Final v2

Powys County Council
North Powys Bulking Facility

Environmental Permit Application

Odour Impact Assessment

Project code: 416.00798.00038
Date: November 2021

WRAP's vision is a world in which resources are used sustainably.

Our mission is to accelerate the move to a sustainable resource-efficient economy through re-inventing how we design, produce and sell products; re-thinking how we use and consume products; and re-defining what is possible through re-use and recycling.

Find out more at www.wrapcymru.org.uk

Written by: SLR Consulting Ltd

Contents

Figures

Tables

Acknowledgements

The content of this Report has been based upon information provided by WRAP Cymru and Powys County Council.

1.0 Introduction

SLR Consulting Limited (SLR) has been commissioned by The Waste and Resource Action Programme (WRAP), on behalf of Powys County Council (PCC) to undertake a detailed desktop Odour Impact Assessment (OIA) for the proposed North Powys Bulking Facility near Newtown, Powys ('the Site'). The purpose of the assessment is to support an Environmental Permit application for the Site to Natural Resources Wales (NRW).

1.1 Background

An indicative site layout plan[1] has been provided which illustrates the proposed layout of the Site. SLR has also produced an Odour Management Plan (OMP) for the Site[2] which accompanies this OIA and the wider Permitting application documentation, outlining the likely odour sources and associated mitigation measures which would be adopted at the bulking facility.

1.2 Scope

The Site will introduce a new source of odours within the local area with a potential to impact upon the amenity of existing sensitive receptors in the surrounding area.

The principal objective is to assess whether odour emissions are effectively dispersed so that no significant detriment to amenity will occur when the Site is operational.

This report presents the approach, detailed methodology and findings of this OIA.

1.3 Report Structure

The remainder of this report is structured as follows:

- Section 2.0 presents an overview of the relevant legislation and guidance;
- Section 3.0 details the assessment methodology;
- Section 4.0 details the site setting;
- Section 5.0 presents the quantification of odour emissions;
- Section 6.0 presents the dispersion model input parameters;
- Section 7.0 presents the results of the OIA; and
- Section 8.0 concludes the study.

[1] "SLR file reference: 416.00798.00038/Drawing 002.

[2] SLR file reference: "416.00798.00038/North Powys Bulking Facility Odour Management Plan"

2.0 Relevant Legislation and Guidance

2.1 Acceptability of Predicted Odour Impact

The potential for odorous compounds to cause nuisance is dependent upon a wide range of factors, including:

- The rate of emission of the compound(s);
- The duration and frequency of exposure;
- The time of the day that this emission occurs;
- The prevailing meteorology;
- The sensitivity of the '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.

There are neither European nor United Kingdom (UK) specific regulatory standards for the assessment of the impact of odours. However, it may be reasonably argued that complaints are likely to occur when odours become detectable and recognisable. The longer the odour detection persists for an individual, the greater the level of complaints may be expected, particularly if the odours are unpleasant.

On this basis, odour impact criteria are typically based upon guideline documents (predominately based on research from outside of the UK), case law and research. These documents typically indicate a numerical concentration limit of between 1.5 and $6ou_E/m^3$, (based on the 98^{th} percentile of hourly averages), depending on the offensiveness of the odour and sensitivity of the location. The lower criterion are typically applied to odours categorised as highly offensive in more urban areas, and higher criterion to less offensive / more pleasant odours in rural or industrial areas where odours are more likely to be tolerated.

2.1.1 NRW's H4 Odour Management Guidance

NRW's H4 Guidance[3] proposes installation-specific exposure criteria (benchmarks) on the basis that not all odours are equally offensive, and not all receptors are equally sensitive.

The H4 Guidance proposes the following benchmarks levels for the assessment and indication of unacceptable odour pollution:

- $1.5ou_E/m^3$ (as a 98th percentile of 1-hour average concentrations) for the most offensive odours;
- $3ou_E/m^3$ (as a 98th percentile of 1-hour average concentrations) for moderately offensive odours; and

[3] Horizontal Guidance H4: Odour Management – How to comply with your Environmental Permit, NRW, 2014.

- $6ou_E/m^3$ (as a 98th percentile of 1-hour average concentrations) for less offensive odours.

The H4 Guidance refers to the application of the $1.5ou_E/m^3$ criterion against the most offensive odorous sources, such as those processes involving handling of municipal waste.

2.1.2 IAQM – Odour Assessment for Planning Guidance

The Institute of Air Quality Management (IAQM) '*Odour assessment for planning guidance*'[4] summarises the typical requirements and approaches for undertaking an odour assessment for planning applications to determine the potential amenity impacts. Whilst this guidance does not form Environmental Permitting guidance, it is considered that if odour exposure does not cause significant detriment to amenity, then it cannot be causing 'significant pollution'.

To facilitate the assessment of the significance of predicted odour exposure on amenity, the guidance defines receptor sensitivity and proposes 'odour effect descriptors' which combine the relative sensitivity of the receptors, the nature (or offensiveness) of the odour with quantitative predicted odour exposure levels.

The IAQM receptor sensitivity types are summarised in **Table 2-1**.

Table 2-1: IAQM Odour Receptor Sensitivity

Receptor Sensitivity	Example Land-uses
High sensitivity receptors	Surrounding land where: ■ Users can reasonably expect enjoyment of a high level of amenity; and ■ People would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural
Medium sensitivity receptors	Surrounding land where: ■ Users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or ■ People wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low sensitivity receptors	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 be present only for limited periods of time as part of the normal pattern of use of the land.

[4] IAQM Guidance on the assessment of odour for planning. IAQM 2014.

Receptor Sensitivity	Example Land-uses
	Examples may include industrial use, farms, footpaths and roads

The IAQM then presents a matrix for 'most offensive' and 'moderately offensive' odour types. However, given the 'most offensive' type of odour associated with municipal waste specifically referenced by NRW's H4 Odour Management guidance, this assessment has only considered the matrix for 'most offensive' odour types and the associated IAQM effect descriptor as summarised in **Table 2-2**. It is noted that impacts descriptors apply equally to cases where there are increases and decreases in odour exposure as a result of a development. Therefore, the terms 'adverse' and 'beneficial' should be applied to the descriptors as appropriate.

Table 2-2: Odour Effect Descriptors – IAQM Guidance

Predicted Odour Exposure $C_{98,1\text{-hour}}$ ou_E/m^3	Receptor Sensitivity		
Most Offensive	Low	Medium	High
≥10	Moderate	Substantial	Substantial
5 – <10	Moderate	Moderate	Substantial
3 – <5	Slight	Moderate	Moderate
1.5 – <3	Negligible	Slight	Moderate
0.5 – <1.5	Negligible	Negligible	Slight
<0.5	Negligible	Negligible	Negligible

As presented in **Table 2-2**, in relation to the impacts of a 'high sensitivity' receptor to a 'most offensive' odour type; the IAQM matrix indicates that exposure greater than $C_{98\text{-%ile, 1 hour}}$ 1.5ou_E/m^3 would be classified as 'moderate adverse' effect. This would be considered to represent a 'significant adverse' effect, which correlates with NRW's H4 criterion for 'significant pollution'.

For a receptor of 'medium sensitivity', the IAQM guidance indicates that for impacts of 'most offensive' odour type; exposure greater than $C_{98\text{-%ile, 1 hour}}$ 3ou_E/m^3 would be classified as 'moderate adverse'.

Similarly, for a receptor of 'low sensitivity', the IAQM guidance indicates that for impacts of 'most offensive' odour type; exposure greater than $C_{98\text{-%ile, 1 hour}}$ 6ou_E/m^3 would be classified as 'moderate adverse'.

2.1.3 Odour Guidance for Local Authorities

DEFRA has published guidance[5] specifically for assessing and managing facilities with odorous emissions from a regulatory perspective, including (in Section 3.4) how olfactometry and dispersion modelling can be applied for assessing the potential impacts of proposed facilities.

[5] Odour Guidance for Local Authorities. DEFRA 2010.

3.0 Assessment Methodology

3.1 Identification of Odour Sources

Potential sources of odour from the proposed bulking facility have been identified on the basis of a review of the proposed development design.

Mixed municipal waste (also referred to as residual material), bulky material, textiles, food waste, Absorbent Hygiene Products (AHPs), and dry mixed recyclables (cans, plastics, paper and cardboard) would be received at the site within the Bulking Shed, inside which all handling activities would take place. Green waste and glass would be received and stored within their designated areas outside of the Bulking shed[6]. When considering the low odour potential and low offensiveness of odours from the outside sources, in combination with the relatively small surface area of these storage areas, it is not anticipated that the storage and handling of the material types to be stored outside would be a significant source of odours. Therefore, these material types have not been considered further in this assessment. Further information on the associated odour potential of the material types to be received at the site is presented within Appendix D.

The Site would also contain a number of facilities associated with supporting refuse and recycling collections such as an office, welfare facilities, a weighbridge, collection vehicle parking, a refuelling station, a vehicle wash and a staff carpark. None of these facilities are considered to pose a significant source of odour emissions and have not been considered further in this assessment.

3.2 Derivation of Emissions

The anticipated odour emissions for the proposal have been estimated based on values given in published literature, as well as design specifications for the ventilation system as detailed within Section 5.4.

3.3 Quantification of Odour Impact

The assessment of odour exposure (and therefore impact) may be undertaken with two differing approaches, by the use of indicator determinands, or total odour.

In the case where an emission is dominated by one particular odorous gas, the use of an indicator determinand allows simple validation of an assessment through monitoring at source and receptor.

However, more commonly (as with waste derived odours) an odour is the result of a complex mixture of chemicals. On this basis, a more appropriate approach in the case of this complex gas mixture is that of total odour. Odour assessments are undertaken using the concept of the European Odour Unit (ou_E), as defined in BS EN 13725[7]. This approach allows impact assessment of any odorous gas as it is independent of chemical constituents and centres instead on multiples of the detection threshold (i.e. the physiological response of a human) of the gas in question.

[6] Refer to drawing reference Drawing 002.

[7] BS EN 13725:2003 *Air Quality – Determination of Odour Concentration by Dynamic Olfactometry.*

As the odour unit is a Standard Unit in the same way as gram or milligram, the notation used in odour assessment follows the conventions of any mass emission unit as follows:

- Concentration: ou_E/m^3;
- Emission: ou_E/s; and
- Specific emission (emission per unit area): $ou_E/m^2/s$.

Like air quality standards for individual pollutants, exposure to odour is given in terms of a percentile of averages over the course of a year. The exposure criteria most accepted in the UK at present is given in terms of (concentration) European Odour Units as a 98^{th} percentile (C_{98}) of hourly averages. This allows 2% of the year when the impact may be above the limit criterion (175 hours). The notation for impact is therefore: $C_{98, 1 hour}$ X ou_E/m^3.

3.4 Detailed Dispersion Modelling

In order to predict potential odour impacts within the vicinity of the proposed bulking facility a quantitative assessment using the AERMOD dispersion model[8] was undertaken. AERMOD is a regulatory model approved for the United States Environmental Protection Agency (US EPA) and is used extensively for odour impact assessment in the UK.

The detailed dispersion modelling has been used to predict the concentration of odour at a height of 1.5m AOD in accordance with the relevant NRW and EA guidance[9]. In accordance with guidance from the IAQM, modelling results from each individual meteorological year considered are presented. In addition, an average of the odour concentrations modelled with the application of the 2015 – 2019 meteorological data has been presented; this prevents results being skewed by infrequent meteorological conditions that would give a false indication of average conditions.

3.4.1 Acceptability of Predicted Odour Impacts – IAQM Quantification of Predicted Significance

The magnitude of the predicted odour effect (i.e. impact significance) has been determined in reference to both the NRW H4 Odour Guidance (Section 2.1.1) and the IAQM odour guidance (Section 2.1.2), with specific consideration given to the likely offensiveness of odours from the bulking facility as well as the sensitivity of the nearby receptors.

For the purposes of this Odour Impact Assessment, and to provide a conservative approach, odours from the bulking facility have been considered to be of 'high offensiveness', and all receptors have been considered to be of 'high sensitivity'.

3.4.2 Criterion for use in Odour Impact Assessment

The objective of this assessment is to determine the potential extent to which unacceptable levels of odour impact could reasonably be expected to occur as a result of emissions from the site.

---

[8] Software used: Lakes AERMOD View, version 9.8. Aermod model executable 19191.

[9] Environment Agency – Air dispersion modelling report requirements (for detailed air dispersion modelling), Air Quality Modelling and Assessment Unit.

In order to ensure that a cautious approach is adopted, it has been assumed that odours from the bulking facility would be of a 'high offensiveness' and that all sensitive receptors are of a 'high sensitivity' to odours. Therefore in reference to the odour criterions outlined within NRW's H4 Odour Guidance as well as the IAQM guidance for odours of a 'high offensiveness' the $C_{98,\ 1\text{-hour}}$ 1.5ou_E/m^3 odour criterion has been applied within this assessment for all sensitive receptors to present the point at which the adverse effect of odours could be considered 'significant pollution'.

4.0 Site Setting and Background

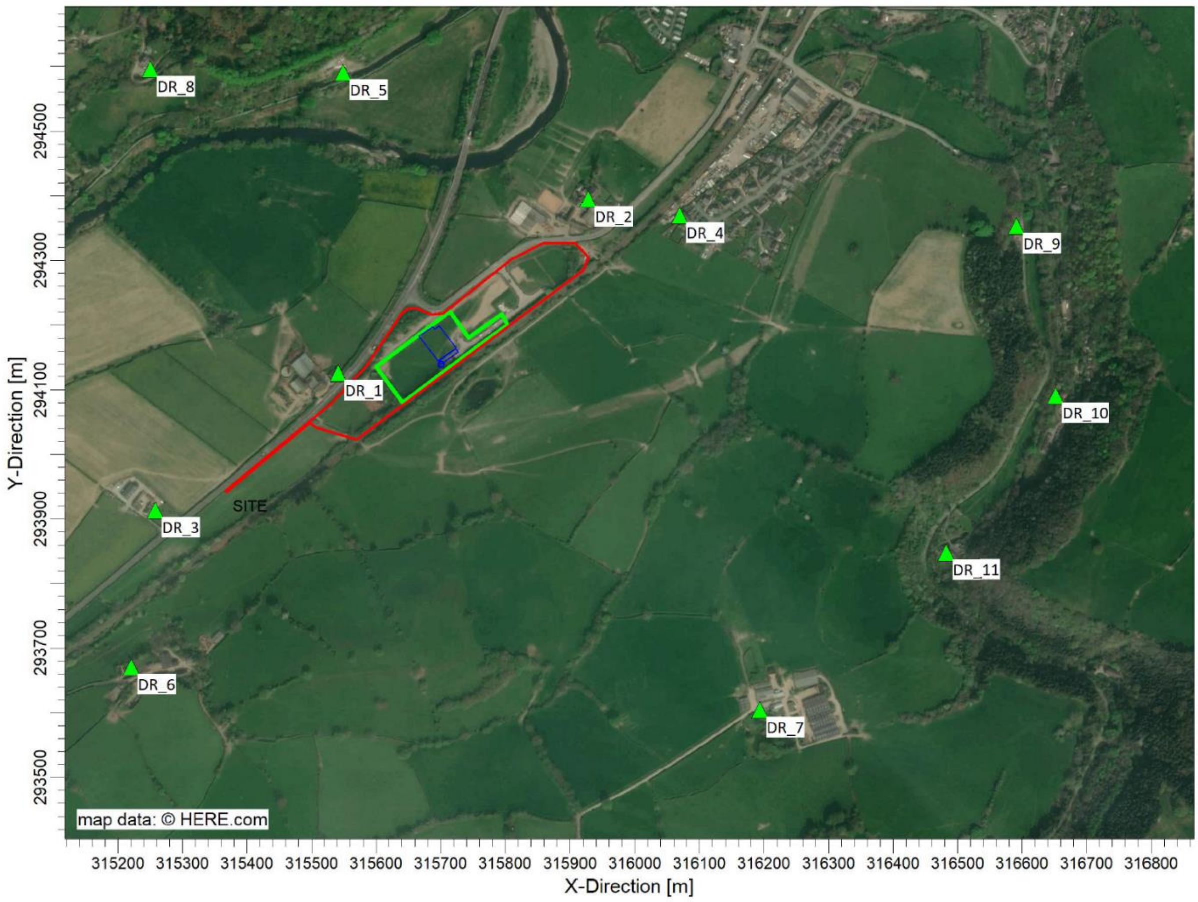
4.1 Site Location

The North Powys Bulking Facility site is located along the A483 to the south-west of Abermule, Powys at approximate National Grid Reference (NGR) x 315740, y 294190. The Site extends from south-west to north-east along the A483.

There are a number of residential receptors in proximity to the proposed bulking facility, the closest of which are isolated farmhouses located off the A483 and B4386, located within 50m of the Site boundary. Beyond, a number of residential dwellings are located within 270m to the north-east of the Site along Court Close, as well as further isolated properties in all directions.

Reference should be made to **Figure 4-1** for an illustration of the identified sensitive receptors relative to the Site. The Site planning boundary is outlined in red, the permit boundary is outlined in green and the Bulking Shed is outlined in blue.

Figure 4-1: North Powys Bulking Facility – Modelled Discrete Odour Receptors



4.2 Potentially Sensitive Receptors

The identified sensitive receptors in proximity of the Site are presented in **Table 4-1**.

Table 4-1: Modelled Discrete Receptors

Receptor	Receptor Type	Receptor Sensitivity	UK NGR (m)		Distance from Permit Boundary (m)
			X	Y	
R1	Farm	High	315541	294125	50
R2	Farm	High	315928	294395	110
R3	Farm	High	315258	293914	400
R4	Residential dwelling	High	316069	294369	270
R5	Residential dwelling	High	315549	294590	400
R6	Farm	High	315220	293671	600
R7	Farm	High	316194	293604	720
R8	Residential dwelling	High	315250	294596	580
R9	Residential dwelling	High	316591	294353	860
R10	Residential dwelling	High	316652	294091	900
R11	Residential dwelling	High	316483	293848	800

The discrete receptors presented within **Table 4-1** is not an exhaustive list, the closest sensitive receptors in each direction surrounding the Site have been identified. There may be more receptors at a greater distance, however when considering that odour concentration decreases with the distance from the source, it can reasonably be inferred that receptors at a greater distance would not be adversely effected if receptors in closer proximity are not predicted to experience an adverse effect.

The receptor sensitivity has been determined in reference to the IAQM guidance (as presented in **Table 2-1**), in which residential dwellings are determined to be of a 'high' sensitivity to odours and farms as 'low sensitivity to odours. However, in order to provide a suitably conservative approach within this assessment, farms have been determined as 'high' sensitivity.

Reference should be made to **Figure 4-1** for an illustration of the considered odour sensitive receptors relative to the site.

4.3 Existing Odour Sources

From a review of aerial imagery, the current primary source of odours in the area is agriculture. A number of farms border the site on all sides, from which the likely odour sources will be from periodic fertilisation of fields as well as rearing of cattle.

5.0 Quantification of Odour Emissions

5.1 Sources of Emission

The operation of the bulking facility has the potential to generate odour during standard operation. The scenarios considered within this assessment are detailed within **Table 5-1**.

Table 5-1: Odour Assessment – Modelling Scenario

Modelled Pollutant	Assessment Criteria	Modelling Criteria Applied
Odour	1-hour mean not to exceed more than 2% of the time (175 hours)	98^{th} percentile of 1-hour means

The assessment considered odour emissions from all sources during normal operating conditions, as described below.

5.2 Process Description

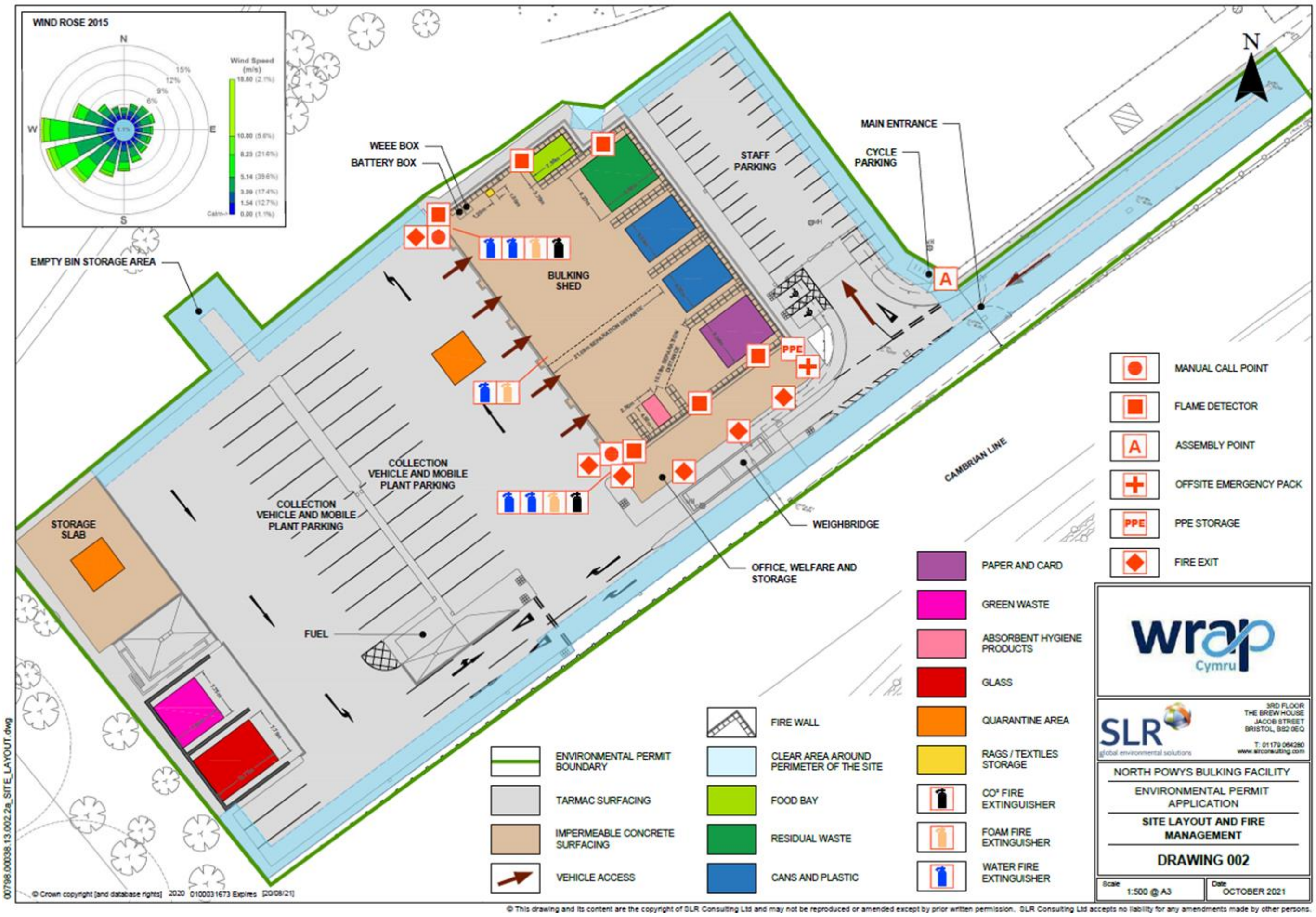
The proposed bulking facility would operate as follows.

Mixed municipal waste, bulky material, textiles, food waste, AHPs, plastics, cans, cardboard, paper, glass, textiles, and green waste (approximately 22,500 tonnes per annum (tpa)) would be received via road within collection vehicles. Mixed municipal waste, food waste deliveries, AHPs, plastics, cans, cardboard and paper would be unloaded at the site within the Bulking Shed, inside which all handling activities for these types of material take place. The AHPs would be tipped (from the collection vehicle) on the floor within the Bulking Shed and subsequently moved to a skip (sealed at the bottom and sides) as soon as is practicable. The skip would be located within the Bulking Shed, AHPs would remain on site for no longer than 7 days. Incoming glass and green waste would be deposited and stored outdoors, within the designated areas.

Materials received would be collected, bulked and temporarily stored prior to being removed from Site by road to other sites for further recovery or disposal. It is understood that under normal operational conditions material delivered to the Site would be stored for a maximum of 5 days prior to removal.

Vehicles would gain access to the Bulking Shed via 5 roller shutter doors on the south-west side of the building. Process air from within the building would be extracted by 5 ventilation fans fitted on the north-eastern wall, and 2 louvres would be fitted on the south-west wall to facilitate airflow into the building when the roller shutter doors are not in use. The layout of the Site is presented in Figure 5-1 below.

Figure 5-1: North Powys Bulking Facility – Site Layout



5.3 Odour Emission Estimation

The receipt, handling and storage of mixed municipal waste, food waste and AHPs within the Bulking Shed presents a significant source of odour emissions. Odours resulting from the outside storage of green waste and glass have been considered negligible (see Appendix D).

The potential odour concentration from within the Bulking Shed has been estimated on the basis of published odour monitoring data from a similar bulking (maximum odour concentrations within the operational waste transfer facility[10] ranged between 65ou_E/m^3 and 1,895ou_E/m^3. Monitoring was undertaken during September and correlated with periods when material was freshly tipped and/or sorted (i.e. active processing) representing maximum potential odour generation and emissions. It is noted that the maximum monitored odour concentration (1,895ou_E/m^3) correlated with the tipping of material on the floor, reflecting a 'worst-case scenario'.

Further details supporting the suitability of the odour emission rates defined in this study are presented in Appendix E.

[10] Comparison of dispersion models for assessing odour from municipal solid wastes, Waste Management Resources (2000) 18: 420 – 428, Hobbs, Stephen E., Longhurst, Philip., Sarkar, Ujjaini., and Sneath, Robert. W.

The odour concentration of air within the Bulking Shed will vary spatially (i.e. higher odour concentrations in proximity to waste storage and handling operations) and temporally (i.e. odour concentrations will be higher during tipping, and lower during quieter periods). However considering that the proposed development would also include handling and storage of a small volume of AHPs within a single skip, it has been assumed that the odour concentration of all air within the Bulking Shed would be the maximum measured result of 1,895ou_E/m^3 (i.e. the highest measured odour concentration during tipping of material within the facility building in the research study), even outside of operational hours. This reflects a highly cautious assessment approach.

Potential odour emissions from the operation of the Bulking Shed access doors are considered insignificant, as a result of the negative pressure maintained within the building by the five ventilation fans located on the north-eastern wall of the Bulking Shed. The negative pressure maintained within the building (during operational hours) would achieve building containment and minimise the potential for fugitive odours from within the Bulking Shed to be released during periods when the access doors are open. Furthermore, as outlined within the OMP for the Site:

- Vehicles entering the building must travel slowly (<5mph), to minimise air displacement; and
- The access doors must be closed when not in use. There is sufficient room for vehicles to fully enter the building, avoiding the need for doors to remain open whilst vehicles are offloading, minimising the duration where the access doors are open.

Outside of operational hours the ventilation system will not be in use, however the doors would not be in during this period.

As such, potential fugitive odour emissions from the Bulking Shed resulting from the operation of the vehicular access doors have not been considered within this dispersion modelled assessment.

5.4 Odour Emission Calculation

PCC provided SLR with the design specification[11] for the ventilation system proposed at the bulking facility which details that the extraction system is designed to achieve 1.5 Air Changes Per Hour (ACPH), equating to an approximate extraction airflow of 22,750m^3/hr. Process air is extracted and discharged by 5 horizontally orientated ventilation fans along the north-eastern wall of the Bulking Shed. Therefore, the volume flow per stack is 1.264m^3/s.

5.4.1 Operational Hours

The proposed bulking facility will operate between the hours of 7am and 6pm Monday – Sunday (including bank holidays). To present a worst-case scenario, it is assumed that material is present within the Bulking Shed at all times. In order to represent this within the dispersion modelling assessment a variable emission rate was applied to reflect the variable nature of the odour emissions from the site (i.e. operational hours vs. outside of operational hours). During operational hours, it is assumed that the ventilation

[11] "W1847 M06 Rev C1 Proposed Main Shed Ventilation Layout" - Drawing Number W1847/M06 revision C1, dated 02/12/2019.

system will operate at the full capability of 1.5ACPH, with extracted process air at a constant worst-case concentration of 1,895ou_E/m^3 as defined in Section 5.3.

On the basis of the ventilation system design and the odour concentration estimate as defined in section 5.3, this equates to an odour emission rate per stack of 2,395ou_E/s (i.e. volume flow x emission concentration = 1.264m^3/s x 1,895ou_E/m^3 = 2,395ou_E/s) during the hours of 7am and 6pm Monday – Sunday. The total odour emission rate from the 5 stacks is 11,975ou_E/s between the hours of 7am and 6pm Monday – Sunday.

5.4.2 Outside of Operational Hours

Outside of operational hours (i.e. 6pm to 7am Monday – Sunday), the Bulking Shed ventilation system will be turned off. This has been reflected in the modelling by an assumed passive ventilation rate of 0.5 ACPH (equating to an airflow rate from the building of 2.105m^3/s), this has been defined in reference to the good level of containment afforded by the building's proposed specification.

On the basis of the assumed passive ventilation rate of 0.5ACPH and the odour concentration estimate as defined in Section 5.3, this equates to a total odour emission rate of 3,992ou_E/s between the hours of 6pm to 7am Monday – Sunday.

A sensitivity assessment was undertaken to determine whether representing the odour emissions outside of operational hours as either 5 stack sources, or a collated volume source resulted in a worst-case representation of odour impact. The assessment concluded that modelling of the odour emission a collated volume source resulted in a worst-case representation of odour impact (the results of the sensitivity assessment are presented in Appendix C). Therefore, odour emissions from the Bulking Shed outside of operational hours has been represented within the model as a single collated volume source.

6.0 Model Input Data

6.1 Model Assumptions

In producing the dispersion model, the following key assumptions were made:

- The potential odour concentration from within the Bulking Shed has been estimated based on a 'worst-case' interpretation of published odour monitoring data from a similar facility (see Section 5.3);
- Under normal operational conditions, it is anticipated that material would be stored within the Bulking Shed for no more than 5 days from reception (with the exception of AHPs which would be stored for a maximum of 7 days). It is noted that material would not always be present overnight, however to present a suitably cautious assessment approach, it has been assumed that the odour concentration within the Bulking Shed would remain at the same concentration overnight as in the day;
- During operational hours, the Bulking Shed ventilation system would continuously operate at the maximum design flow rate of 1.5 ACPH (see Section 5.4);
- Any fugitive odour emissions from the Bulking Shed (including any from the operation of the access doors) are considered insignificant as a result of the negative pressure maintained within the building by the ventilation fans, and as such have not been considered within this assessment (see Section 5.3);Outside of operational hours, when the Bulking Shed ventilation system is not in use, a passive ventilation rate of 0.5 ACPH has been applied (see Section 5.4); and
- Odours resulting from the outside storage of green waste and glass have been considered negligible (see Section 3.1).

The above assumptions have been determined to form a 'worst-case scenario' to ensure a suitably conservative assessment approach is adopted.

6.2 Assessment Area

The modelling has been undertaken using a radial receptor grid across the study area, as well as discrete receptors located at the sensitive receptors identified in proximity to the Site (see **Table 4-1**). Pollutant exposure isopleths are generated by interpolation between receptor points and superimposed onto the map. This method allows the predicted odour concentration to be calculated in the local area surrounding the bulking facility.

The radial receptor grid was defined as follows:

- 36 radials of equal size (i.e. 10 degrees between radials);
- 11 rings at 20, 40m, 60m, 80m, 100m, 150m, 200m, 250m, 300m, 350m and 400m; and
- Centred at NGR coordinates x315713, y294184.

6.2.1 Modelled Sources and Emission Rates

Emission parameters for the Bulking Shed ventilation fans have been determined based on the assumptions presented in Sections 5.3 and 5.4.

Reference should be made to **Figure 6-1** for an illustration of the modelled sources. **Table 6-1** and **Table 6-2** present the emission parameters for the Bulking Shed ventilation fans adopted in the model, both during and outside of operational hours.

Table 6-1: Odour Emission Sources - During Operational Hours

Parameter	Unit	Ventilation Fan 1	Ventilation Fan 2	Ventilation Fan 3	Ventilation Fan 4	Ventilation Fan 5
Emission Source Type	-	Stack	Stack	Stack	Stack	Stack
Location (NGR)	Easting (x)	315705	315709	315702	315714	315719
	Northing (y)	294189	294184	294195	294178	294171
Discharge Height	Meters (m)	7	7	7	7	7
Stack orientation	-	Horizontal				
Efflux Velocity	m/s	n/a [a]				
Volumetric Flow Rate	m^3/s	1.264	1.264	1.264	1.264	1.264
Discharge Temperature	°C	Ambient [b]				
Emission Rate	ou_E/s	2,395	2,395	2,395	2,395	2,395

Notes:

(A) In order to reflect the horizontal nature of the emission point, in line with the latest Aermod guidance, the 'Horizontal' release type has been selected within Aermod. By selecting this option, Aermod reduces the efflux velocity to a near-zero value.

(B) The 'ambient' temperature option has been selected within Aermod. This substitutes the discharge temperature with the ambient temperature value within meteorological file for that hour.

Table 6-2: Odour Emission Sources - Outside of Operational Hours

Parameter	Unit	Ventilation Fan 1
Emission Source Type	-	Volume

Parameter	Unit	Ventilation Fan 1
Location (NGR)	Easting (x)	315696
	Northing (y)	294174
Discharge Height	Meters (m)	7.0
Length of Side [a]	m	40
Initial Lateral Dimension [b]	m	9.3
Initial Vertical Dimension [c]	m	4.4
Emission Rate	ou_E/s	3,992

Notes:

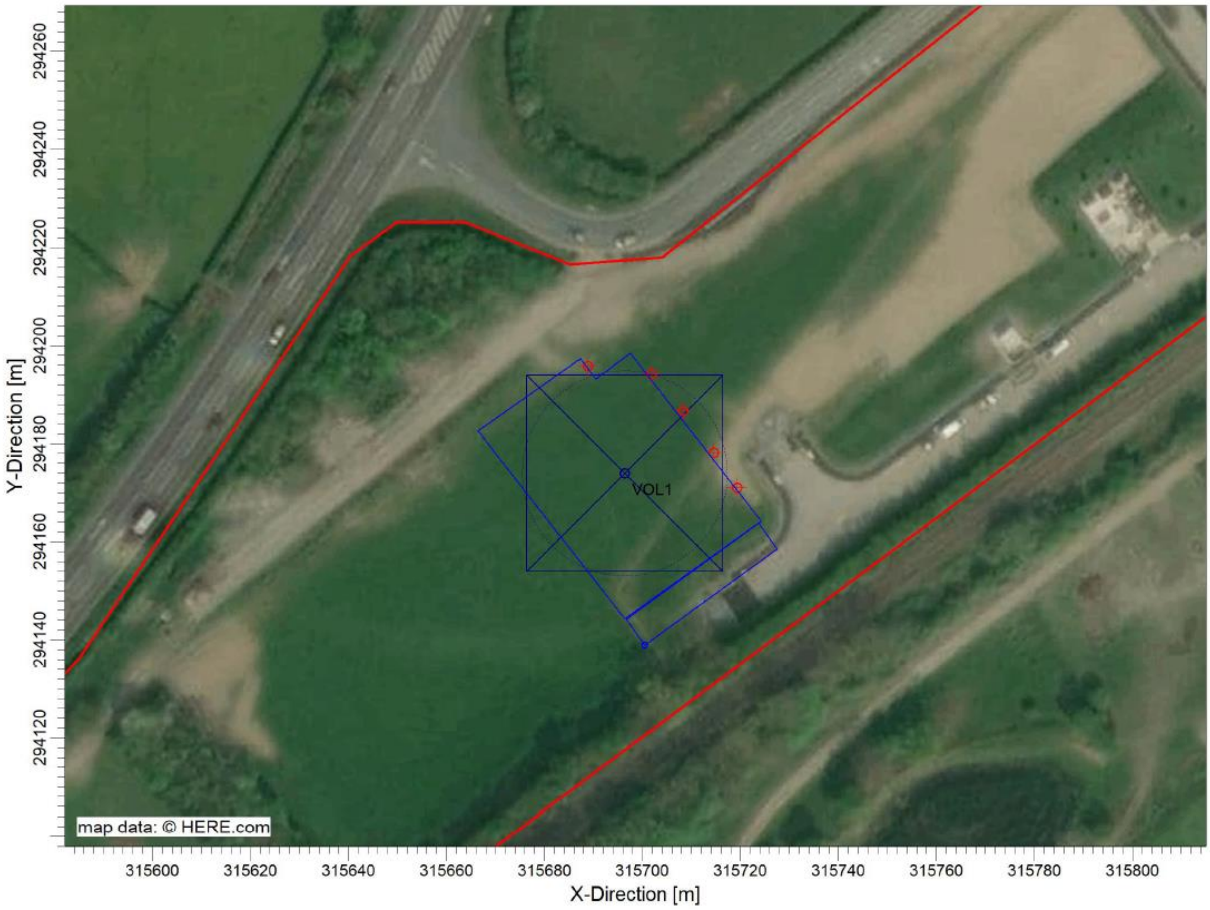
(A) In line with the approach outlined in the Aermod implementation guide, the side length of the building has been calculated by transforming the building shape to a square of equivalent surface area.

(B) In line with the approach outlined in the Aermod implementation guide, the initial lateral dimension has been calculated by dividing the side length by 4.3.

(C) In line with the approach outlined in the Aermod implementation guide, the initial vertical dimension has been calculated by dividing the height of the building by 2.15.

Figure 6-1 presents the modelled odour emission sources (red points) in relation to the modelled buildings (blue outline) and site boundary (red outline).

Figure 6-1: North Powys Bulking Facility – Odour Emission Sources



6.3 Meteorological Data

The most important meteorological parameters governing the atmospheric dispersion of pollutants are as follows:

- Wind direction: determines the broad transport of the emission and the sector of the compass into which the emission is released;
- Wind speed: will affect ground level emissions by determining the initial dilution of pollutants emitted; and
- Atmospheric stability: is a measure of the turbulence, particularly of vertical motions.

There are a number of meteorological stations surrounding the Site (Lake Vyrnwy, Shobdon Airfield, Bala, Shawbury and Trawsgoed) however these stations are all a considerable distance from the Site and have significantly differing characteristics such as elevation and surrounding land use. A review of meteorological stations in proximity to the Site is presented in **Table 6-3** and **Figure 6-2** below for reference.

Table 6-3: Details on Recording Stations in Proximity to the Site

Recording Station Name	Station ID	Station Elevation (m)	Distance from Site (km)	Summary of Location
Lake Vyrnwy (No. 2)	3410	359	28	Rural

Recording Station Name	Station ID	Station Elevation (m)	Distance from Site (km)	Summary of Location
Shobdon Airfield	3520	99	40	Semi-rural
Bala	3409	163	46	Rural
Shawbury	3414	76	48	Semi-rural
Trawsgoed	3503	62	52	Rural
Table Notes: The Site elevation is 94m. The land use in the immediate vicinity surrounding the Site is rural.				

Figure 6-2: Recording Stations in Proximity to the Site

As there are no meteorological stations in proximity to the Site which were considered to be representative of the Site location, Numerical Weather Prediction (NWP) meteorological data has been utilised for the study. Five consecutive years of hourly-sequential NWP data was acquired based on the Site location and applied in the assessment.

The NWP meteorological data (5 years of hourly sequential data for the period 2015 to 2019 inclusive) was obtained in '.met' format from the data supplier. The data was converted to the required surface and profile formats for use in AERMOD, in accordance with the latest guidance[12], using AerMet View meteorological pre-processor, details specific to the Site location were used to define surface roughness, albedo and bowen ratio in the conversion (see **Table 6-4**) using the AerSurface tool within AerMet.

[12] AERMOD Implementation guide. AERMOD implementation workgroup, USEPA. Last revised August, 2019.

Table 6-4: Meteorological Data Preparation – Applied Surface Characteristics

Zone (Start and End Sectors)	Albedo	Bowen	Surface Roughness
0 – 30°	0.18	0.57	0.146
30 – 60°	0.18	0.57	0.157
60 - 90°	0.18	0.57	0.154
90 - 120°	0.18	0.57	0.140
120 - 150°	0.18	0.57	0.090
150 - 180°	0.18	0.57	0.087
180 - 210°	0.18	0.57	0.088
210 - 240°	0.18	0.57	0.088
240 - 270°	0.18	0.57	0.088
270 - 300°	0.18	0.57	0.088
300 - 330°	0.18	0.57	0.158
330 - 0°	0.18	0.57	0.141

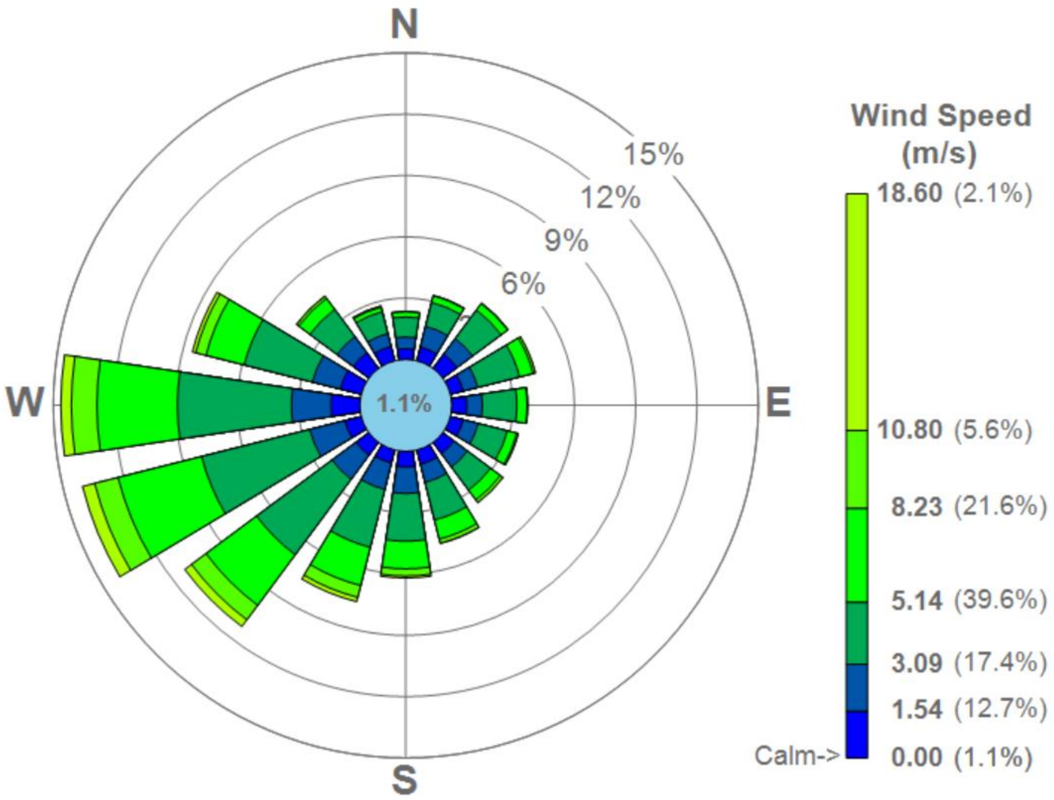
A composite windrose for the 5-year dataset is presented in **Figure 6-3**. Individual wind-roses for each year of meteorological data are presented in Appendix B. The wind-roses indicate that the prevailing wind direction is from the west.

Table 6-5 presents statistics on the meteorological dataset illustrating the number of hours of calms (i.e. no measurable wind-speed) predicted as well as any missing data within the 5-year period. It should be noted that as NWP meteorological data is generated by the supplier based on measured data from the surrounding measurement stations, missing data from one station can be supplemented by data from another station to avoid periods of missing data.

Table 6-5: Numerical Weather Prediction Meteorological Data Statistics

Year	Calm Hours (%)	Missing Hours (%)
2015	0.9	0.0
2016	1.3	0.0
2017	0.8	0.0
2018	1.2	0.0
2019	1.2	0.0

Figure 6-3: NWP Meteorological Data Wind Rose 2015 - 2019



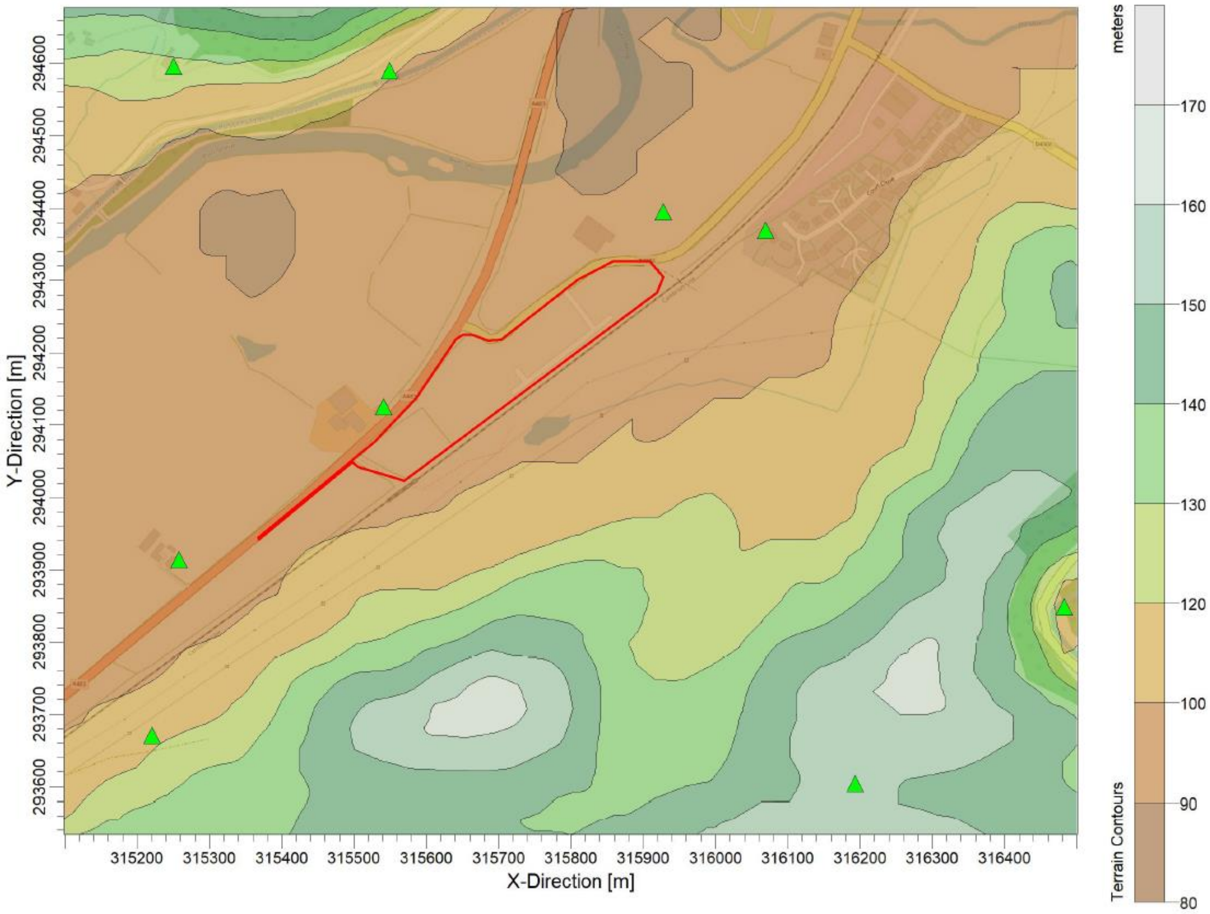
6.4 Terrain Data

The presence of elevated terrain can significantly affect the dispersion of pollutants and the resulting ground level concentration in a number of ways. Elevated terrain reduces the distance between the plume centre line and the ground level, thereby increasing ground level concentrations. Elevated terrain can also increase turbulence and, hence, plume mixing with the effect of increasing concentrations near to a source and reducing concentrations further away. Topography was incorporated within the modelling using 30m resolution Shuttle Radar Topography Mission (SRTM) terrain data. Data was processed by the AERMAP function within

AERMOD to calculate terrain heights (see **Figure 6-4**).

The bulking facility is situated in base of a shallow valley which runs from south-west to north-east, at an elevation of approximately 90m AOD. The land rises at the extents of the valley, to the south-east and north-west of the site, to a height of approximately 160m. As such, topography has been incorporated into the model.

Figure 6-4: Terrain Data



6.5 Building Downwash

Building downwash occurs when turbulence, induced by nearby structures, causes pollutants emitted from an elevated source to be displaced and dispersed rapidly towards the ground, resulting in elevated ground level concentrations.

The integrated Building Profile Input Programme (BPIP) module within AERMOD was used to assess the potential impact of building downwash upon predicted dispersion characteristics. Building and significant structures (such as the Bulking Shed) height and dimensions were sourced from technical design drawings provided by PCC as well as detailed aerial imagery. All structures present on-site were input to the BPIP Building Downwash pre-processor.

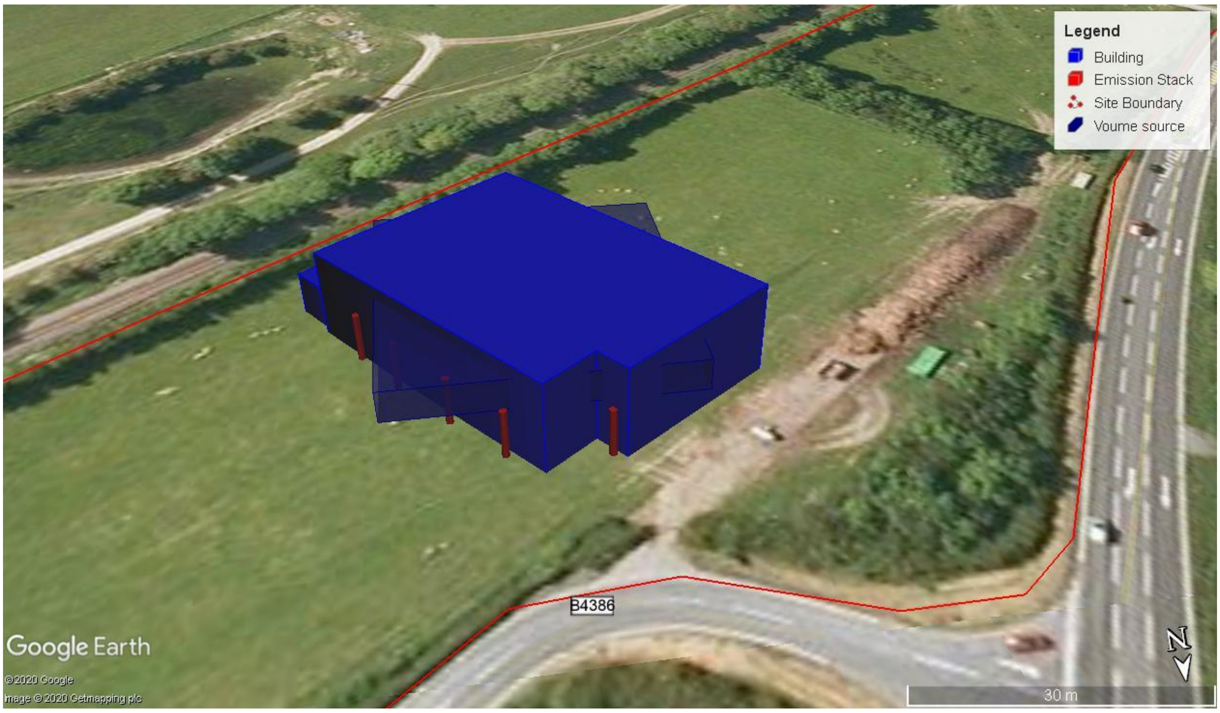
Building downwash should always be considered for buildings that have a maximum height equivalent to at least 40% of the emission height and are located within a distance of five times the lesser of the height or maximum projected width of the building. Buildings to be entered into the dispersion modelling assessment are presented within **Table 6-6**.

Table 6-6: Buildings and Structures Modelled

Structure ID	South-west Corner NGR (m)		Height (m)	Length (m)	Width (m)
	X	Y			
Bulking Shed	315723	294165	13.4	48.5	33.4
Office, welfare and storage building	315700	294139	6.4	6.5	33.4

Reference should be made to **Figure 6-5** for a visual representation of the buildings and structures modelled.

Figure 6-5: Modelled Structures and Buildings



7.0 Prediction of Impacts

This section provides a presentation of the predicted odour impact of the Site, as determined through the detailed dispersion modelling study.

The odour exposures predicted as a result of emissions from the bulking facility are presented in **Figure 7-1**, **Figure 7-2** and **Table 7-1** below.

7.1 Predicted Odour Concentrations at Sensitive Receptors

The predicted concentrations may be compared against the relevant benchmark criterion of 1.5ou$_E$/m^3 for 'high' sensitivity receptors (i.e. residential dwellings), as appropriate for a 'more offensive' odour, reflecting a worst-case assessment approach.

The odour exposures predicted as a result of emissions from the bulking facility at the identified sensitive receptors are presented in **Table 7-1** below.

Table 7-1: Predicted Odour Concentrations at Sensitive Receptors

Receptor	Receptor Sensitivity	Predicted Odour Concentration ($C_{98,\ 1\text{-hour}}$ ou$_E$/m^3)					
		2015	2016	2017	2018	2019	Average 5-years
DR1	High	1.0	1.3	0.7	1.2	1.1	1.1
DR2	High	0.5	0.6	0.7	0.7	0.8	0.6
DR3	High	0.2	0.2	0.1	0.2	0.2	0.2
DR4	High	0.3	0.4	0.5	0.5	0.5	0.5
DR5	High	0.2	0.3	0.2	0.2	0.4	0.2
DR6	High	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DR7	High	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DR8	High	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
DR9	High	<0.1	<0.1	0.1	0.1	0.1	0.1
DR10	High	<0.1	<0.1	0.1	<0.1	0.1	<0.1
DR11	High	<0.1	<0.1	0.1	<0.1	<0.1	<0.1

7.2 Isopleth Maps

The results of the dispersion modelling have been presented as isopleths of 98th percentile of 1-hour mean concentrations. The predicted concentrations may be compared against the relevant benchmark criterion of 1.5ou$_E$/m^3 for 'high' sensitivity receptors.

Figure 7-1 presents the modelled dispersion of odours from the bulking facility when considering the 'worst-case' meteorological year investigated (2016) (i.e. the individual meteorological year which results in the prediction of maximum impacts at considered sensitive receptors).

Figure 7-1: Modelled Odour Concentrations, 2016 Meteorology

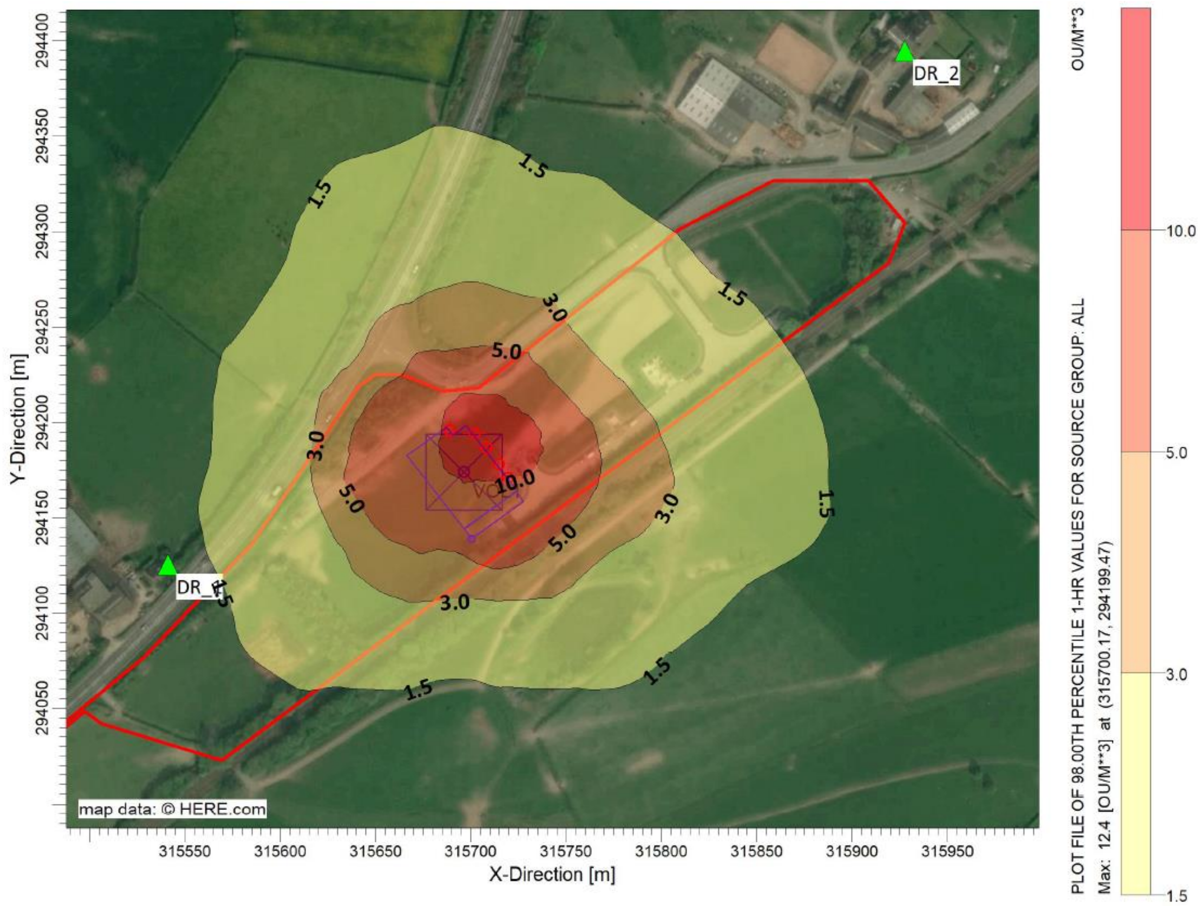
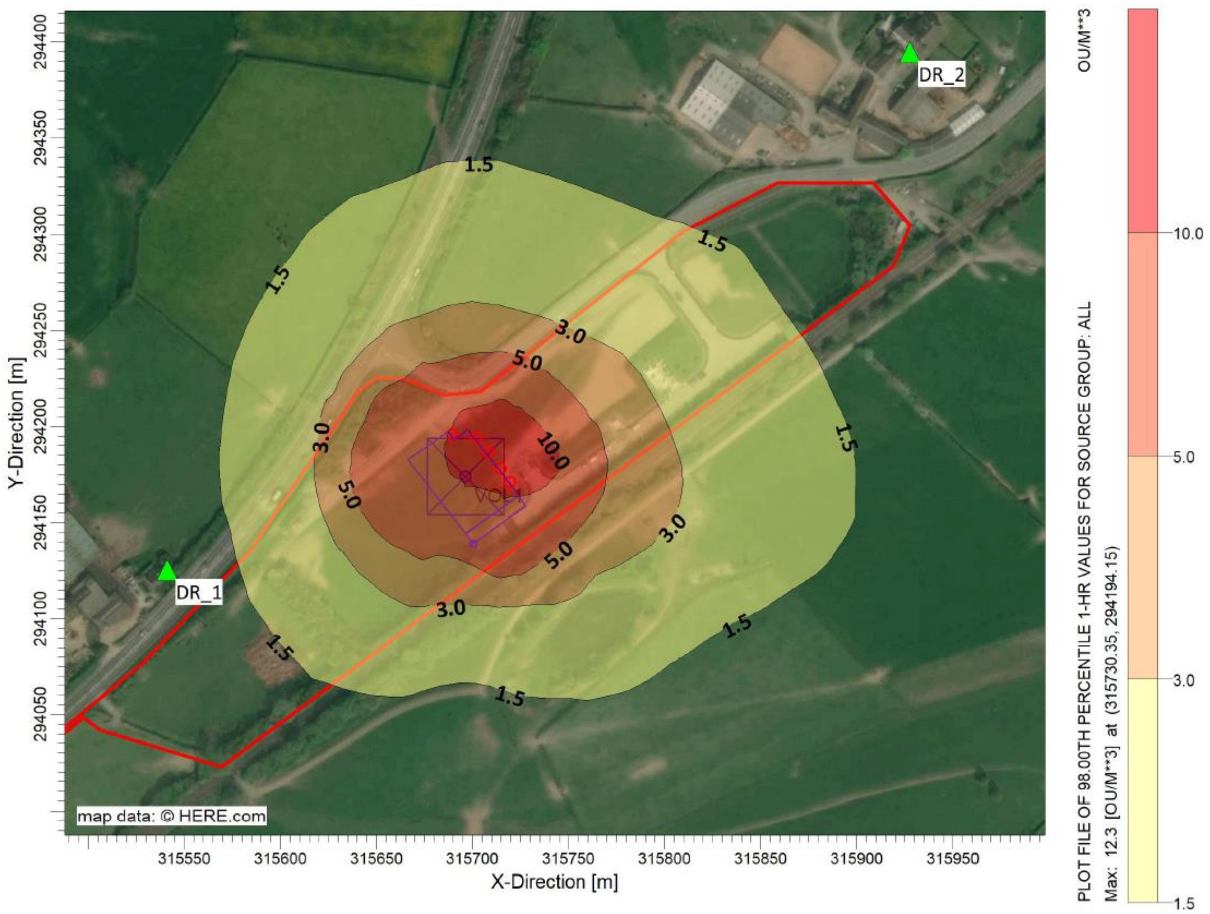


Figure 7-2 presents the modelled dispersion of odours from the bulking facility when considering the average of the 5-years'meteorological data investigated to provide an indication of *'typical'* dispersion trends.

Figure 7-2: Modelled Odour Concentrations, Average of 2015-19 Meteorology



Reference should be made to Appendix A for presentation of the modelled isopleth contour plots for each meteorological year considered.

7.3 Interpretation of Results

The results of the assessment indicate that the odour impact from the operation of the bulking facility is less than the benchmark criterion of 1.5ou_E/m^3 as a 98th percentile of 1-hour mean concentrations at all considered receptors.

Therefore, in accordance with NRW's H4 Odour Guidance there is no risk of significant pollution at all receptors.

8.0 Summary and Conclusion

SLR has undertaken an OIA of identified sources of odour from the proposed North Powys Bulking Facility near Newtown, Powys, to support a permit application for the Site.

The potential odour impact from the proposed facility has been quantified by dispersion modelling using Lakes AERMOD, applying a precautionary approach and model inputs, applied as part of a robust assessment. Odour emission rates for use in the dispersion modelling were determined in reference to published research data conducted at a similar site as well as design specifications for the ventilation system.

Dispersion modelling of odour from the standard operation of the proposed bulking facility has been compared against the $C_{98,1\text{-hour}}$ $1.5ou_E/m^3$ odour impact criterion (i.e. 'high' receptor sensitivity, 'highly offensive' odour) to reflect a worst-case assessment. It is noted that a number of the identified sensitive receptors in close proximity to the bulking facility are Farmhouses, which could be considered of a lower receptor sensitivity (in reference to the IAQM Odour Guidance). However, to present a suitably cautious approach for this assessment, it has been assumed that all identified receptors are of a 'high sensitivity'.

The results of the assessment indicate that the odour impact from the operation of the bulking facility is less than the benchmark criterion of $1.5ou_E/m^3$ as a 98^{th} percentile of 1-hour mean concentrations at all considered receptors. Therefore, in accordance with NRW's H4 Odour Guidance there is no risk of significant pollution (as a result of the bulking facility's operation) at all receptors.

Appendix A: Figures – Modelled Odour Contours and Impact Descriptors

Figure A-1: North Powys Bulking Facility – Modelled $C_{98\ 1\text{-hour}}$ Odour Impact: 2015 Meteorological Data

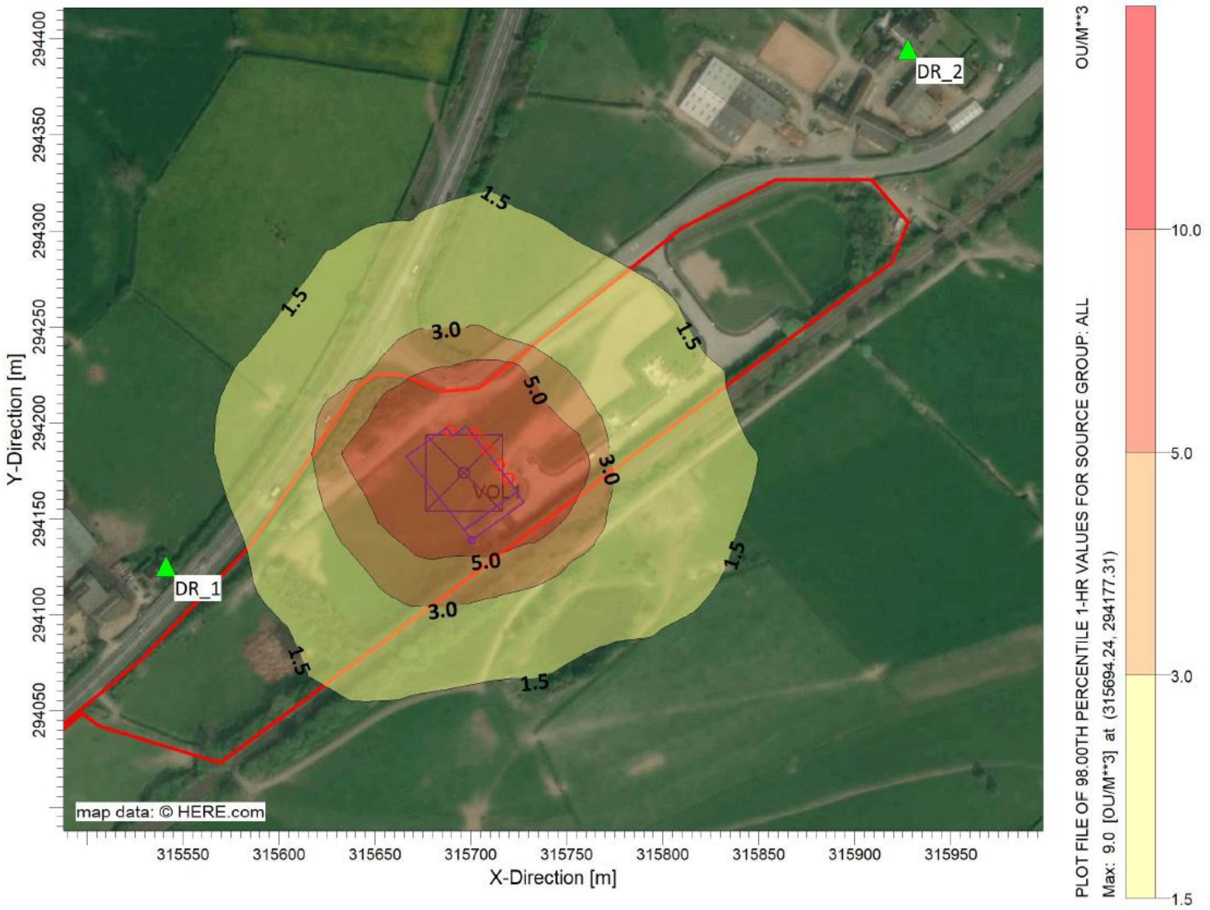


Figure A-2: North Powys Bulking Facility – Modelled $C_{98\ 1\text{-hour}}$ Odour Impact: 2016 Meteorological Data

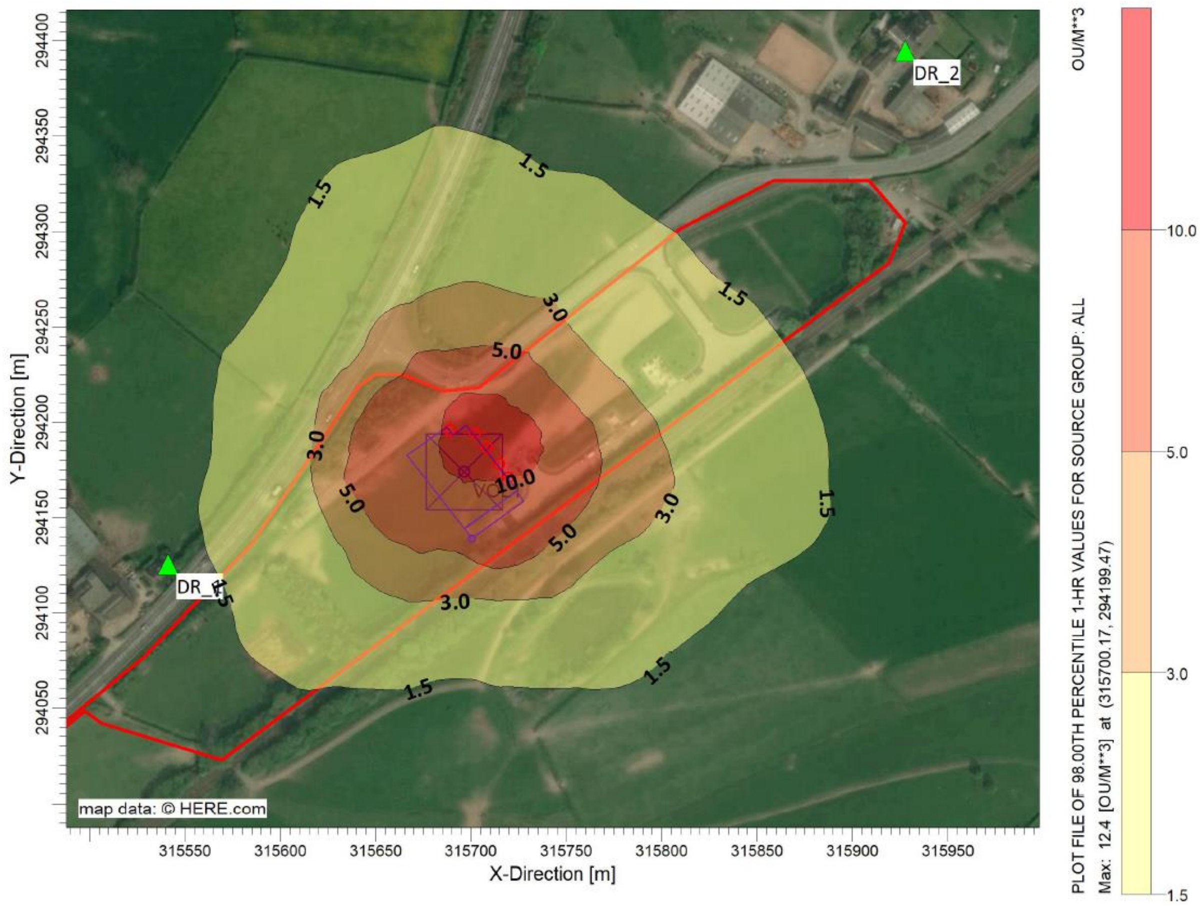


Figure A-3: North Powys Bulking Facility – Modelled $C_{98\ 1\text{-hour}}$ Odour Impact: 2017 Meteorological Data

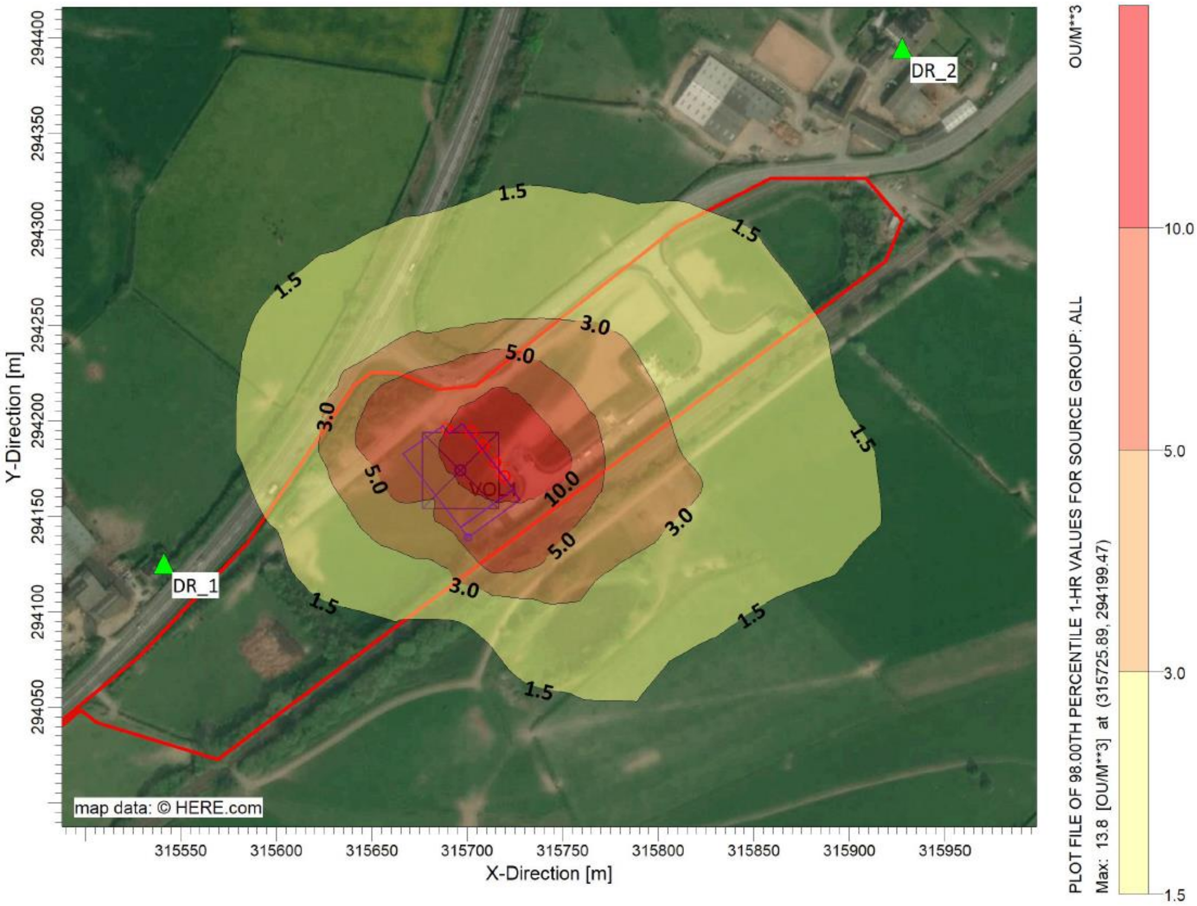


Figure A-4: North Powys Bulking Facility – Modelled $C_{98\ 1\text{-hour}}$ Odour Impact: 2018 Meteorological Data

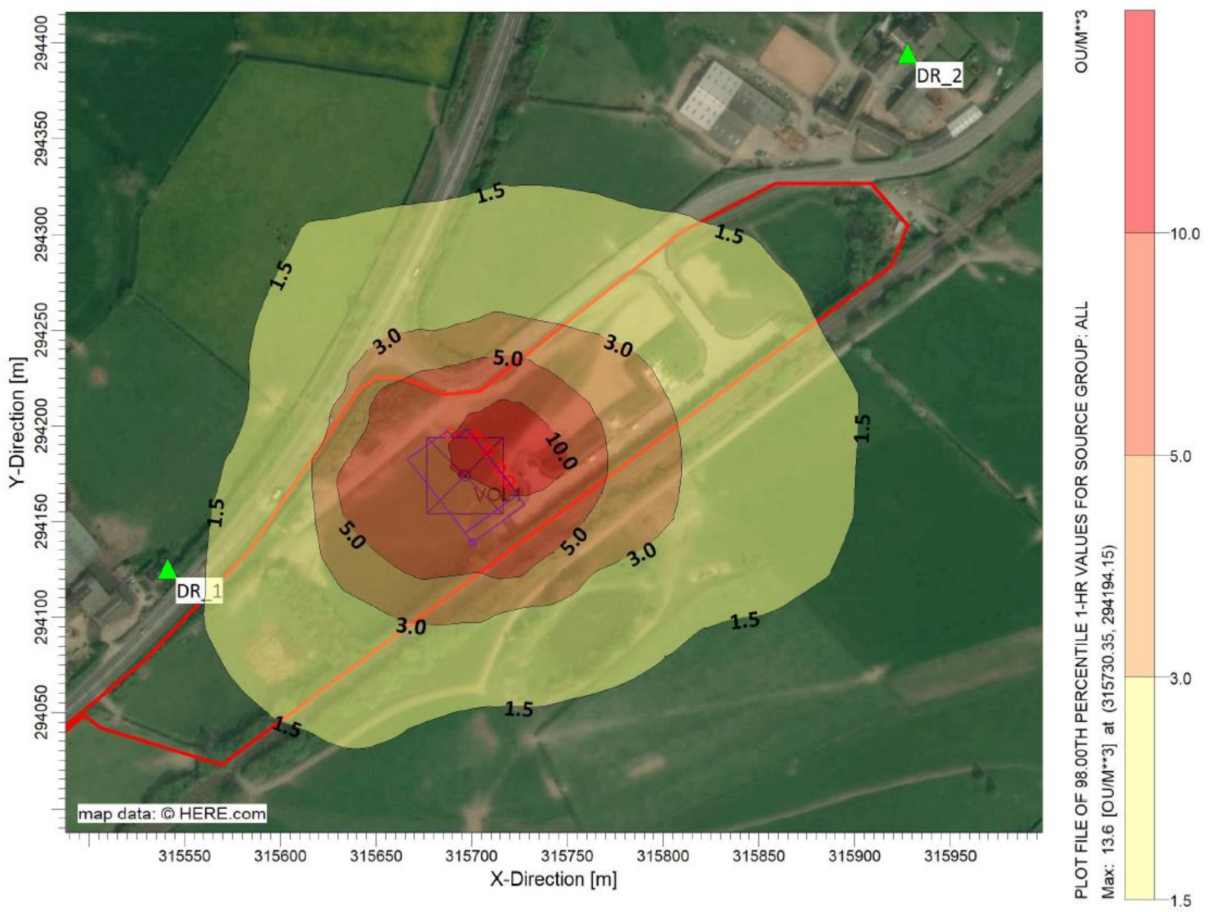
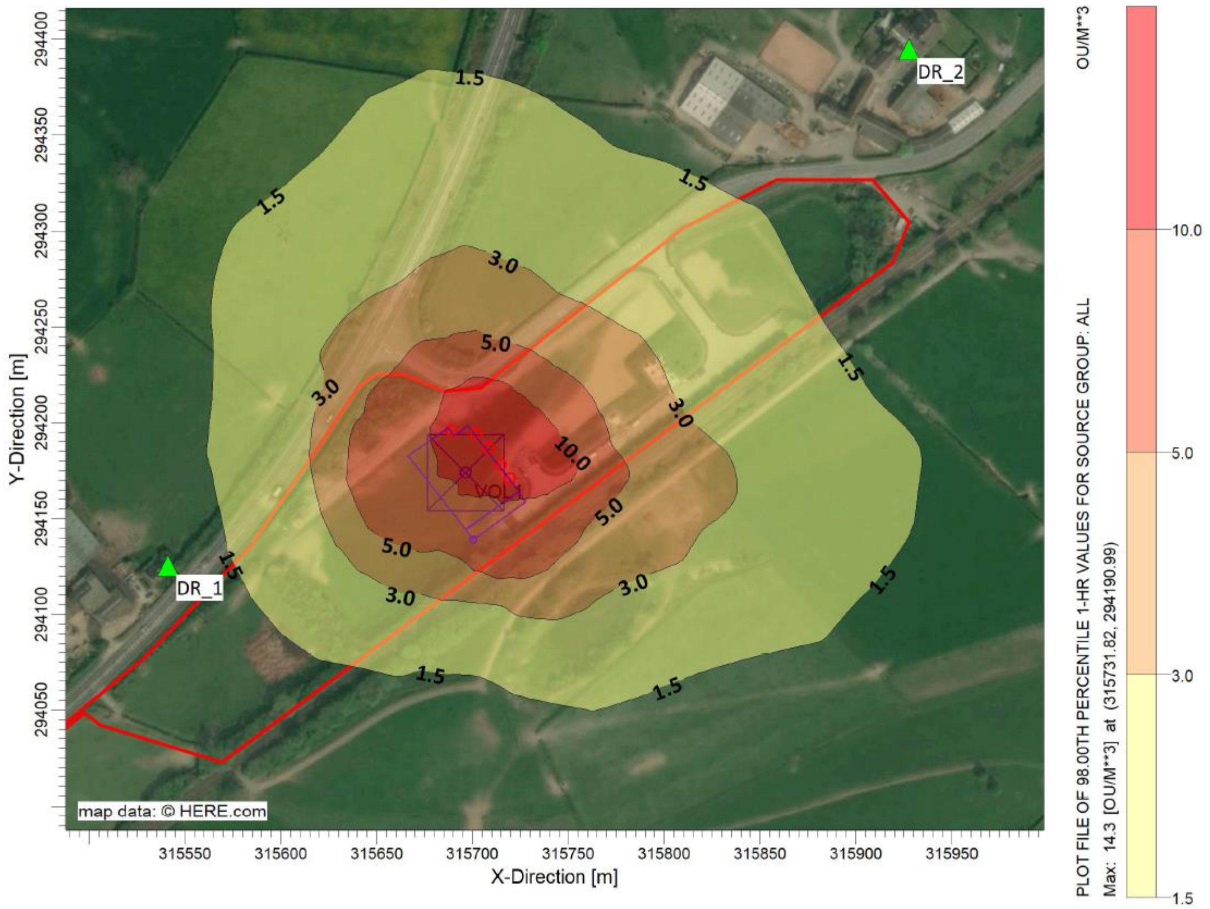


Figure A-5: North Powys Bulking Facility – Modelled $C_{98\ 1\text{-hour}}$ Odour Impact: 2019 Meteorological Data



Appendix B: Meteorological Data Wind Roses

Figure B-6: NMP Meteorological Data Wind Rose 2015

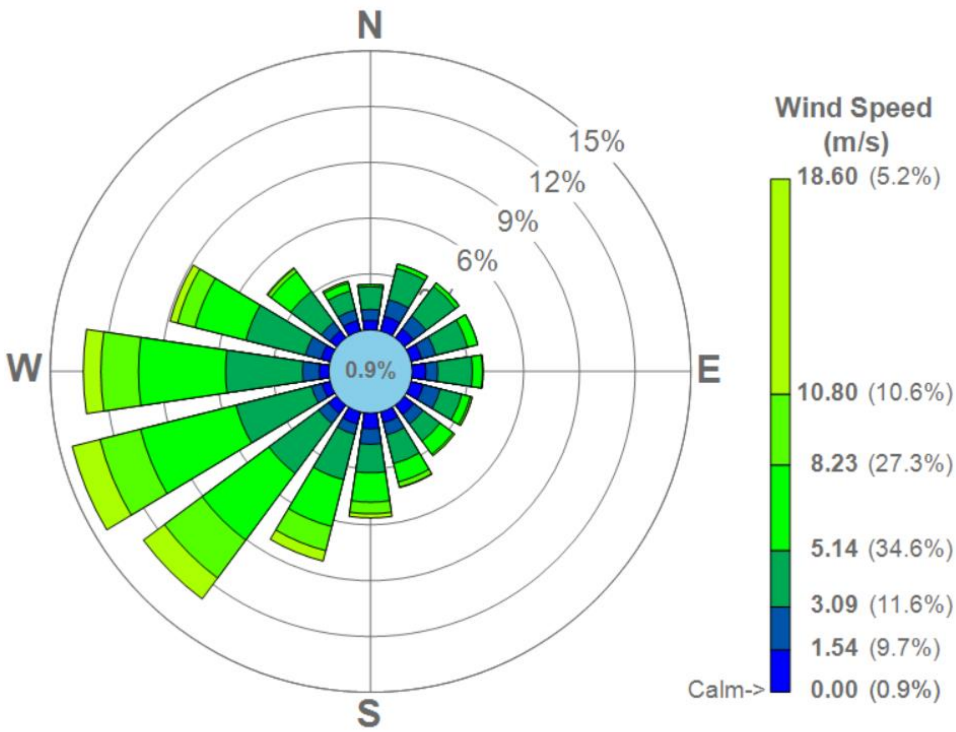


Figure B-7: NMP Meteorological Data Wind Rose 2016

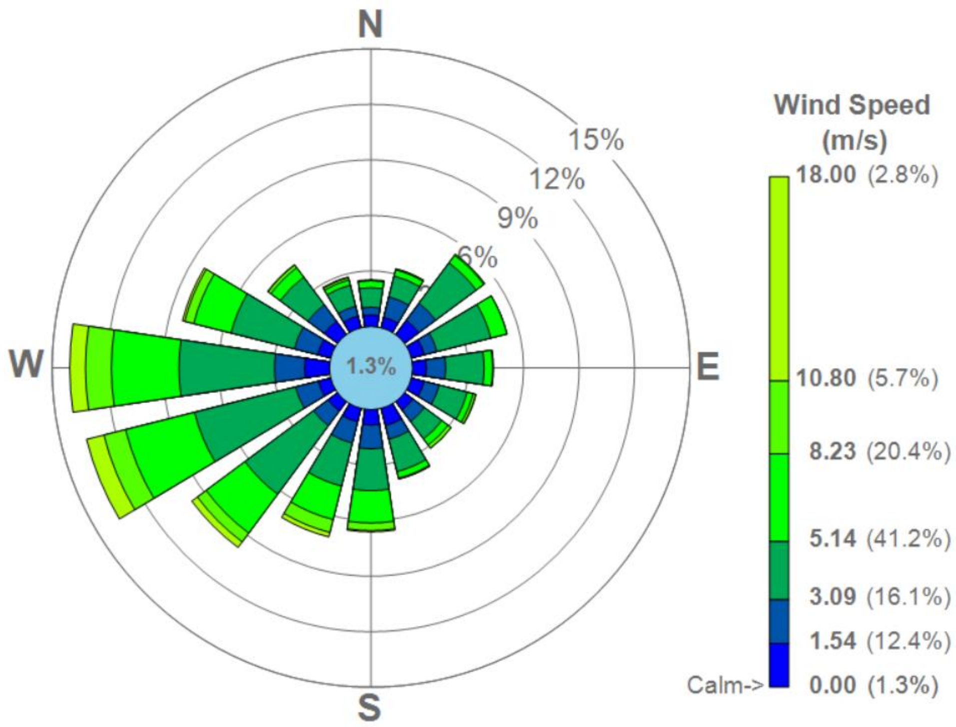


Figure B-8: NMP Meteorological Data Wind Rose 2017

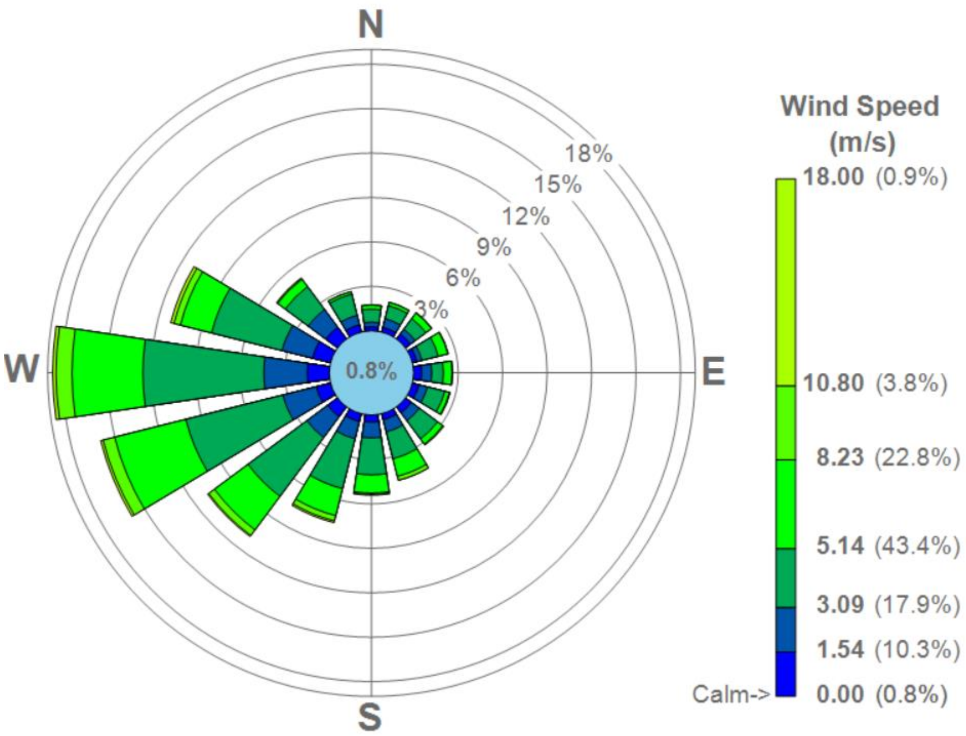


Figure B-9: NMP Meteorological Data Wind Rose 2018

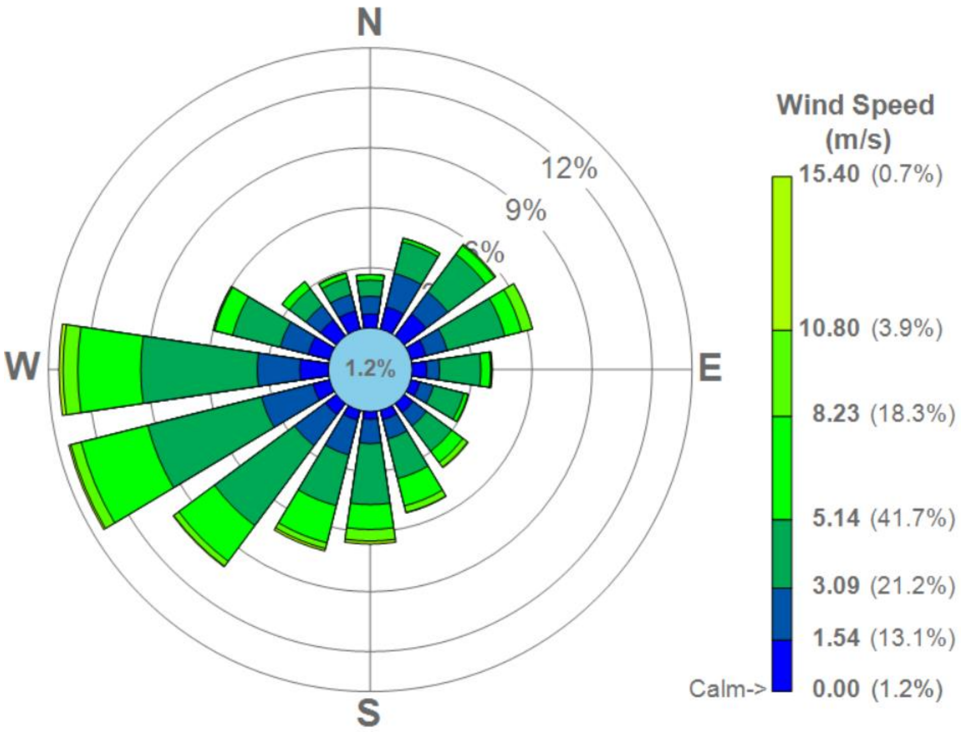

N
E
S
W
12%
9%
6%
1.2%
Wind Speed
(m/s)
15.40 (0.7%)
10.80 (3.9%)
8.23 (18.3%)
5.14 (41.7%)
3.09 (21.2%)
1.54 (13.1%)
Calm->
0.00 (1.2%)

Figure B-10: NMP Meteorological Data Wind Rose 2019

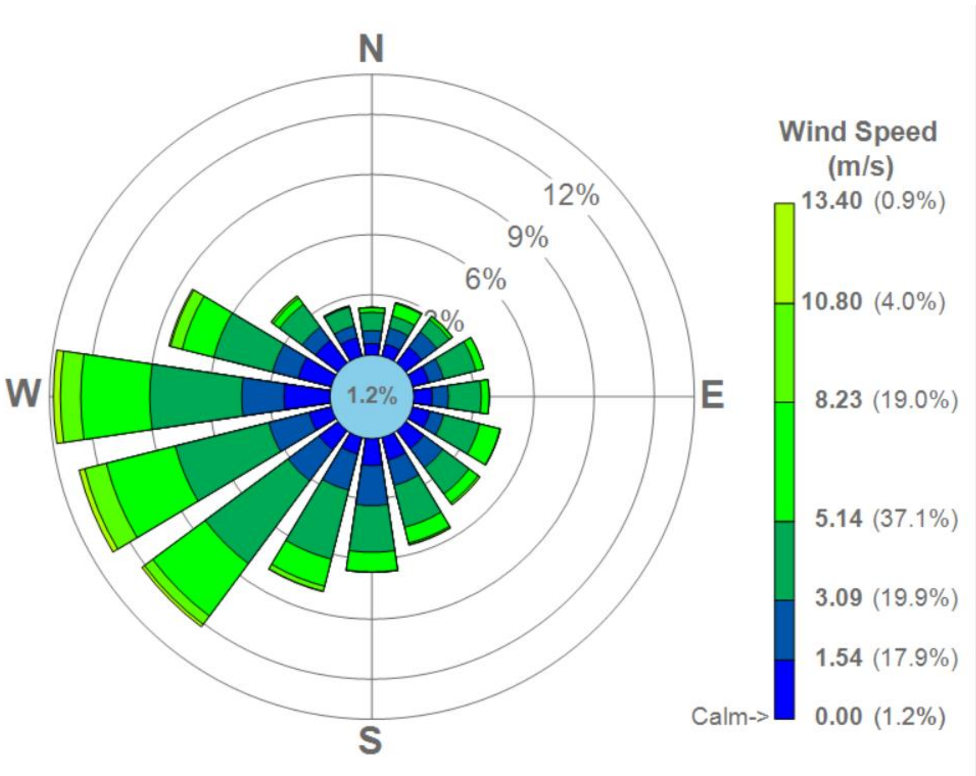
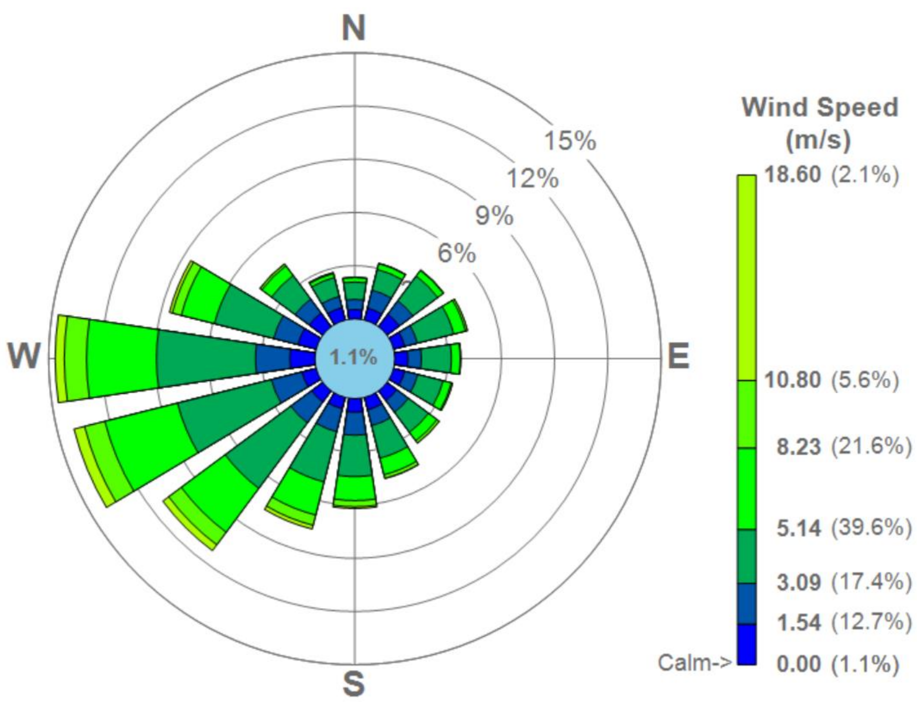


Figure B-11: NMP Meteorological Data Wind Rose 2015 - 2019



Appendix C: Model Sensitivity Analysis

To ensure a conservative assessment approach has been adopted, a sensitivity analysis has been undertaken to investigate the different odour modelling approaches available to predict off-site odour impacts resulting from the Bulking shed outside of operational hours (i.e. when the ventilation system is not active and operations have ceased).

Outside of operational hours the ventilation system is not operational and fugitive odours could be released from Bulking Shed through passive ventilation from the building (in the absence of negative pressure from the ventilation system). This has been represented within the dispersion modelling by application of an assumed passive ventilation rate of 0.5 ACPH (reflecting a well enclosed, purpose-built building, as proposed), defined in reference to the good level of containment afforded by the building's proposed specification (as outlined in Section 5.4.2).

Odour emissions were modelled as stack emissions sources (as presented in Table C-1 below) and as a volume source (as presented in Table 6-2), applying the same total odour emission rate, as presented in Table C-1 below. By comparison of these scenarios which apply the odour emission rate, the influence of the modelling approach can be compared, to ensure a conservative approach is adopted in the study.

Table C-1: Odour Emission Sources - Sensitivity Analysis (Point Sources)

Parameter	Unit	Ventilation Fan 1	Ventilation Fan 2	Ventilation Fan 3	Ventilation Fan 4	Ventilation Fan 5
Emission Source Type	-	Stack	Stack	Stack	Stack	Stack
Location (NGR)	Easting (x)	315705	315709	315702	315714	315719
	Northing (y)	294189	294184	294195	294178	294171
Discharge Height	Meters (m)	7	7	7	7	7
Stack orientation	-	Horizontal				
Efflux Velocity	m/s	n/a [a]				
Volumetric Flow Rate	m^3/s	0.421	0.421	0.421	0.421	0.421
Discharge Temperature	°C	Ambient [b]				

Parameter	Unit	Ventilation Fan 1	Ventilation Fan 2	Ventilation Fan 3	Ventilation Fan 4	Ventilation Fan 5
Emission Rate	ou_E/s	798	798	798	798	798

Notes:

(A) In order to reflect the horizontal nature of the emission point, in line with the latest Aermod guidance, the 'Horizontal' release type has been selected within Aermod. By selecting this option, Aermod reduces the efflux velocity to a near-zero value.

(B) The 'ambient' temperature option has been selected within Aermod. This substitutes the discharge temperature with the ambient temperature value within meteorological file for that hour.

Figure C-12: North Powys Bulking Facility – Modelled $C_{98\ 1\text{-hour}}$ Odour Impact: 2015 Meteorological Data (Stack Sources)

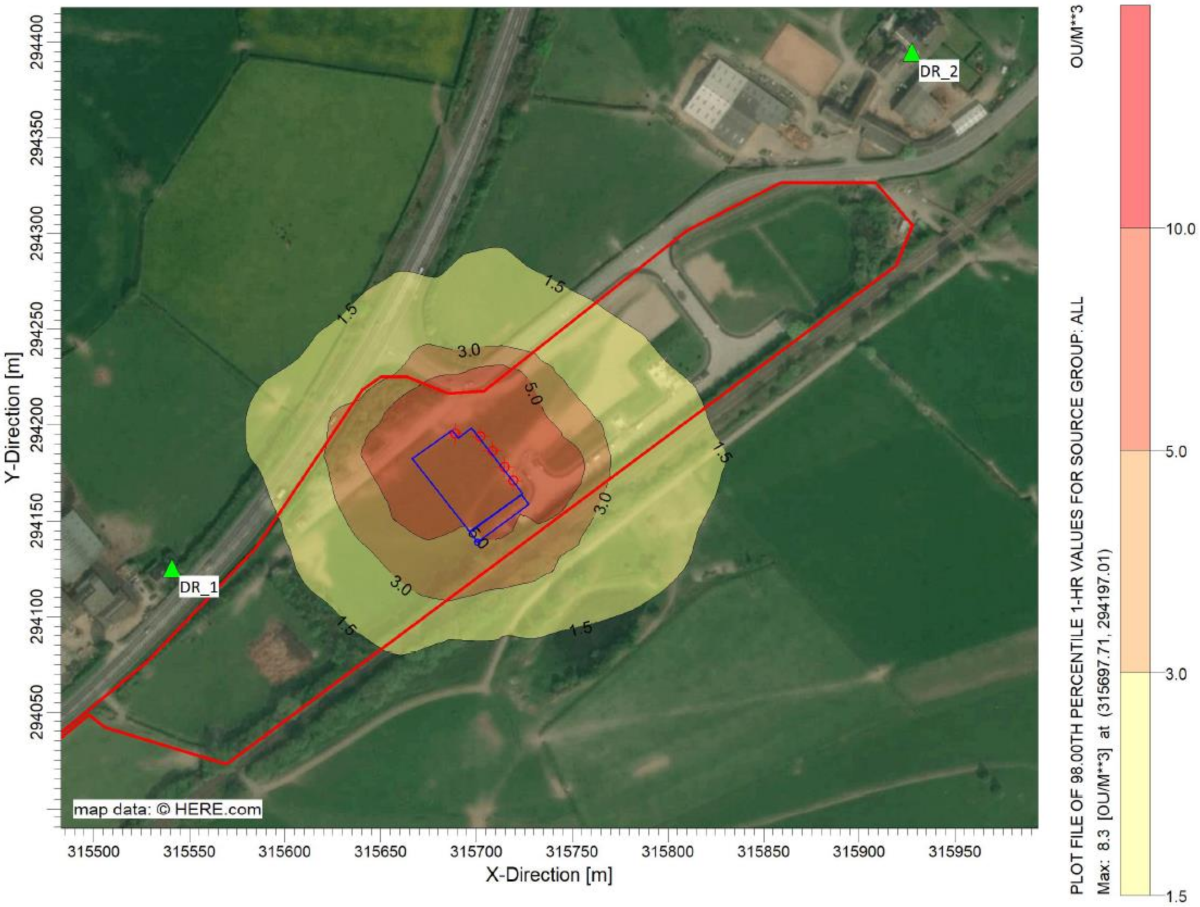
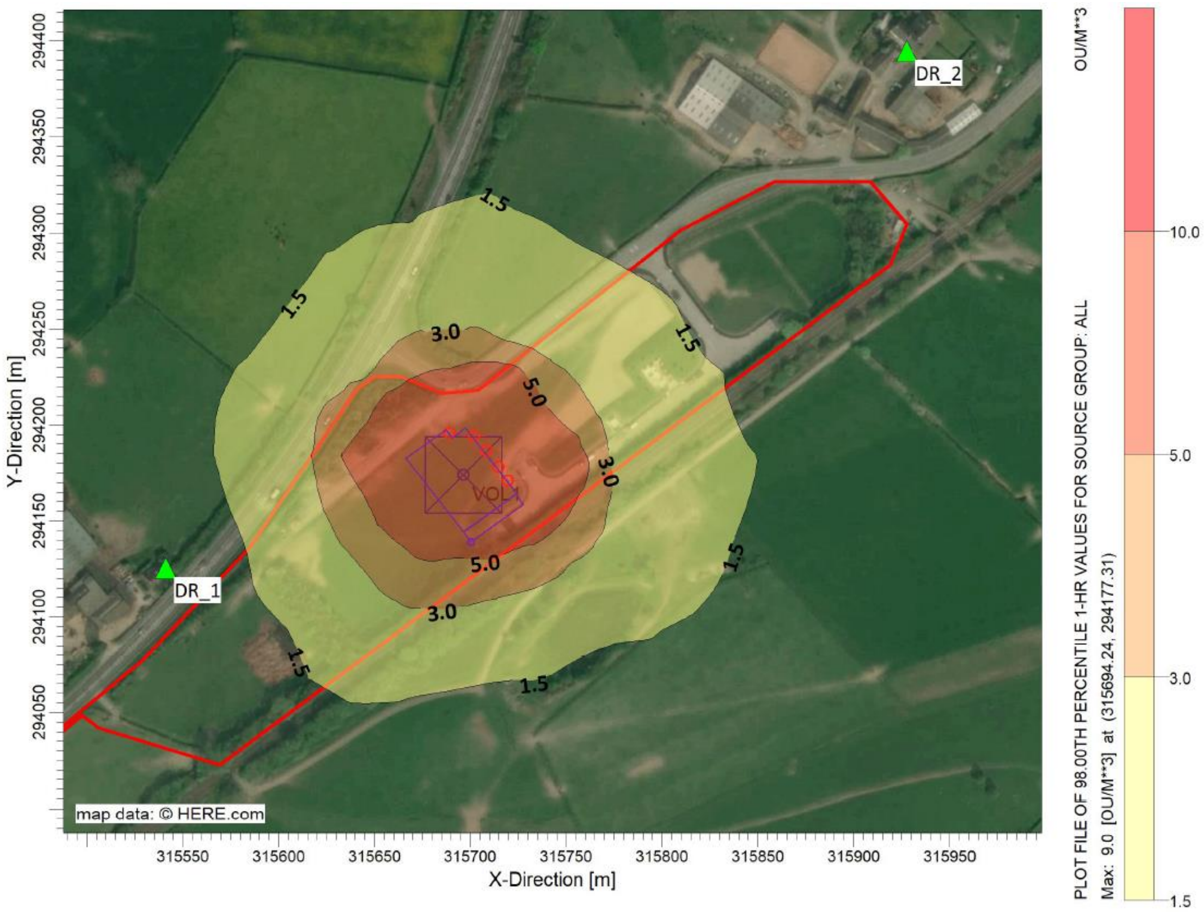


Figure C-2: North Powys Bulking Facility – Modelled $C_{98\ 1\text{-hour}}$ Odour Impact: 2015 Meteorological Data (Volume Sources)



Through reference to the results presented in Figure C-1 and C-2 above, the sensitivity analysis concludes that representation of odour emissions (outside of operational hours) as a volume source represents a worst-case assumption, and has therefore been adopted for this study.

Appendix D: Odour Potential of Waste Types

Table D-1: Odour Potential of Waste Types

Waste Code	Description of Waste	Approximate Total Storage Bund Area (m^2)	Storage Location	Associated Odour Potential
200301	Residual waste	100	Bunded area located within Bulking Shed	Medium - High
200303	Street cleaning litter			Medium - High
200307	Bulky waste			Low/Negligible
200111	Textiles			Low/Negligible
200108	Food waste	40		High
200199	Absorbent Hygiene Products	up to 10 (1 skip)		Very High
15 01 02, 15 01 04, 20 01 39 and 20 01 40	Co-mingled cans and plastic	167		Low/Negligible
15 01 01 and 200101	Mixed paper and cardboard	100		Low/Negligible
15 01 07, 19 12 05 and 200102	Mixed glass	115	Bunded area located Outdoors	Low/Negligible
200201	Green (garden) waste	115		Low

The odour potential of the different types of material have been determined in reference to odour monitoring data from a range of sites around the UK, IAQM Odour Guidance and Waste Sector Guidance[13]. The trend observed is that the lower the organic content of material type, the lower the odour potential (and also the inverse).

Green waste is an exception in that it is comprised almost entirely of plant matter but has a moderate odour potential. However, when considering the site setting (agricultural), the sensitivity of nearby residential receptors to green-waste type odours is likely to be low, therefore the associated odour potential has been considered 'low'.

When considering the relatively small volume of AHPs to be stored at the site, in combination with the level of containment provided by the skip as well as the Bulking Shed building, the resulting odour potential would be considered medium.

[13] Best Available Techniques (BAT) Reference Document for Waste Treatment, European Commission, 2018.

Appendix E: Justification of Odour Emission Rates

As the Proposed Development has not yet been constructed, estimated odour emission rates / odour concentration data for the site activities and waste to be processed have been defined through a literature review of monitoring data from other similar waste transfer sites. Two different approaches by which to estimate odour emissions for the Bulking Shed are outlined below:

Approach 1:
The potential odour concentration from within the Bulking Shed has been estimated on the basis of published odour monitoring data from a similar bulking (maximum odour concentrations within the operational waste transfer facility[10] ranged between 65ou_E/m^3 and 1,895ou_E/m^3. Monitoring was undertaken during September and correlated with periods when material was freshly tipped and/or sorted (i.e. active processing) representing maximum potential odour generation and emissions. It is noted that the maximum monitored odour concentration (1,895ou_E/m^3) correlated with the tipping of material on the floor, reflecting a 'worst-case scenario'.

The odour concentration of air within the Bulking Shed will vary spatially (i.e. higher odour concentrations in proximity to waste storage and handling operations) and temporally (i.e. odour concentrations will be higher during tipping, and lower during quieter periods). However considering that the proposed development would also include handling and storage of a small volume of AHPs within a single skip, it has been assumed that the odour concentration of all air within the Bulking Shed would be the maximum measured result of 1,895ou_E/m^3 (i.e. the highest measured odour concentration during tipping of material within the facility building in the research study), even outside of operational hours. This reflects a highly cautious assessment approach.

As presented in Table 6-1 and Table 6-2, total site odour emissions are estimated to be 11,975ou_E/s during operational hours, and 3,992ou_E/s outside of operational hours, when adopting this highly precautionary approach

Approach 2:

An alternative approach is to apply measured area odour emission rates for each waste type to be stored within the Bulking Shed (domestic, food and AHP waste) and multiply these by the proposed storage areas. This method assumes that all waste storage bays are continuously filled with waste at maximum capacity, reflecting a conservative approach.

Area odour emission rates for these waste types are presented in Table E-1 below, and have been gathered from a range of sources including published reference material and previous monitoring data within the public domain.

Table E-2: Area Odour Emission Rates

Waste Type	Reference Source	Area Odour Emission Rate ($ou_E/m^2/s$)	Maximum Area Odour Emission Rate ($ou_E/m^2/s$)	Surface Area of Associated Storage Bay (m^2)	Estimated Odour Emission Rate (ou_E/s)
Residual (domestic) waste	Arpley [A]	13.1	28.4	101.5	2,883
	Redhill [B]	8.0			
	Lancashire [C]	28.4			
Food waste	NEG [D]	139.0	139.0	28.1	3,906
AHP waste	Stratford [E]	36.8	36.8	11.3	414

Table notes:

(A) Arpley Landfill Odour Impact Assessment, 2013, FCC Ltd.
(B) Air Spectrum Environmental Limited, Odour Impact Assessment, Proposed Development at Nutfield Road, Redhill.
(C) Odour Sol JV (April 2016) Odour Assessment, Lancashire Waste Recycling Ltd.
(D) Netherlands Emissions Guidelines for Air, Nov 2007, Chapter 3.3G. Odour emission presented is in the units $ou_E/m^2/hour$ and has been converted to the presented value in $ou_E/m^2/s$.
(E) Stratford WTS, Odournet UK Ltd report reference: ARCE15A_06_FINAL, 2015. Odour emission rate for sewage screenings (i.e. consisting of used hygiene products) has been applied as a surrogate for AHP waste, reflecting a worst-case assumption as AHP waste would be less contaminated (and is often individually bagged or double-bagged).

In lieu of a specific reference for the odour emission rate for AHP waste, the odour emission rate for sewage sludge has been substituted, representing a 'worst-case' assumption.
In consideration of the maximum odour emission rates presented in Table E-1, the total estimated odour emission rate would be 7,206 ouE/s when adopting this approach.

Conclusion:
As presented above, Approach 1 results in a higher estimate of odour emissions from the Bulking Shed compared to Approach 2. Therefore, it is considered that as this OIA has applied the odour emission rates as defined in Approach 1, the approach is robust and reflects a conservative 'worst-case' assumption in the determination of off-site odour impacts.

Ageing of Waste:

A conservative assessment approach has been adopted in regard to the effect of ageing of waste upon odour emissions. The adopted approach has considered odour emissions derived from sampling of freshly agitated waste, immediately after tipping from collection vehicles, which reflects the period during which odour emissions from waste are highest.

Organic content within waste is the main mechanic by which odour emissions could potentially increase over time as a result of decomposition and putrefaction[14]. However it should be considered that food waste is segregated from mixed municipal waste within the catchment of this WTS, therefore the organic content of the mixed municipal waste received would be much reduced (in comparison to catchments where food waste is co-mingled).

The odour potential of mixed municipal waste (without food waste co-mingled) decreases over time; sharply decreasing within the first hour following tipping, and steadily decreasing further over the following days. It is proposed that mixed municipal waste would be stored at the Site for up to 5 days, therefore it can be considered highly unlikely that odour emissions from mixed municipal waste would surpass the odour emission rate measured from 'freshly tipped' mixed municipal waste over the proposed maximum retention period (5-days) as a result of decomposition or putrefaction of the waste.

Food waste has a very high organic content and therefore there is the potential for odour emissions from this waste type to increase over time as the organic material decomposes (and putrefaction may occur). However in consideration that the retention time would be just 24-hours (in line with the Waste Sector Best Available Techniques Reference Document[15]), it is not anticipated that significant levels of decomposition or putrefaction would occur during this short retention period.

The approach to definition of odour emissions from waste within this assessment is therefore highly conservative and reflects a 'worst-case' assessment approach, as it assumes that all waste stored is 'freshly tipped' (i.e. the period of maximum odour emissions).

[14] The contribution of biowaste disposal to odor emission from landfills, Ziyang Lou, Mingchao Wang, Youcai Zhao & Renhua Huang

[15] Best Available Techniques (BAT) Reference Document for Waste Treatment, JRC, 2018.

www.wrapcymru.org.uk/CCP

Helpu Cymru i leihau ei Hôl Troed Carbon
Help Wales reduce its Carbon Footprint

recycle ailgylchu