailed in the following report.

2.0 ODOUR BACKGROUND

2.1 Odour Definition

2.1.1 The Department for Environment, Food and Rural Affairs (DEFRA) guidance[1] defines odour as follows:

> "An odour is the organoleptic attribute perceptible by the olfactory organ on sniffing certain volatile substances. It is a property of odorous substances that make them perceptible to our sense of smell. The term odour refers to the stimuli from a chemical compound that is volatilised in air. Odour is our perception of that sensation and we interpret what the odour means. Odours may be perceived as pleasant or unpleasant. The main concern with odour is its ability to cause a response in individuals that is considered to be objectionable or offensive.
>
> Odours have the potential to trigger strong reactions for good reason. Pleasant odours can provide enjoyment and prompt responses such as those associated with appetite. Equally, unpleasant odours can be useful indicators to protect us from harm such as the ingestion of rotten food. These protective mechanisms are learnt throughout our lives. Whilst there is often agreement about what constitutes pleasant and unpleasant odours, there is a wide variation between individuals as to what is deemed unacceptable and what affects our quality of life."

2.1.2 Although it is recognised that the DEFRA guidance[2] has been formally withdrawn, the definition of odour provided within the document is still considered to be relevant in the context of the 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 **FIDOR** acronym is a useful reminder of the factors that will determine the degree of odour pollution:

[1] Odour Guidance for Local Authorities, DEFRA, 2010.

[2] Odour Guidance for Local Authorities, DEFRA, 2010.

- **F**requency of detection - frequent odour incidents are more likely to result in complaints;
- **I**ntensity as perceived - intense odour incidents are more likely to result in complaints;
- **D**uration of exposure - prolonged exposure is more likely to result in complaints;
- **O**ffensiveness - more offensive odours have a higher risk of resulting in complaints; and,
- **R**eceptor sensitivity - sensitive areas are more likely to have a lower odour tolerance.

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 **FIDOR** factors can be further considered to provide the following in regards 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 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 industrial activities is the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments. If a process is deemed potentially odorous then the relevant regulator will usually include an appropriate condition in the site's Environmental Permit to restrict impacts beyond the facility boundary.

2.3.2 Enforcement of the condition is by the relevant regulator, either the EA for Part A(1) processes, or the Local Authority for Part A(2) and B processes. If the regulator is satisfied that odour from a facility is causing pollution beyond the site boundary, then they can serve an improvement notice that requires remedial works to be undertaken to reduce impacts to an acceptable level. The measures that are deemed appropriate will depend on the industry sector and site-specific circumstances and will take costs and benefits into account. Should appropriate actions not be taken by the operator then the regulator has a number of available options, cumulating in the revocation of the Environmental Permit and cessation of all activities on site.

2.3.3 As previously stated, the Arla facility operates under an Environmental Permit (EPR/NP3638NN/V005) issued by the EA. This includes the following condition in relation to odour:

> "3.3 Odour
>
> 3.3.1 Emissions from activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour.
>
> The operator shall:
>
> (a) If notified by the Environment Agency that the activities are giving rise to pollution outside the site due to odour, submit to the Environment Agency for approval within the period specified an odour management plan which identifies and minimise the risk of pollution from odour;
>
> (b) Implement the approved odour management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency."

2.3.4 The existing facility does not have a significant complaints history, and no regulatory action has been undertaken by the EA to date in relation to odour pollution from the site. In addition, a recent review of the Environmental Permit for the facility by the EA as part of a Regulation 61 Notice, concluded that an Odour Management Plan (OMP) is not

required for the site as there has been no substantiated odour nuisance as a result of the operations.

2.3.5 Notwithstanding the findings of the EA review, an OMP has been prepared in support of the Environmental Permit Variation Application in order to formalise the measures that will be undertaken during future operation of the facility to ensure that odour emissions are minimised, and impacts are effectively controlled. Reference should be made be made to Redmore Environmental report 3558-3r1 for a copy of the OMP.

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[3] which contains indicative benchmark levels for use in the assessment of potential impacts from industrial 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 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 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

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

Relative Offensiveness of Odour	Benchmark Level as 98th %ile of 1-hour Means (ou_E/m^3)
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 Existing and proposed activities at the facility do not include processes involving decaying animal or fish, septic effluent or sludge or biological landfill odours. As such, potential odours would be classified as 'moderately offensive' in accordance with EA H4 guidance[4].

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 $5ou_E/m^3$ as 98th %ile of 1-hour means, complaints are relatively rare, at only 3% of the total registered;
- At modelled exposures between $5ou_E/m^3$ and $10ou_E/m^3$ 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 $10ou_E/m^3$ as a 98th %ile of 1-hour means, 59% of the total.

4 H4: Odour Management, EA, 2011.

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

Department for Environment, Food and Rural Affairs

2.4.6 In order to provide some context to the odour benchmark values, 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.

2.4.7 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:

5 Odour Guidance for Local Authorities, DEFRA, 2010.

6 Odour Guidance for Local Authorities, DEFRA, 2010.

- 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.

7 Odour Guidance for Local Authorities, DEFRA, 2010.

8 Odour Guidance for Local Authorities, DEFRA, 2010.

3.0 METHODOLOGY

3.1 Introduction

3.1.1 The facility may result in odour emissions during normal operation. These were assessed in accordance with the following stages:

- Identification of odour sources;
- Screening of odour emissions;
- 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 Potential odour sources associated with current site operations, as well as those proposed under the Environmental Permit Variation, were identified through a visit to the facility on 30th September 2025 and discussions with Arla. A summary of the identified odour sources is provided in Table 3.

Table 3 Odour Sources

Source		Emission Point ID	Source Description	Emission Type
1	Boiler No. 1	A2	Stack serving 10.9MW_{th} natural gas fired boiler	Continuous point source emissions
2	Boiler No. 2	A3	Stack serving 11.3MW_{th} natural gas fired boiler	Continuous point source emissions
3	Baghouse fan outlet	A4	Vent serving the baghouse filter	Continuous point source emissions
4	Receiving baghouse Vent	A5	Vent serving the baghouse filter	Continuous point source emissions
5	Cooling Crystallisation Concentrator (CCC) exhaust	A6	Exhaust vent serving the CCC process	Continuous point source emissions
6	Combined Heat and Power (CHP) unit stack	A7	Stack serving natural gas fired CHP unit	Continuous point source emissions

Source		Emission Point ID	Source Description	Emission Type
7	Steam safety valves	A8	Emergency Pressure Release Valves (PRVs) serving processes across the site	Point source emissions during emergency events only
8	Clean In Place (CIP) tank vents	A9 to A21	Vents serving the CIP tanks installed across the site	Point source emitting once or twice during a 24-hour period
9	Condensate valves	A22 to A27	Vents serving condensate lines installed across the site	Point source emissions
10	Raw milk and whey silo vents	-	Vents serving the raw milk and whey silos which exhaust displaced air during filling	Point source emissions
11	Proposed WwTP	-	Open and closed effluent treatment processes and infrastructure	Point source and diffuse emissions
12	Ammonia refrigeration Plant	-	Ammonia-based cooling systems used in product storage and process cooling	Fugitive emissions as a result of any leaks
13	Chemical storage	-	Cleaning chemical whilst stored for use in the CIP systems	Fugitive emissions
14	Waste storage	-	Palletised and containerised general and food waste awaiting disposal	Fugitive emissions

3.3 Screening Assessment

3.3.1 An initial Screening Assessment was undertaken in order to consider the potential for impacts as a result of emissions from the sources identified in Table 3 and to determine the requirement for detailed consideration as part of dispersion modelling. This was completed with reference to EA guidance 'Risk Assessment for your Environmental Permit'[9] and included consideration of the following factors:

[9] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit#risks-from-your-specific-activity.

- Receptor - what is at risk? What do I wish to protect?
- Source - what is the agent or process with potential to cause harm?
- Harm - what are the harmful consequences if things go wrong?
- Pathway - how might the receptor come into contact with the source?
- Probability of exposure - how likely is this contact?
- Consequence - how severe will the consequences be if this occurs?
- Magnitude of risk - what is the overall magnitude of the risk?; and,
- Justification for magnitude - on what did I base my judgement?

3.3.2 Further explanation for the key assessment areas is provided below.

Receptor

3.3.3 The first step was to consider how the activity could harm the environment. This involved identifying receptors that may be affected and included people, property, and the natural and physical environment.

3.3.4 A desk-top study was undertaken in order to identify any receptor locations in the vicinity of the site that required specific consideration during the assessment. These are summarised in Table 4.

Table 4 Sensitive Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Culm Cross	265207.0	101530.3
R2	Residential - Culm Cross	265413.2	101550.6
R3	Residential - Week	265378.4	101702.1
R4	Residential - Week	265328.9	101795.5
R5	Residential - Fore Street	265656.5	101681.0
R6	Residential - Mill Lane	265695.2	101657.1

3.3.5 Reference should be made to Figure 2 for a map of the receptor locations.

Probability of Exposure

3.3.6 The probability of exposure was defined based on the likelihood of exposure of the specific receptor to the identified source. This depended on several factors, such as:

- Distance between source and receptor;
- Dispersion potential of emission;
- Duration of emission; and,

Harm

3.3.7 The severity of harm from a risk depends on:

- How much a person or part of the environment is exposed; and,
- How sensitive a person or part of the environment is.

3.3.8 Some parts of the environment can be very sensitive. For example, serious health effects can occur if humans are exposed to certain chemicals for only short periods of time.

Magnitude of Risk

3.3.9 The level of risk is a combination of:

- How likely a problem is to occur; and,
- How serious the harm might be.

3.3.10 Risk is highest where both the likelihood of a problem is high and the potential harm is severe. Risk is lowest where a problem is unlikely to occur and the harm that might result is not serious.

3.3.11 The risk assessment is provided in Table 5.

Table 5 Odour Screening Assessment

Data and Information				Control Measures	Judgement			
Receptor	**Source**	**Harm**	**Pathway**		**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**
Sensitive receptors, as identified in Table 4	Boiler No. 1 Boiler No. 2	Loss of amenity	Wind-blown emissions	The boiler stacks terminate to atmosphere at high level to ensure effective dilution and dispersion of emissions Complete combustion of natural gas does not typically result in significant odour emissions	**Very Low** due to the distance between the sources and the majority of receptors, the low odour potential and the dispersion arrangements	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact
Sensitive receptors, as identified in Table 4	Baghouse fan outlet	Loss of amenity	Wind-blown emissions	The bag house filter is used to control emissions associated with whey powder production. This stage of the process does not typically result in significant odour emissions due to the nature of the materials handled and the predominantly dry, non-volatile airstreams involved The filter outlet terminates to atmosphere at high level to promote effective dilution and dispersion of emissions	**Very Low** due to the distance between the sources and the majority of receptors, the low odour potential and the dispersion arrangements	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors and the low odour emission potential are considered to result in a **low** risk of impact

Data and Information				Control Measures	Judgement			
Receptor	**Source**	**Harm**	**Pathway**		**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**
Sensitive receptors, as identified in Table 4	Receiving baghouse vent	Loss of amenity	Wind-blown emissions	The bag house filter is used to control emissions associated with whey powder production. This process does not typically result in significant odour emissions due to the nature of the materials handled and the predominantly dry, non-volatile airstreams involved The filter outlet terminates to atmosphere at high level to promote effective dilution and dispersion of emissions	**Very Low** due to the distance between the sources and the majority of receptors, the low odour potential and the dispersion arrangements	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact
Sensitive receptors, as identified in Table 4	CCC exhaust	Loss of amenity	Wind-blown emissions	CCC system handles clean whey which has a low odour emission potential The outlet terminates to atmosphere at high level to promote effective dilution and dispersion of emissions	**Very Low** due to the distance between the sources and the majority of receptors, the low odour potential and the dispersion arrangements	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact

Data and Information				Control Measures	Judgement			
Receptor	**Source**	**Harm**	**Pathway**		**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**
Sensitive receptors, as identified in Table 4	CHP unit stack	Loss of amenity	Wind-blown emissions	The CHP unit stack terminates to atmosphere at high level to ensure effective dilution and dispersion of emissions Complete combustion of natural gas does not typically result in significant odour emissions	**Very Low** due to the distance between the sources and the majority of receptors, the low odour potential and the dispersion arrangements	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact
Sensitive receptors, as identified in Table 4	Steam safety valves	Loss of amenity	Wind-blown emissions	The steam safety valves are only used in emergency scenarios in order to prevent overpressure The valves discharge clean steam to atmosphere when operational	**Very Low** due to the distance between the source and the majority of receptors and the infrequent operation of the valves	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact

Data and Information				Control Measures	Judgement			
Receptor	**Source**	**Harm**	**Pathway**		**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**
Sensitive receptors, as identified in Table 4	CIP tank vents	Loss of amenity	Wind-blown emissions	Emissions from the CIP vents are likely to have a low odour potential as they consist primarily of steam and clean displaced air arising from non-organic cleaning solutions. The vents only operate once or twice every 24-hours	**Very Low** due to the distance between the sources and the majority of receptors, and the infrequent operation of the vents	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact
Sensitive receptors, as identified in Table 4	Condensate valves	Loss of amenity	Wind-blown emissions	Emissions from the condensate valves are likely to have a low odour potential as they are likely to consist primarily of clean steam, water vapour and small amounts amounts of non-condensable gases	**Very Low** due to the distance between the sources and the majority of receptors, and the low odour potential	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact

Data and Information				Control Measures	Judgement			
Receptor	**Source**	**Harm**	**Pathway**		**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**
Sensitive receptors, as identified in Table 4	Raw milk and whey silo vents	Loss of amenity	Wind-blown emissions	The raw milk and whey silos are temperature controlled to present degradation of materials and associated odour emissions Fresh milk and whey do not typically result in significant odour emissions	**Very Low** due to the distance between the sources and the majority of receptors, and the low odour potential	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact
Sensitive receptors, as identified in Table 4	Proposed WwTP	Loss of amenity	Wind-blown emissions	The proposed WwTP is fully automated and has been designed to ensure aerobic treatment of effluent Continuous monitoring of effluent characteristics will be undertaken to ensure compliance with regulatory standards process optimisation The WwTP will include a number of enclosed and open sources. These may have the potential to result in result in channelled and diffuse odour emissions	**Medium** due to the distance between the sources and the majority of receptors, the level of containment of sources and the odour emission potential	**Medium** if odour can be detected for extended periods	**Low** to **Medium**	The distance between sources at the WwTP and receptors, the source emission potential and the specified control measures are considered to result in a **low** to **medium** risk of impact

Data and Information				Control Measures	Judgement			
Receptor	**Source**	**Harm**	**Pathway**		**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**
Sensitive receptors, as identified in Table 4	Ammonia refrigeration plant	Loss of amenity	Wind-blown emissions	The ammonia cooling systems are enclosed and there are no emissions to atmosphere during normal operation The ammonia plant has alarm systems installed to detect any accidental leakages of refrigerant to atmosphere	**Low** during normal operation due to the distance between the sources and the majority of receptors, and the low odour potential as a result of containment of ammonia within the closed systems	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact
Sensitive receptors, as identified in Table 4	Chemical storage	Loss of amenity	Wind-blown emissions	All chemicals are stored in containers prior to use. The chemicals are delivered to the CIP systems via closed loops	**Very Low** due to the distance between the sources and receptors and containment of chemicals within the storage units and CIP systems	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact

Data and Information				Control Measures	Judgement			
Receptor	**Source**	**Harm**	**Pathway**		**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**
Sensitive receptors, as identified in Table 4	Waste storage	Loss of amenity	Wind-blown emissions	All waste materials are stored in covered skips and bins. Frequent removal of waste materials is undertaken to minimise storage time and the potential for odour emissions	**Low** due to the distance between the sources and the majority of receptors, and containment of waste materials during storage	**Medium** if odour can be detected for extended periods	**Low**	The distant nature of the majority of receptors, the low odour emission potential and the specified control measures are considered to result in a **low** risk of impact

3.3.12 As shown in Table 5, the Screening Assessment indicated that there is a low risk of impact as a result of emissions from the following sources:

- Boilers 1 and 2;
- The baghouse filters;
- The CCC exhaust;
- The CHP unit stack;
- The steam safety valves;
- The CIP tank vents;
- The condensate valves;
- The raw milk and whey silo vents;
- The ammonia refrigeration plant;
- Chemical storage; and,
- Waste storage.

3.3.13 The findings of the assessment are supported by the fact that the facility does not have a significant complaints history, and no regulatory action has been undertaken by the EA to date in relation to odour pollution from the site.

3.3.14 Based on the findings, emissions from the stated sources are not considered to be significant and have therefore not been considered further as part of the dispersion modelling.

3.3.15 The Screening Assessment indicated that there is a low to medium risk of impact as a result of emissions from the proposed WwTP. As such, potential releases and associated impacts at the sensitive receptor locations were considered further as part of the dispersion modelling.

3.3.16 As stated previously, an OMP has been prepared in support of the Environmental Permit Variation Application for the facility in order to formalise the measures that will be undertaken to ensure that emissions from all odour sources are minimised and impacts are effectively controlled. Reference should be made be made to Redmore Environmental report 3558-3r1 for a copy of the OMP.

3.4 Dispersion Modelling

3.4.1 Dispersion modelling was undertaken using ADMS-6.0 (v6.0.2.0), 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.

3.4.2 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;
- Pollutant emission 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.

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 Wastewater Treatment Plant Odour Sources

3.6.1 Potential odour sources at the proposed WwTP were identified based on information provided by Arla. These are summarised in Table 7.

Table 7 Odour Sources

Source		Source Description	Emission Characteristics
1	Inlet Screen	Open screening system	Diffuse emissions from exposed effluent and screened materials within the plant
2	Dissolved Air Flotation (DAF) unit	Closed DAF unit	Fugitive surface emissions from the DAF unit
3	Membrane Bioreactor (MBR) 1	Open MBR process tank	Diffuse emissions from exposed effluent within the open tank
4	MBR 2	Open MBR process tank	Diffuse emissions from exposed effluent within the open tank
5	MBR 3	Open MBR process tank	Diffuse emissions from exposed effluent within the open tank
6	Dewatered Sludge Trailer 1	Open dewatered sludge storage trailer	Diffuse emissions from exposed dewatered sludge within the trailer
7	Dewatered Sludge Trailer 2	Open dewatered sludge storage trailer	Diffuse emissions from exposed dewatered sludge within the trailer
8	Balance Tank	Closed balance tank	Point source emission from the atmospheric vent serving the tank during filling
9	Divert Tank	Closed divert tank	Point source emission from the atmospheric vent serving the tank during filling
10	Anoxic Tank	Open anoxic tank	Diffuse emissions from exposed effluent within the open tank

Source		Source Description	Emission Characteristics
11	Aeration Tank 1	Open aeration tank	Diffuse emissions from exposed effluent within the open tank
12	Aeration Tank 2	Open aeration tank	Diffuse emissions from exposed effluent within the open tank
13	MBR Permeate Tank	Open MBR tank	Point source emission from the atmospheric vent serving the tank during filling
14	Reverse Osmosis (RO) Permeate Tank	Closed RO permeate tank with atmospheric vent	Point source emission from the atmospheric vent serving the tank during filling
15	RO Feed Tank	Closed RO feed tank with atmospheric vent	Point source emission from the atmospheric vent serving the tank during filling
16	Sludge Tank	Closed sludge storage tank with atmospheric vent	Point source emission from the atmospheric vent serving the tank during filling

3.7 Odour Emission Data

3.7.1 There are no Emission Limit Values (ELVs) for odour and as the proposed WwTP is not yet operational, estimations of future releases from the identified sources had to be made to inform the dispersion model. These were based on odour monitoring data reported at similar installations. As such, they are considered to provide representative inputs for an assessment of this nature. A summary of the data is provided in Table 8.

Table 8 Odour Emission Data

Source		Odour Emission Data	Unit	Reference
1	Inlet Screen	50.0	$ou_E/m^2/s$	UKWIR[1]
2	DAF Unit	10.0	$ou_E/m^2/s$	UKWIR[1]
3	MBR 1	4.0	$ou_E/m^2/s$	UKWIR[1]
4	MBR 2	4.0	$ou_E/m^2/s$	UKWIR[1]
5	MBR 3	4.0	$ou_E/m^2/s$	UKWIR[1]
6	Dewatered Sludge Trailer 1	62.0	$ou_E/m^2/s$	UKWIR[1]

Source		Odour Emission Data	Unit	Reference
7	Dewatered Sludge Trailer 2	62.0	$ou_E/m^2/s$	UKWIR(1)
8	Balance Tank	24.8	$ou_E/m^2/s$	Odour Monitoring Ireland(2)
9	Divert Tank	24.8	$ou_E/m^2/s$	Odour Monitoring Ireland(2)
10	Anoxic Tank	52.4	$ou_E/m^2/s$	Odour Monitoring Ireland(2)
11	Aeration Tank 1	10.0	$ou_E/m^2/s$	UKWIR(1)
12	Aeration Tank 2	10.0	$ou_E/m^2/s$	UKWIR(1)
13	MBR Permeate Tank	0.7	$ou_E/m^2/s$	UKWIR(1)
14	Reverse Osmosis (RO) Permeate Tank	0.7	ou_E/m^3	UKWIR(1)
15	RO Feed Tank	0.7	$ou_E/m^2/s$	UKWIR(1)
16	Sludge Tank	108.6	$ou_E/m^2/s$	Odour Monitoring Ireland(2)

NOTES: (1) Odour Control in Wastewater Treatment - A Technical Reference Document, UKWIR.
(2) Odour Impact Assessment of the Existing and Proposed Operations Located in Eurofarm Foods, Duleek, Co. Meath, Odour Monitoring Ireland.

3.8 Odour Emission Rates and Process Conditions

3.8.1 The data shown in Table 8 was utilised with additional information provided by the Arla to define emissions within the dispersion model. A summary of the relevant inputs for each identified source including details of any assumptions is provided in Table 9.

Table 9 Modelled Odour Emission Rates

Source		Odour Emission Rate	Unit	Characteristics and Assumptions
1	Inlet Screen	50.0	$ou_E/m^2/s$	• The inlet screen was represented by a single area source in the model • The area source has an emitting surface area of $4.4m^2$ • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions

Source		Odour Emission Rate	Unit	Characteristics and Assumptions
				• Emissions were assumed to be constant, 24-hours per day, 365-days per year
2	DAF Unit	10.0	$ou_E/m^2/s$	• The DAF unit was represented by a single area source in the model • The area source has an emitting surface area of 17.5m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The DAF unit is covered. Industry guidance[10] indicates that engineered covers can result in a 90% reduction in emissions. As such, the emission rate for the source was reduced by this value to reflect containment of emissions • The factored emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
3	MBR 1	4.0	$ou_E/m^2/s$	• MBR tank 1 was represented by a single area source in the model • The area source has an emitting surface area of 68.4m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • Emissions were assumed to be constant, 24-hours per day, 365-days per year
4	MBR 2	4.0	$ou_E/m^2/s$	• MBR tank 1 was represented by a single area source in the model • The area source has an emitting surface area of 68.4m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • Emissions were assumed to be constant, 24-hours per day, 365-days per year

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

Source		Odour Emission Rate	Unit	Characteristics and Assumptions
5	MBR 3	4.0	$ou_E/m^2/s$	• MBR tank 1 was represented by a single area source in the model • The area source has an emitting surface area of 68.4m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • Emissions were assumed to be constant, 24-hours per day, 365-days per year
6	Dewatered Sludge Trailer 1	62.0	$ou_E/m^2/s$	• The trailer was represented by a single area source in the model • The area source has an emitting surface area of 10.0m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • Emissions were assumed to be constant, 24-hours per day, 365-days per year
7	Dewatered Sludge Trailer 2	62.0	$ou_E/m^2/s$	• The trailer was represented by a single area source in the model • The area source has an emitting surface area of 10.0m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • Emissions were assumed to be constant, 24-hours per day, 365-days per year
8	Balance Tank	24.8	$ou_E/m^2/s$	• The balance tank was represented by a single area source in the model • The area source has an emitting surface area of 726.1m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The balance tank is covered. As such, in accordance with industry guidance[11], the

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

Source		Odour Emission Rate	Unit	Characteristics and Assumptions
				emission rate for the source was reduced by 90% to reflect containment of emissions • The factored emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
9	Divert Tank	24.8	$ou_E/m^2/s$	• The balance tank was represented by a single area source in the model • The area source has an emitting surface area of 726.1m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The divert tank is covered. As such, in accordance with industry guidance[12], the emission rate for the source was reduced by 90% to reflect containment of emissions • The factored emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
10	Anoxic Tank	52.4	$ou_E/m^2/s$	• The anoxic tank was represented by a single area source in the model • The area source has an emitting surface area of 59.3m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
11	Aeration Tank 1	10.0	$ou_E/m^2/s$	• The aeration tank was represented by a single area source in the model • The area source has an emitting surface area of 226.4m^2

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

Source		Odour Emission Rate	Unit	Characteristics and Assumptions
				• An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
12	Aeration Tank 2	10.0	$ou_E/m^2/s$	• The aeration tank was represented by a single area source in the model • The area source has an emitting surface area of 226.4m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
13	MBR Permeate Tank	0.7	$ou_E/m^2/s$	• The MBR permeate tank was represented by a single area source in the model • The area source has an emitting surface area of 4.4m^2 • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The tank is covered. As such, in accordance with industry guidance[13], the emission rate for the source was reduced by 90% to reflect containment of emissions • The factored emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year

13 SCAIL-Agriculture update: Sniffer ER26: Final Report, Sniffer, 2014.

Source		Odour Emission Rate	Unit	Characteristics and Assumptions
14	RO Permeate Tank	0.7	$ou_E/m^2/s$	• The RO permeate tank was represented by a single area source in the model • The area source has an emitting surface area of $4.4m^2$ • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The tank is covered. As such, in accordance with industry guidance[14], the emission rate for the source was reduced by 90% to reflect containment of emissions • The factored emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
15	RO Feed Tank	0.7	$ou_E/m^2/s$	• The RO feed tank was represented by a single area source in the model • The area source has an emitting surface area of $4.4m^2$ • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions • The emission temperature was set to match ambient conditions • The tank is covered. As such, in accordance with industry guidance[15], the emission rate for the source was reduced by 90% to reflect containment of emissions • The factored emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year
16	Sludge Tank	108.6	$ou_E/m^2/s$	• The sludge tank was represented by a single area source in the model • The area source has an emitting surface area of $86.0m^2$ • An efflux velocity of 0m/s was assumed to reflect the diffuse nature of emissions

14 SCAIL-Agriculture update: Sniffer ER26: Final Report, Sniffer, 2014.

15 SCAIL-Agriculture update: Sniffer ER26: Final Report, Sniffer, 2014.

Source		Odour Emission Rate	Unit	Characteristics and Assumptions
				• The emission temperature was set to match ambient conditions • The tank is covered. As such, in accordance with industry guidance[16], the emission rate for the source was reduced by 90% to reflect containment of emissions • The factored emission rate was applied to the area source allowing for any differences between modelled and actual areas • Emissions were assumed to be constant, 24-hours per day, 365-days per year

3.9 Assessment Area

3.9.1 The assessment area was defined based on the facility location, anticipated odour dispersion patterns and the positioning of sensitive receptors. Ambient concentrations were predicted over NGR: 264595, 100590 to 266095, 102090. 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. Reference should be made to Figure 3 for a graphical representation of the assessment grid extents.

3.9.2 The same sensitive receptor locations identified in the Screening Assessment were considered as part of the dispersion modelling. Reference should be made to Figure 2 for a map of the receptor locations.

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.

16 SCAIL-Agriculture update: Sniffer ER26: Final Report, Sniffer, 2014.

3.11 Meteorological Data

3.11.1 Meteorological data used in the assessment was taken from Exeter Meteorological Station over the period 1st January 2019 to 31st December 2023 (inclusive). This observation station is located at NGR: 300821, 93986, which is approximately 36.4km east 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.

3.11.2 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 the utilised meteorological records.

3.12 Roughness Length

3.12.1 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 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)'.

3.13 Monin-Obukhov Length

3.13.1 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-6 as being suitable for 'rural areas'.

3.13.2 A minimum Monin-Obukhov length of 10m was used to describe the meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-6 as being suitable for 'small towns < 50,000'.

3.14 Assessment Criteria

3.14.1 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 the EA H4 guidance criteria, research undertaken by UKWIR and the position statement produced by CIWEM.

3.15 Modelling Uncertainty

3.15.1 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.

3.15.2 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 the site to account 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;
- Operating conditions - Information was provided by Arla to describe the existing and proposed activities at the facility. As such, these are considered to be representative of likely operating conditions;
- Emission rates - Emission rates for the use in the dispersion modelling were derived from monitoring data reported for similar facilities, as well as the UKWIR technical guidance document. As such, they are considered to provide a robust representation of potential emissions from the facility;
- 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.

3.15.3 Results were considered in the context of the relevant odour benchmark level. 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

4.1.1 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. 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 10 Predicted Odour Concentrations

Receptor		Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3)				
		2018	2019	2020	2021	2022
R1	Residential - Culm Cross	0.5	0.8	**1.0**	0.6	0.5
R2	Residential - Culm Cross	1.2	1.1	1.3	**1.7**	1.4
R3	Residential - Week	0.8	0.7	**0.9**	1.1	**0.9**
R4	Residential - Week	0.6	0.5	0.6	**0.9**	0.6
R5	Residential - Fore Street	0.6	0.6	0.7	0.7	**0.8**
R6	Residential - Mill Lane	0.6	0.5	0.7	0.6	**0.8**

4.1.2 As indicated in Table 10, predicted odour concentrations were below the benchmark level of $3ou_E/m^3$ at all receptor locations for all modelling years. As such, potential impacts as a result of emissions from the proposed WwwTP are considered to be not significant.

4.1.3 Reference should be made to Figure 5 to Figure 9 for graphical representations of predicted odour concentrations throughout the assessment extents.

5.0 CONCLUSION

5.1.1 Redmore Environmental Ltd was commissioned by EHS Projects Ltd to undertake an Odour Assessment in support of an Environmental Permit Variation Application for the Arla Taw Valley Creamery in North Tawton, Devon.

5.1.2 An Environmental Permit Variation Application is being made to the EA in order to authorise a number of changes to operations and infrastructure at the site. These include the addition of a new mozzarella manufacturing line and the installation of a replacement WwTP.

5.1.3 The proposed changes have the potential to alter the odour emission profile of the facility and result in impacts at sensitive locations in the vicinity of the site. An Odour Assessment was therefore undertaken to evaulate effects and identify the requirement for any additional mitigation to control impacts to an acceptable level.

5.1.4 An initial Screening Assessment was undertaken to identify potentially significant odour sources at the site. This indicated the risk of impacts as a result of releases from a number of emission points was not significant. Any releases that could not be screened from the assessment were considered further through dispersion modelling.

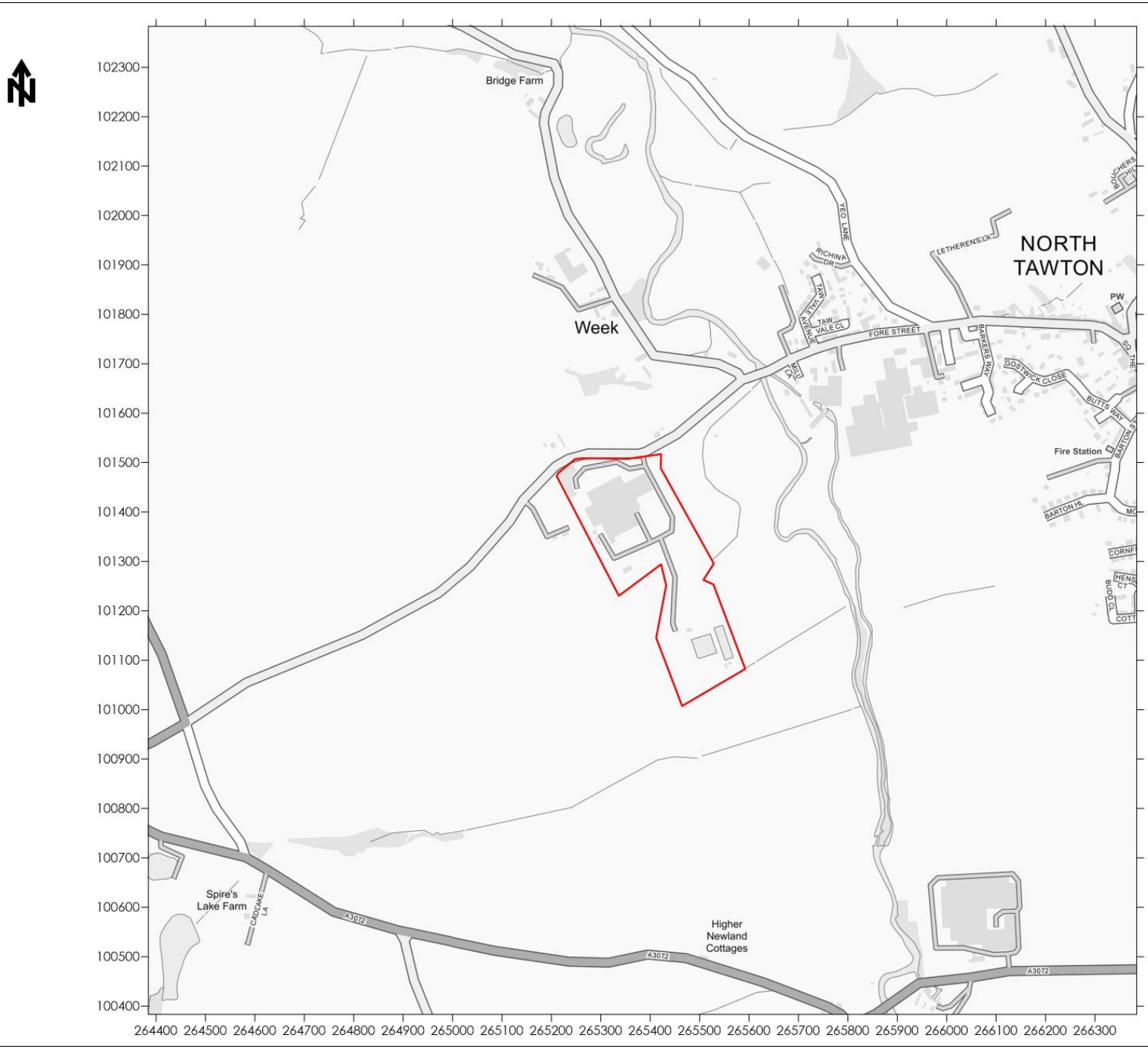
5.1.5 Potential odour releases from the relevant sources were defined based on the size and nature of the operations. Impacts at sensitive receptors were quantified using dispersion modelling and the results compared with the relevant odour benchmark level.

5.1.6 The results indicated that predicted odour concentrations were below the relevant benchmark level at all sensitive locations in the vicinity of the site for all modelling years. As such, potential odour emissions from the facility are not considered to be significant.

6.0 ABBREVIATIONS

CERC	Cambridge Environmental Research Consultants
CCC	Cooling Crystallisation Concentrator
CHP	Combined Heat and Power
CIP	Clean In Place
CIWEM	Chartered Institute of Water and Environmental Management
COD	Chemical Oxygen Demand
DAF	Dissolved Air Flotation
DEFRA	Department for Environment, Food and Rural Affairs
EA	Environment Agency
ELV	Emission Limit Value
WwTP	Effluent Treatment Plant
MBR	Membrane Bioreactor
NGR	National Grid Reference
OMP	Odour Management Plan
RO	Reverse Osmosis
UKWIR	United Kingdom Waste Industry Research
WwTWs	Wastewater Treatment Works
z_0	Roughness length
%ile	Percentile

Figures



Legend

Site Boundary

Title
Figure 1 - Site Location Plan

Project
Odour Assessment
Taw Valley Creamery

Project Reference
3558-2

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EHS Projects Ltd

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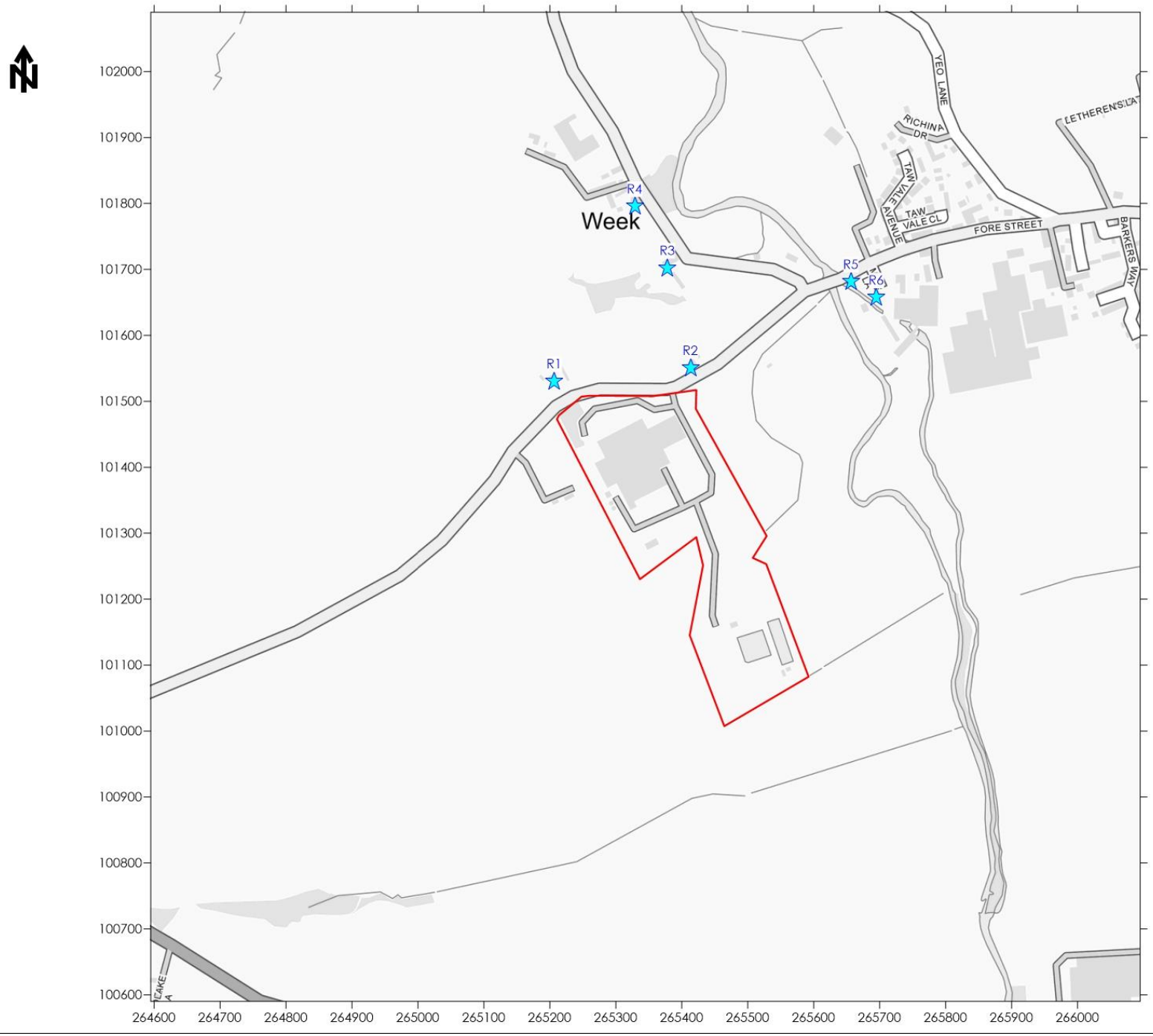

Legend

Site Boundary

Human Receptor

Title
Figure 2 - Sensitive Receptor Locations

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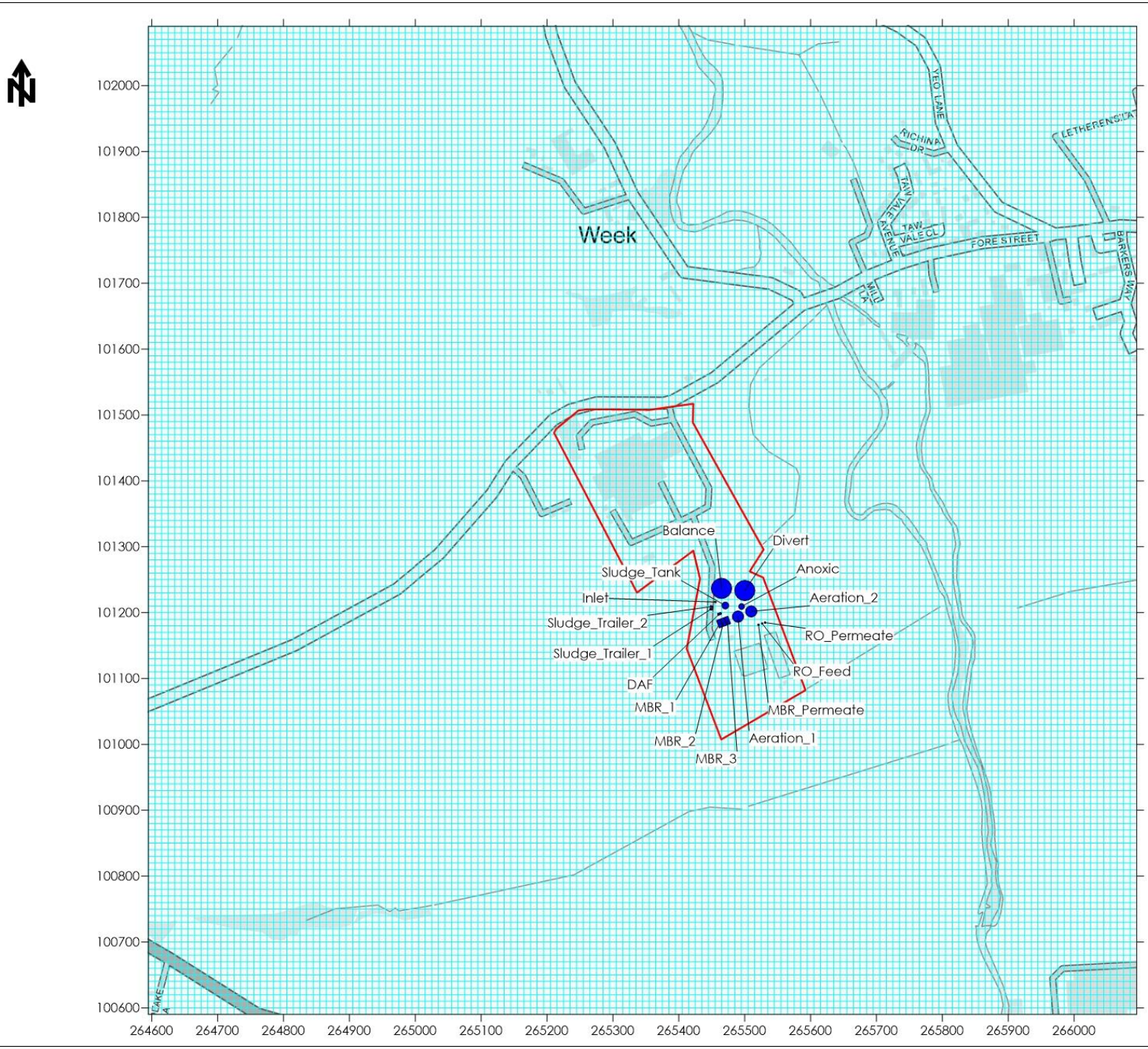

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Site Boundary

Assessment Grid

Building

Title
Figure 3 - ADMS-6 Inputs

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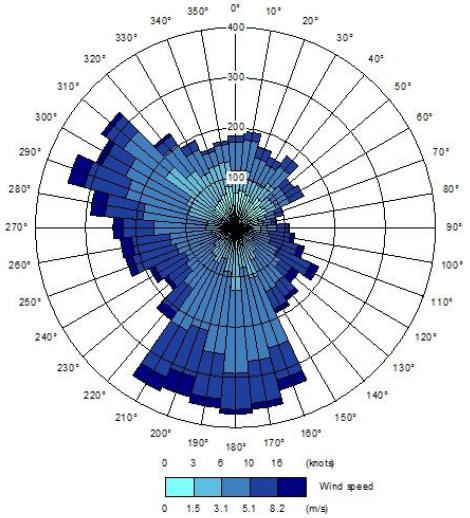
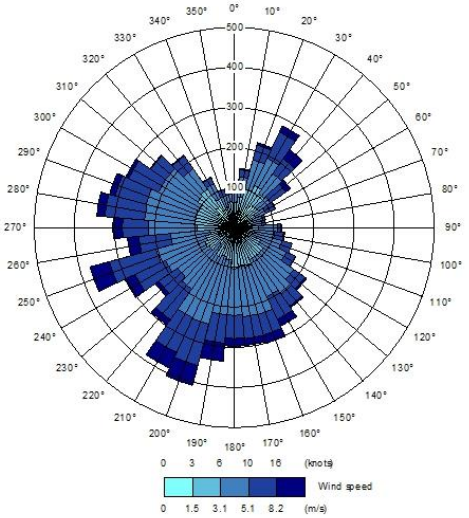
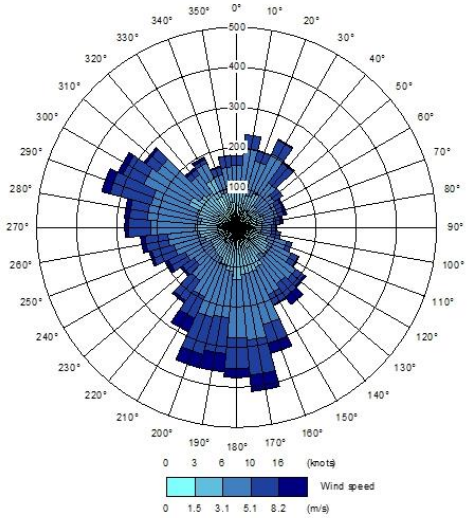


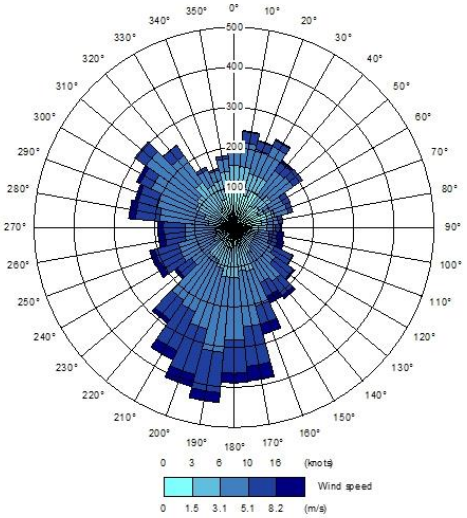
2019 Meteorological Data



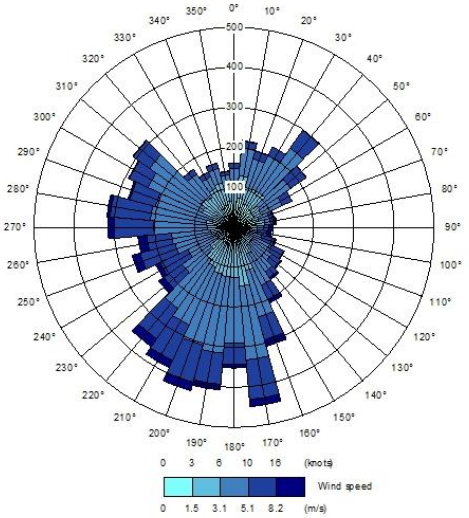
2020 Meteorological Data



2021 Meteorological Data



2022 Meteorological Data



2023 Meteorological Data

Legend

Title
Figure 4 - Wind Roses of 2019 to 2023
Exeter Meteorological Station Data

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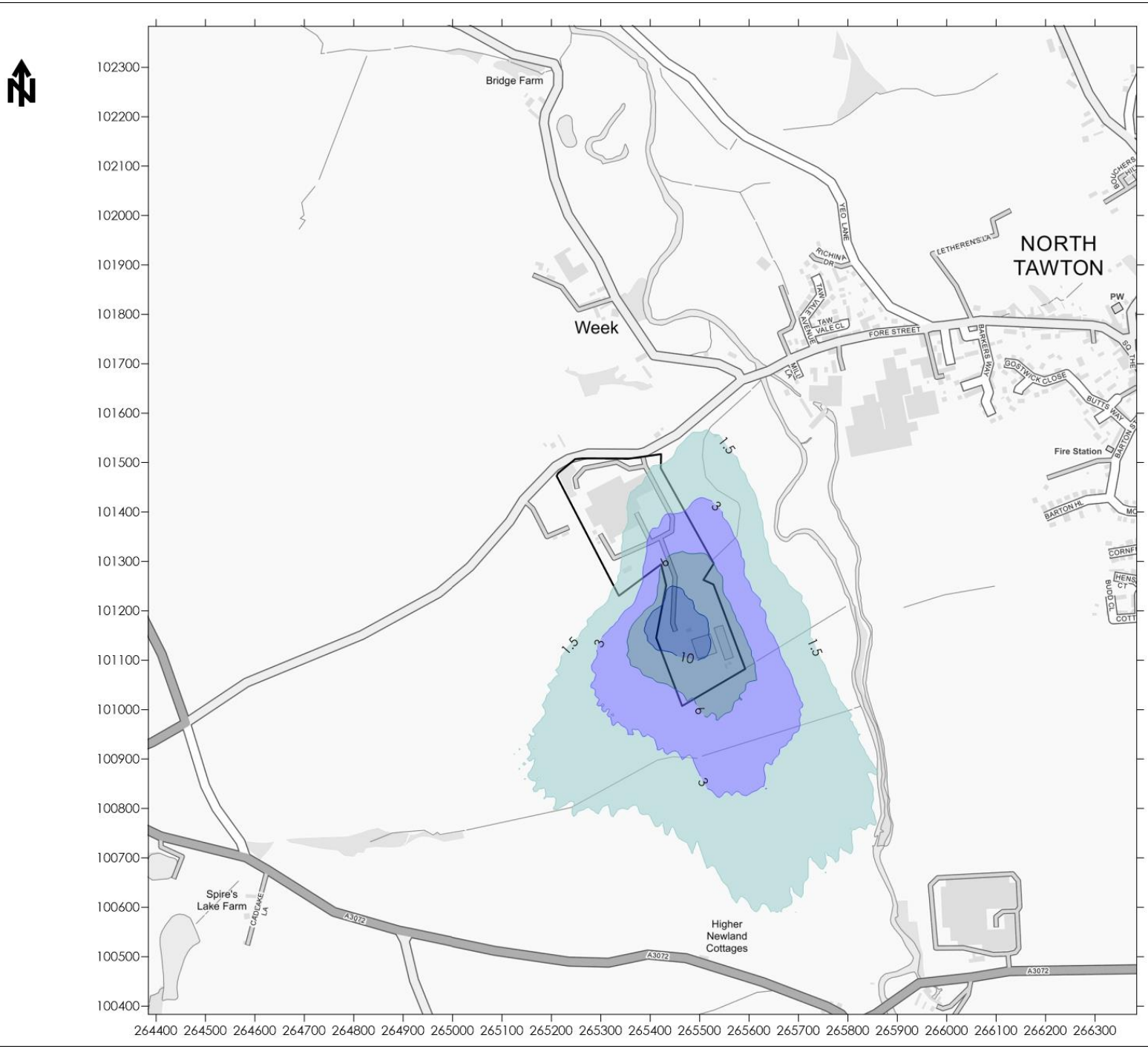

Legend

Site Boundary

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

10
6
3
1.5

Title

Figure 5 - 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
6
3
1.5

Title

Figure 6 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2020 Meteorological Data

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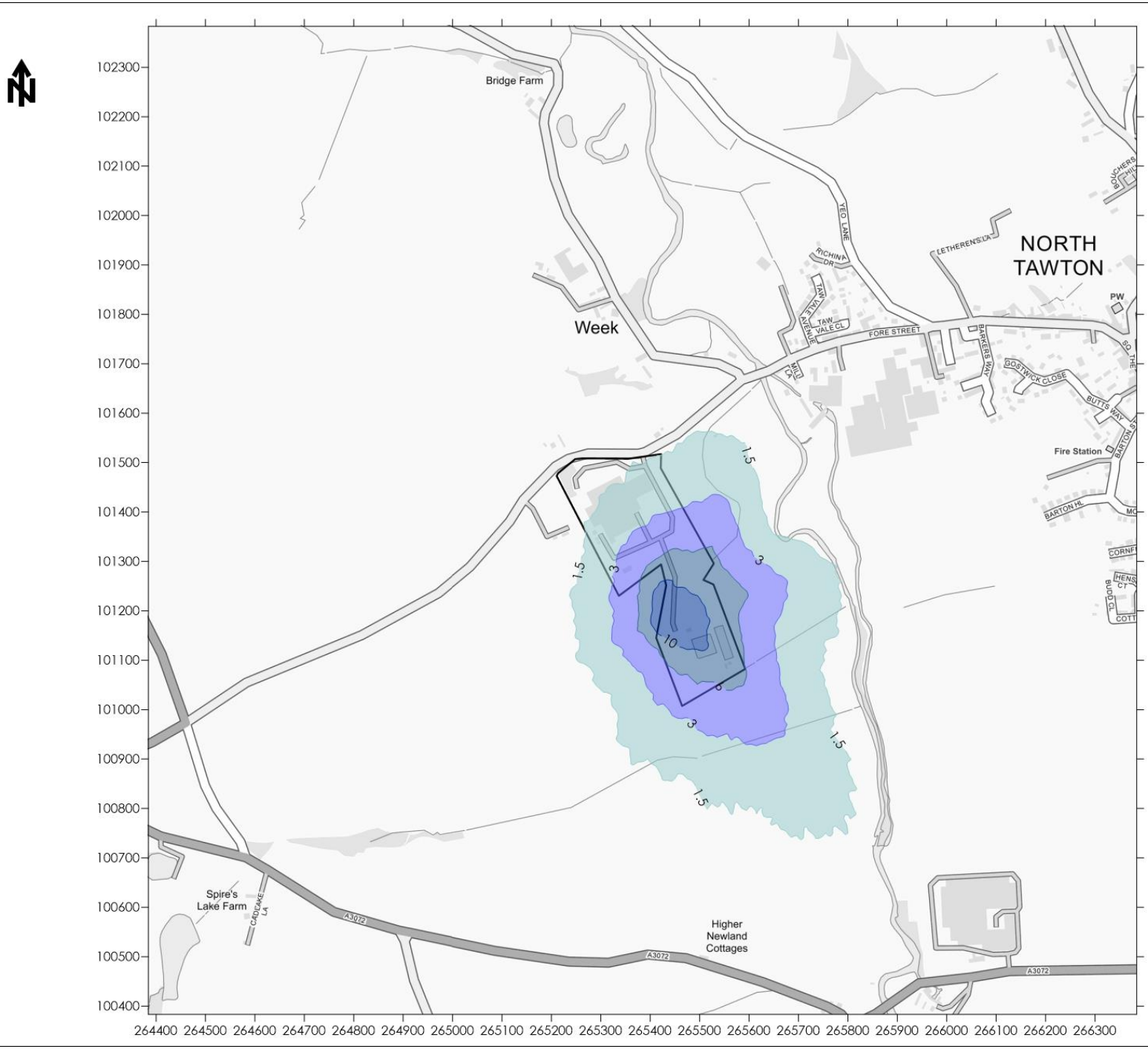

Legend

Site Boundary

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

10
6
3
1.5

Title

Figure 7 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2021 Meteorological Data

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Taw Valley Creamery

Project Reference

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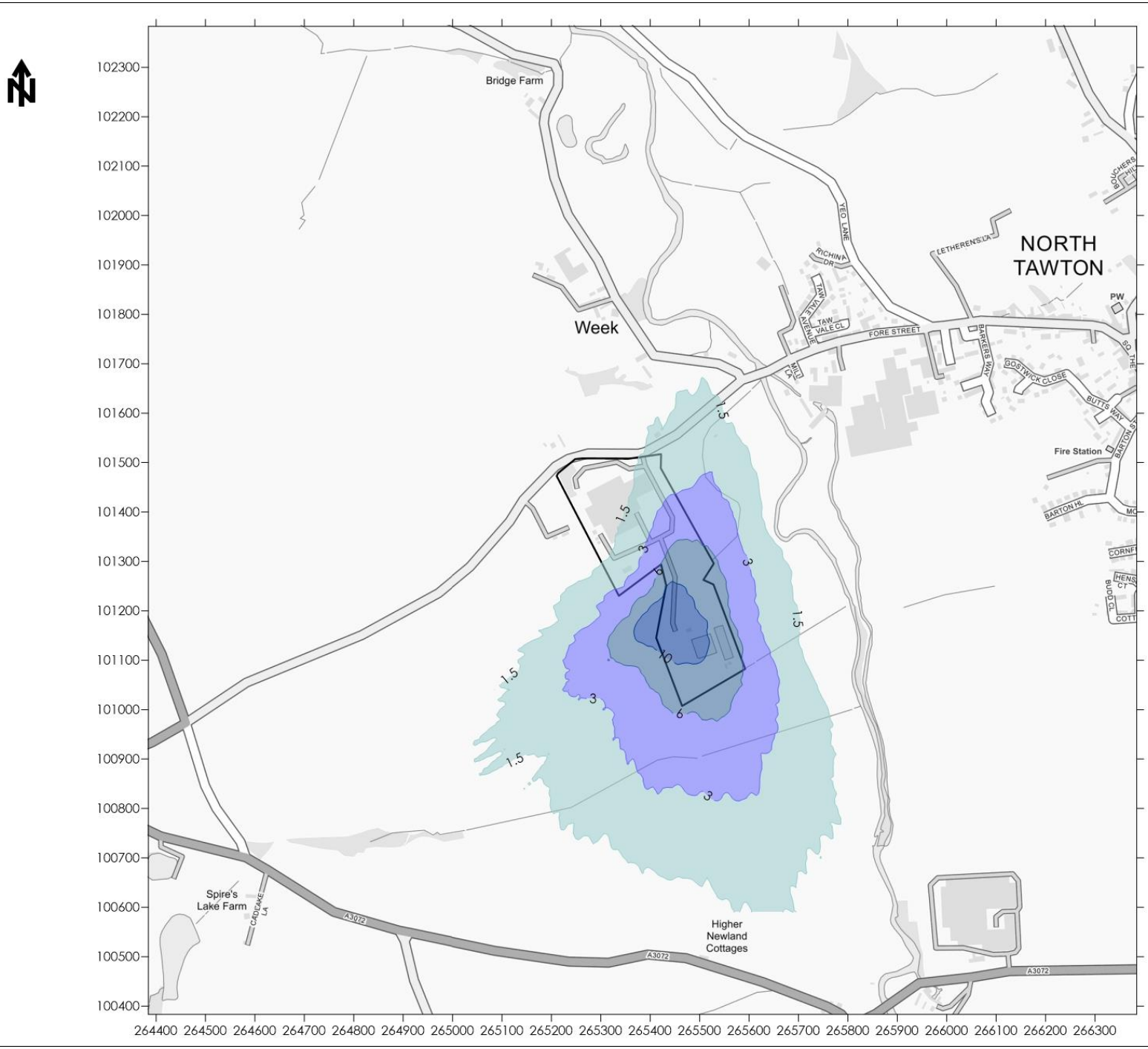

Legend

Site Boundary

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

10
6
3
1.5

Title

Figure 8 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2022 Meteorological Data

Project

Odour Assessment
Taw Valley Creamery

Project Reference

3558-2

Client

EHS Projects Ltd

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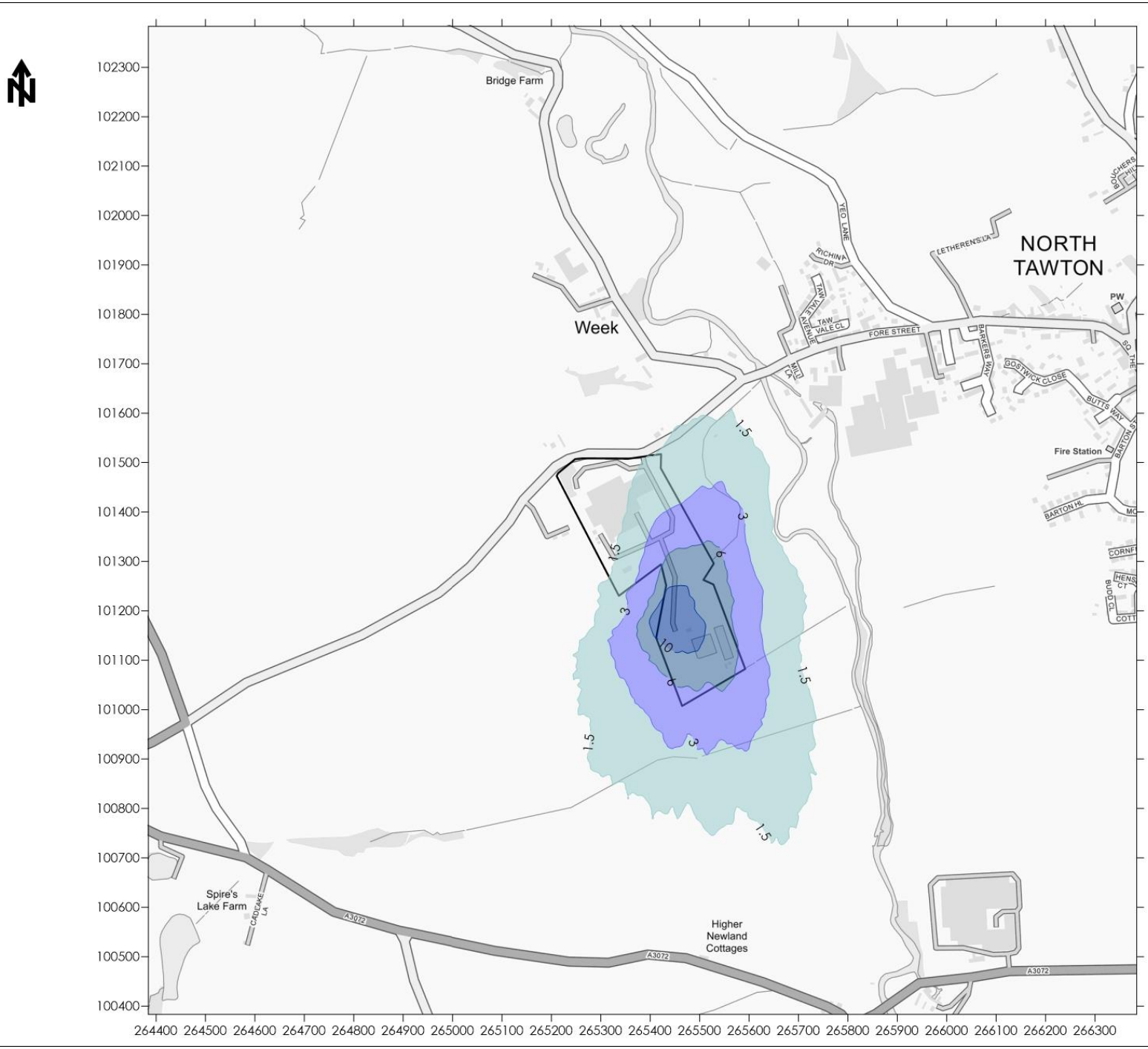

Legend

Site Boundary

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

10
6
3
1.5

Title

Figure 9 - Predicted 98th %ile 1-hour Mean Odour Concentration (ou_E/m^3) 2023 Meteorological Data

Project

Odour Assessment
Taw Valley Creamery

Project Reference

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