

Appendix 10.3 - Odour Assessment

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1.0 INTRODUCTION

- 1.1.1 This Technical Appendix provides a detailed methodology and assessment of the potential for loss of amenity of future site users as a result of odour emissions associated with operations at Pilsworth South Landfill. It should be read in conjunction with the Air Quality Chapter of the Environmental Statement and the other Technical Appendices.

2.0 ODOUR BACKGROUND

2.1 Odour Definition

2.1.1 The Institute of Air Quality Management (IAQM) guidance¹ defines odour as:

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

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

2.2 Odour Impacts

2.2.1 The magnitude of odour impact depends on a number of factors and the potential for complaints varies due to the subjective nature of odour perception. The **FIDOL** acronym (also stated as **FIDOR** in Environment Agency (EA) guidance²) is a useful reminder of the factors that will determine the degree of odour pollution. These are described by the IAQM³ as follows:

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

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

² H4: Odour Management, EA, 2011.

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

be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

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

2.2.3 The **FIDOL** factors can be further considered to provide the following issues in regards to the potential for an odour emission to cause 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 in England 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) and waste 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 Activities at the Pilsworth South Landfill are controlled under an Environmental Permit issued by the EA (Reference: EPR/BS7951IB). This includes a number of controls to ensure that odour impacts do not occur at sensitive locations as a result of emissions generated during operations. This comprises the following condition in relation to odour:

"3.3 Odour

3.3.1 Emissions from the 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.

3.3.2 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 minimises the risks 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 In accordance with the stated condition, Pilsworth South Landfill operates in line with an Odour Management Plan (OMP)⁴. This specifies the procedures that are followed at the facility in order to prevent or minimise odour emissions and associated impacts during normal and emergency operating scenarios.

- 2.3.5 The legislative controls described above were considered as necessary throughout the undertaking of this assessment.

⁴ OMP Pilsworth South Landfill, Valencia, 2025.

2.4 Institute of Air Quality Management Guidance

- 2.4.1 The IAQM published the 'Guidance on the Assessment of Odour for Planning'⁵ document on 20th May 2014. This was updated in 2018⁶ and specifically deals with assessing odour impacts for planning purposes, namely potential effects on amenity. The assessment methodology outlined in the guidance has been utilised in throughout this report where relevant.

⁵ Guidance on the Assessment of Odour for Planning, IAQM, 2014.

⁶ Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

3.0 BASELINE

3.1 Introduction

3.1.1 Existing conditions in the vicinity of the Assessment Boundary were identified in order to provide a baseline. These are detailed in the following Sections.

3.2 Potential Odour Sources

Desk Top Study

3.2.1 Pilsworth South Landfill covers an area of 72.6ha. Activities at the facility include the extraction of sand and gravel, followed by progressive backfilling with imported waste and restoration. The facility accepts a wide range of municipal, industrial and commercial wastes for both active non-hazardous and hazardous landfill. Reference should be made to Figure 10.4.1 for a map showing the boundary of Pilsworth South Landfill.

3.2.2 Review of aerial imagery and the OMP⁷ indicates that there are 14 cells at the facility, of which six (42%) are currently non-operational and are covered with a geo-membrane.

3.2.3 As outlined in the OMP⁸, there are four potential odour sources associated with operations at the facility. These are:

- Active waste disposal operations and the deposition of freshly tipped waste;
- Old waste that may be released from drilling or over-tip operations;
- Landfill gas from the decomposition of waste; and,
- Leachate, when present on the surface or stored in structures.

3.2.4 To ensure odours are minimised from these sources, Pilsworth South Landfill have adopted the following measures:

⁷ OMP Pilsworth South Landfill, Valencia, 2025.

⁸ OMP Pilsworth South Landfill, Valencia, 2025.

- Pre-acceptance and on-site waste acceptance checks to determine the nature of the waste and potential odours deposited on site. Where wastes containing a high odour risk are accepted, these are buried immediately to a minimum depth of 300mm and covered. The majority of waste is deposited to a minimum depth of 150mm;
- Recordings of odour observations during on-site receipt and unloading of waste;
- Progressive compaction of waste during the day to reduce the exposed surface area of waste;
- Adherence of a tipping plan to avoid the movement of old waste;
- Use of non-odorous cover materials such as, uncontaminated waste soils and quarry sand;
- Progressive capping of completed cells, within 6-months of completion;
- Landfill gas management is undertaken in accordance with a Gas Management Plan;
- An active gas management system has been installed and comprises a network of vertical and horizontal gas extraction wells, connected to a main carrier to control the release of fugitive emissions;
- Leachate management is undertaken in accordance with a Leachate Management Plan;
- Leachate is transferred within sealed pipework and stored within enclosed tanks to minimise the release of odours;
- Leachate monitoring and extraction infrastructure are sealed to prevent odour emissions;
- Weekly on-site and monthly off-site odour monitoring; and,
- Monthly monitoring of ambient methane and hydrogen sulphide (H₂S) levels, to determine compliance with the specified levels for the site. Where levels are exceeded, further investigation is required to determine any on-site sources that require remedial action.

3.2.5 It should be noted that BC have recently approved a planning application for the erection and operation of a material recycling facility (MRF) in the north-western portion of the landfill site (Reference: 71273). This will have a capacity to process 250,000-tonnes of waste per year and will prevent recyclable and recoverable wastes from being disposed. Any residual non-combustible waste that cannot be recovered will be utilised in landfill engineering or placed in the landfill.

Odour Complaints History

3.2.6 It is noted that a series of odour complaints regarding Pilsworth South Landfill have been made by local residents. As such, in accordance with their Environmental Permit, the operators have been working with the EA to control odour levels. In response to the complaints, the facility has included the following measures, as outlined by BC⁹ and the EA¹⁰:

- Installation of 12 additional wells to capture landfill gas from decomposing waste;
- Temporary capping of over 50,000m² of exposed waste; and,
- An increased monitoring programme of H₂S. In 2024 this involved analysis of H₂S concentrations over a 103-day period at nearby sensitive receptors. Results of the monitoring indicated that concentrations of H₂S did not exceed the 24-hour World Health Organisation limit.

3.3 Meteorological Conditions

3.3.1 The potential for atmospheric emissions to impact at sensitive locations depends significantly on the meteorology, particularly wind direction, during release. In order to consider prevailing conditions at the Assessment Boundary, review of historical weather data was undertaken. Meteorological data used in the assessment was taken from Manchester Airport meteorological station at NGR: 381792, 384116, which is approximately 21.4km south of the Assessment Boundary. It is considered that conditions are likely to be reasonably similar over a distance of this magnitude and the information is a suitable source of data for an assessment of this nature.

3.3.2 Meteorological data was obtained from Manchester Airport meteorological station over the period 1st January 2019 to 31st December 2023 (inclusive). This is summarised in Table 10.4.1. Reference should be made to Figure 10.4.2 for a wind rose of the meteorological data.

⁹ <https://www.bury.gov.uk/pests-pollution-and-food-hygiene/pollution/pilsworth-south-landfill-site>

¹⁰ <https://consult.environment-agency.gov.uk/gmmc/information-on-pilsworth-south-landfill-pilsworth/>

Table 10.4.1 Wind Frequency Data

Wind Direction (°)	Frequency of Wind (%)
345 - 15	1.70
15 - 45	3.82
45 - 75	7.21
75 - 105	7.01
105 - 135	4.71
135 - 165	8.00
165 - 195	18.33
195 - 225	15.14
225 - 255	9.34
255 - 285	10.75
285 - 315	8.28
315 - 345	3.01
Sub-Total	97.31
Calms	1.152
Missing/Incomplete	1.54

3.3.3 As shown in Table 10.4.1, the prevailing wind direction at the Assessment Boundary is from the south, with significant frequencies from the south-west. Winds from the north and east are relatively infrequent, which is indicative of conditions throughout the majority of the UK.

3.3.4 All meteorological data used in the assessment was provided by Atmospheric Dispersion Modelling Ltd, which is an established distributor of meteorological data within the UK.

4.0 METHODOLOGY

4.1 Introduction

- 4.1.1 The Project for Assessment has the potential to cause loss of amenity of future site users as a result of potential odour emissions associated with operations at Pilsworth South Landfill. A two-stage assessment was therefore undertaken in accordance with the IAQM 'Guidance on the Assessment of Odour for Planning'¹¹ document, as summarised in the following Sections. This methodology was agreed with Rob Hall, Unit Manager - Commercial Team at Bury Council (BC), on 3rd April 2025.

4.2 Field Odour Surveys

Background

- 4.2.1 An adverse effect of odour exposure, such as annoyance or loss of amenity, is subjective and is not something that can be wholly defined or assessed by scientific methods alone. An assessment can therefore be strengthened by including a subjective assessment of prevailing odour conditions by those directly affected or by experienced, trained, observers.
- 4.2.2 Sensory testing techniques use the human nose as the analytical sensor to enable the odour magnitude (as either intensity or concentration), frequency, duration and offensiveness of the odour to be recorded at a particular location at a specific time. This is a sound approach considering that no analytical instrument can currently give a unified measure of a complex mixture of compounds that quantifies it as a whole in the same way that a human experiences odour. Sensory testing also allows the character of the odour to be assessed, which is a great benefit when there are a number of different odour sources.
- 4.2.3 Subjective sensory tests, such as the Field Odour Survey, should not automatically be considered inferior to quantitative ambient monitoring. When carried out to a rigorous, well-designed methodology, the results of such sensory surveys can be expected to be robust and reproducible.

¹¹ Guidance on the Assessment of Odour for Planning, IAQM, 2018.

Field Odour Survey Procedure

4.2.4 Sensory tests were carried out at a number of survey locations on 12th March 2025, 13th March 2025 and 25th March 2025. Survey positions 2 to 13 were chosen to represent locations closest to the landfill that are most likely to be affected by operations when the Project for Assessment is downwind. These locations are therefore considered to represent worst-case conditions. It should be noted that position 1 was chosen as a control, upwind of the facility, to ensure any odours detected during the surveys originated from the landfill site.

4.2.5 The survey locations are summarised in Table 10.4.2 and are shown visually in Figure 10.4.3.

Table 10.4.2 Survey Locations

Position	Location Description	NGR	
		X	Y
1	Pilsworth Road - Upwind	382321.7	409144.6
2	Pilsworth South Landfill southern boundary	382566.3	408392.9
3	Pilsworth South Landfill southern boundary	382785.6	408496.5
4	Pilsworth South Landfill southern boundary	383010.8	408661.0
5	Pilsworth South Landfill southern boundary	383132.2	408886.2
6	Pilsworth South Landfill southern boundary	383302.7	409082.8
7	Moss Hall Road	383466.0	409182.9
8	Moss Hall Road	383631.6	408857.6
9	Moss Hall Road	383538.7	409076.8
10	Assessment Boundary	383364.7	408986.3
11	Assessment Boundary	383195.5	408784.9
12	Assessment Boundary	383139.5	408551.3
13	Assessment Boundary	382841.6	408339.2

4.2.6 Monitoring was undertaken over a 5-minute period at each position. For each test location, the start time of the observation period, meteorological conditions and the attributes of the odour were recorded as follows:

- The assessor breathed normally, inhaling ambient air samples through the nose every 10-seconds, to give 30 samples over the 5-minute observation period;
- For each sample, the odour intensity was recorded using the scale outlined in Table 10.4.3.

Table 10.4.3 Odour Intensity Scale

Odour Strength	Intensity Level	Comments
No odour/not perceptible	0	No odour when compared to the clean site
Slight/very weak	1	There is probably some doubt as to whether the odour is actually present
Slight/weak	2	The odour is present but cannot be described using precise words or terms
Distinct	3	The odour character is barely recognisable
Strong	4	The odour character is easily recognisable
Very strong	5	The odour is offensive. Exposure to this level would be considered undesirable
Extremely strong	6	The odour is offensive. An instinctive reaction would be to mitigate against further exposure

- At the end of the observation period at the test location, the odour unpleasantness was noted by classifying it as unpleasant, neutral (neither pleasant nor unpleasant) or pleasant. This assumed that at least some of the 30 samples were of intensity 3 or more (i.e. the odour is at least 'barely recognisable');
- The odour descriptor and meteorological conditions were also noted;
- The pervasiveness/extent of the odour at the test location was assessed by calculating the percentage odour time, $t_{\geq 4}$, which is the number of samples where odour was recognisable divided by the total number of samples (i.e. 30). Note that 'recognisable odour' is where the odour strength exceeds the recognition threshold and is definitely recognisable by the assessor i.e. the assessor is capable of definitely identifying its quality/character, which corresponds to an intensity of 4 or more; and,

- The average odour intensity (I_{mean}) over the test period was calculated and the maximum intensity (I_{max}) noted.

4.2.7 The following additional factors were also adopted to safeguard the quality of the sensory assessments:

- The odour assessor would not have undertaken the assessment if they had a cold, sore throat, sinus trouble, etc;
- The odour assessor was not hungry or thirsty;
- The odour assessor did not work within half an hour of the end of their last meal;
- The odour assessor did not smoke or consume strongly flavoured food or drink, including coffee, for at least half an hour before the field odour survey was carried out, or during the survey;
- The odour assessor did not consume confectionery or soft drinks for at least half an hour before the field odour survey was carried out, or during the survey;
- Scented toiletries, such as perfume/aftershave were not used on the day of the field odour survey; and,
- The vehicle used during the field odour survey did not contain any deodorisers.

Odour Exposure

4.2.8 Following completion of the Field Odour Surveys, the matrix outlined in Table 10.4.4 was utilised to determine the level of odour exposure at each monitoring location.

Table 10.4.4 Odour Exposure

Average Intensity (I_{mean})	Percentage Odour Time ($t_{\geq 4}$)				
	≤10%	11% to 20%	21% to 30%	31% to 40%	≥41%
6	Large	Very Large	Very Large	Very Large	Very Large
5	Medium	Large	Large	Very Large	Very Large
4	Small	Medium	Medium	Large	Large
3	Small	Medium	Medium	Medium	Medium
2	Small	Small	Medium	Medium	Medium
1	Small	Small	Small	N/A	N/A

4.2.9 It should be noted that I_{mean} was rounded to the nearest whole number.

4.2.10 The following overriding considerations also affect the scoring of the odour annoyance impact:

- If $I_{\text{mean}} = 0$, then the odour effect can for practical purposes be considered **negligible**; and,
- If $I_{\text{mean}} = 1$ but $t_{\geq 4} = 0\%$, then the odour effect can for practical purposes be considered **negligible**.

Significance of Odour Effect

4.2.11 Following the determination of the odour exposure level, the significance of effect was determined through the interaction with receptor sensitivity, as outlined in Table 10.4.5.

Table 10.4.5 Odour Receptor Sensitivity

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

4.2.12 The assessment matrix is provided in Table 10.4.6.

Table 10.4.6 Odour Effect Significance

Overall Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
Very Large	Substantial	Substantial	Substantial
Large	Moderate	Moderate	Substantial
Medium	Slight	Slight	Moderate
Small	Negligible	Negligible	Slight
Negligible	Negligible	Negligible	Negligible

4.3 **Risk Assessment**

Background

4.3.1 The basic concept of risk assessment is that the overall risk depends on the probability of an event occurring together with the likely consequences if it was to occur. For odour assessments the probability can be considered as the likelihood of exposure (impact), and the consequence can be considered to be the effect on the receptor if that exposure (impact) took place. These two facets can be summarised by the source-pathway-receptor concept.

4.3.2 Behind the source-pathway-receptor concept, is the fundamental relationship:

$$\text{Effect} \approx \text{Dose} \times \text{Response}$$

4.3.3 In the specific case of odour assessments, the dose can be considered equivalent to the odour exposure, or impact. This will be determined by FIDO of the FIDOL factors. The effect is the result of the changes on specific receptors (people in the case of odour) taking into account their sensitivities (i.e. responsiveness to odour), the L (location) in FIDOL is to categorise the sensitivity.

4.3.4 The IAQM guidance states that a qualitative risk-based approach is appropriate for:

- Screening of odour impacts;
- Development proposals likely to have a low risk of adverse effects;

- Situations where there is insufficient information to carry out detailed predictive dispersion modelling;
- Situations where the information has wide uncertainties and its use as input to a detailed predictive dispersion model would be at best a waste of time, money and effort or, worse, would lead to an illusory and false impression of accuracy and precision in the numbers generated; and,
- When the model is not able to properly represent the reality of the situation being assessed, e.g. if the odour effects are likely to be significantly influenced by accidental, unexpected, or unknown releases. In such instances a qualitative estimate may be more appropriate, on the basis that it is better to be broadly correct than precisely wrong.

4.3.5 It is considered that the last three criteria are met for this project. As such, a qualitative assessment methodology was deemed appropriate.

Risk Assessment Procedure

4.3.6 The first step in the assessment is to estimate the odour generating potential of the site activities. This is termed the Source Odour Potential, which takes into account three factors:

- The scale (magnitude) of the release from the odour source, taking into account the effectiveness of any odour control or mitigation measures that are already in place. This involves judging the relative size of the release rate after mitigation and taking account of any pattern of release (e.g. intermittency);
- How inherently odorous the emission is. In some cases it may be known whether the release has a low, medium or high Odour Detection Threshold (ODT). This is the concentration at which an odour becomes detectable to the human nose. In most instances the odours released by a source will be a complex mixture of compounds and the detectability will not be known. However, for some industrial processes the odour will be due to one or a small number of known compounds and the detection thresholds will be a good indication of whether the release is highly odorous or mildly odorous; and,
- The relative pleasantness/unpleasantness of the odour.

4.3.7 Using the example risk ranking in Table 10.4.7, the Source Odour Potential can be categorised as **small**, **medium** or **large**.

Table 10.4.7 Source Odour Potential

Source Odour Potential	Comments
Large	Magnitude - Larger Environmentally Permitted processes of odorous nature or large Sewage Treatment Works (STWs); materials usage hundreds of thousands of tonnes/m³ per year; area sources of thousands of m². The compounds involved are very odorous (e.g. mercaptans), having very low ODTs where known Unpleasantness - processes classed as "Most offensive" in EA Guidance H4¹²; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score Mitigation/control - open air operation with no containment, reliance solely on good management techniques and best practice
Medium	Magnitude - smaller Environmentally Permitted processes or small STWs; materials usage thousands of tonnes/m³ per year; area sources of hundreds of m². The compounds involved are moderately odorous Unpleasantness - processes classed in EA Guidance H4 as "Moderately offensive"; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score Mitigation/control - some mitigation measures in place, but significant residual odour remains
Small	Magnitude - falls below Environmental Permit Part B threshold; materials usage hundreds of tonnes/m³ per year; area sources of tens m². The compounds involved are only mildly odorous, having relatively high ODTs where known Unpleasantness - processes classed as "Less offensive" in EA Guidance H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score Mitigation/control - effective, tangible mitigation measures in place leading to little or no residual odour

4.3.8 The next step is to estimate the effectiveness of the pollutant pathway as the transport mechanism for odour through the air to the receptor, versus the dilution/dispersion in the atmosphere. Any factor that increases dilution and dispersion of the plume as it travels from source to receptor will reduce the concentration at the end point, and hence reduce exposure. Important factors for consideration are:

- The distance between sensitive receptors and the odour source;

¹² H4: Odour Management, EA, 2011.

- Whether receptors are downwind with respect to the prevailing wind direction. Odour episodes often tend to occur during stable atmospheric conditions with low wind speed, which gives poor dispersion and dilution. Receptors close to the source in all directions can be affected under these conditions. When circumstances are not calm, it will be the downwind receptors that are affected. As such, receptors that are downwind with respect to the prevailing wind direction tend to be at higher risk of odour impact;
- The effectiveness of the point of release in promoting good dispersion e.g. releasing emissions from a high stack will increase the pathway, dilution and dispersion; and,
- The topography and terrain between the source and receptor. The presence of topographical features such as hills and valleys, or urban terrain features such as buildings, can affect air flow and therefore increase, or inhibit, dispersion and dilution.

4.3.9 Using the example risk ranking in Table 10.4.8, the pollutant pathway from source to receptor can be categorised as **ineffective**, **moderately effective**, or **highly effective**.

Table 10.4.8 Pathway Effectiveness

Pathway Effectiveness	Comments
Highly effective	Distance - receptor is adjacent to the source/site; distance well below any official set-back distances Direction - high frequency of winds from source to receptor, or, qualitatively, receptors downwind of source with respect to prevailing wind Effectiveness of dispersion/dilution - open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes
Moderately effective	Distance - receptor is local to the source Where mitigation relies on dispersion/dilution - releases are elevated, but compromised by building effects
Ineffective	Distance - receptor is remote from the source; distance exceeds any official set-back distances Direction - low frequency of winds from source to receptor, or, qualitatively, receptors upwind of source with respect to prevailing wind Where mitigation relies on dispersion/dilution - releases are from high level (e.g. stacks, or roof vents greater than 3m above ridge height) and are not compromised by surrounding buildings

4.3.10 The sensitivity of the receiving receptor is defined based on the criteria shown in Table 10.4.5.

4.3.11 The estimates of Source Odour Potential and Pathway Effectiveness are considered together to predict the risk of odour exposure (impact) at the receptor location, as shown by the matrix in Table 10.4.9.

Table 10.4.9 Risk of Odour Exposure

Pathway Effectiveness	Source Odour Potential		
	Small	Medium	Large
Highly effective	Low	Medium	High
Moderately effective	Negligible	Low	Medium
Ineffective	Negligible	Negligible	Low

4.3.12 The final step is to determine the significance of odour effect at the specified receptor location through the interaction between sensitivity and risk, as outlined in Table 10.4.10.

Table 10.4.10 Significance of Odour Effect

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High	Slight	Moderate	Substantial
Medium	Negligible	Slight	Moderate
Low	Negligible	Negligible	Slight
Negligible	Negligible	Negligible	Negligible

4.4 Overall Odour Significance

4.4.1 Following completion of the Field Odour Surveys and Risk Assessment, the IAQM guidance¹³ states that a conclusion on the likely significance of the predicted impact should be reached. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the effect is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it

¹³ Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

is **significant** or it is **not significant**. This has been considered to determine the overall significance of potential odour effects at the development site.

- 4.4.2 The IAQM guidance recognises that assessment of odour requires some degree of professional judgement¹⁴. Qualitative methodologies such as those utilised within this report provide guidance for assessing potential impacts. However, professional judgement should be exercised in order to take account of the specific details which are unique to each development. This has been considered as necessary throughout the assessment. The IAQM also suggest that the assessor's qualifications and experience are detailed within an Odour Assessment. These can be provided upon request.

¹⁴ Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

5.0 **RESULTS**

5.1 **Field Odour Surveys**

Field Odour Survey 1

5.1.1 Field Odour Survey 1 was undertaken between 10:03 and 11:29 on 12th March 2025. It should be noted that it was not possible to access positions 9 to 13 during the first set of surveys. The results for positions 1 to 8 are summarised in Table 10.4.11.

Table 10.4.11 Field Odour Survey 1 - Results

Position	$f_{\geq 4}$ (%)	I_{mean}	I_{max}	Unpleasantness	Odour Description	Notes
1	0	0	1	-		-
2	0	0	1	-		-
3	0	0	1	-		-
4	0	1	3	Neutral	Leachate	-
5	0	0	1	-		-
6	0	0	1	-		-
7	0	0	1	-		-
8	0	0	3	Neutral	Leachate	-

5.1.2 The meteorological conditions during the monitoring were dry and cloudy with temperatures of approximately 5°C. The wind direction was from the north-west at positions 1 and 2 and from the north at all other monitoring locations. The wind speed was rated between 0 and 1 on the Beaufort scale.

Field Odour Survey 2

5.1.3 Field Odour Survey 2 was undertaken between 13:24 and 15:55 on 13th March 2025. The results are summarised in Table 10.4.12.

Table 10.4.12 Field Odour Survey 2 - Results

Position	$t_{\geq 4}$ (%)	I_{mean}	I_{max}	Unpleasantness	Odour Description	Notes
1	0	0	1	-		-
2	0	0	1	-		-
3	0	1	2	-		-
4	0	1	2	-		-
5	0	0	1	-		-
6	0	0	1	-		-
7	0	0	1	-		-
8	0	1	3	Neutral	Leachate	-
9	0	2	3	Neutral	Smoke, Leachate	-
10	0	2	3	Neutral	Smoke	
11	0	0	1	-		
12	0	0	1	-		
13	0	0	1	-		

5.1.4 The meteorological conditions during the monitoring were dry and cloudy with temperatures of approximately 6 to 7°C. The wind direction was from the north-west at positions 1 and 2 and from the north at all other monitoring locations. The wind speed was rated between 1 and 2 on the Beaufort scale.

Field Odour Survey 3

5.1.5 Field Odour Survey 3 was undertaken between 13:30 and 15:58 on 25th March 2025. It should be noted that position 13 was not accessible during this survey. The results are summarised in Table 10.4.13.

Table 10.4.13 Field Odour Survey 3 - Results

Position	$t_{\geq 4}$ (%)	I_{mean}	I_{max}	Unpleasantness	Odour Description	Notes
1	0	1	2	-	Vehicle emissions	-
2	0	0	1	-	-	-

Position	t _{≥4} (%)	I _{mean}	I _{max}	Unpleasantness	Odour Description	Notes
3	0	0	1	-	-	-
4	0	1	1	-	-	-
5	0	2	3	Unpleasant	Metallic, sulphur	-
6	0	0	1	-	-	-
7	0	1	2	-	Manure	-
8	0	2	3	Unpleasant	Manure	Adjacent fields spreading muck
9	0	1	3	Neutral	Vehicle emissions	-
10	0	2	2	-	Manure	-
11	0	0	1	-	-	-
12	0	0	1	-	-	-

5.1.6 The meteorological conditions during the monitoring were dry and cloudy with temperatures of approximately 12°C. The wind direction was from the west-north-west at all monitoring locations. The wind speed was rated between 1 and 2 on the Beaufort scale.

Odour Exposure and Significance

5.1.7 Following completion of the three Field Odour Surveys, odour exposure at each of the monitoring locations was determined. This is summarised in Table 10.4.14.

Table 10.4.14 Field Odour Surveys - Odour Exposure Risk

Position	Odour Exposure		
	Field Odour Survey 1	Field Odour Survey 2	Field Odour Survey 3
1	Negligible	Negligible	Negligible
2	Negligible	Negligible	Negligible
3	Negligible	Negligible	Negligible
4	Negligible	Negligible	Negligible

Position	Odour Exposure		
	Field Odour Survey 1	Field Odour Survey 2	Field Odour Survey 3
5	Negligible	Negligible	Negligible
6	Negligible	Negligible	Negligible
7	Negligible	Negligible	Negligible
8	Negligible	Negligible	Negligible
9	-	Negligible	Negligible
10	-	Negligible	Negligible
11	-	Negligible	Negligible
12	-	Negligible	Negligible
13	-	Negligible	-

5.1.8 As shown in Table 10.4.14, odour exposure was **negligible** at all monitoring locations. It should be noted that impacts relate to all odours detected, as well as those thought to be associated with the identified sources.

5.1.9 The significance of the odour impact at each location was determined in accordance with the criteria outlined in Table 10.4.6. The Project for Assessment includes a range of land-use classes considered to be of **medium** and **high** sensitivity. The majority of the land-use is considered to be **medium** sensitivity. However, in order to provide a robust assessment, a **high** sensitivity classification was applied to all monitoring locations.

5.1.10 The significance of the odour exposure results for the Field Odour Surveys is summarised in Table 10.4.15.

Table 10.4.15 Field Odour Surveys - Odour Significance

Position	Odour Significance		
	Field Odour Survey 1	Field Odour Survey 2	Field Odour Survey 3
1	Negligible	Negligible	Negligible
2	Negligible	Negligible	Negligible
3	Negligible	Negligible	Negligible

Position	Odour Significance		
	Field Odour Survey 1	Field Odour Survey 2	Field Odour Survey 3
4	Negligible	Negligible	Negligible
5	Negligible	Negligible	Negligible
6	Negligible	Negligible	Negligible
7	Negligible	Negligible	Negligible
8	Negligible	Negligible	Negligible
9	-	Negligible	Negligible
10	-	Negligible	Negligible
11	-	Negligible	Negligible
12	-	Negligible	Negligible
13	-	Negligible	-

5.1.11 As shown in Table 15, impacts were **negligible** at all positions during all three surveys. Reference should be made to Figure 10.4.4 for a graphical representation of the findings.

5.2 Risk Assessment

5.2.1 The Project for Assessment has the potential to expose future users to odour emissions as a result of operations associated with Pilsworth South Landfill. The risk of potential impacts was therefore assessed in accordance with the previously stated IAQM methodology¹⁵.

5.2.2 The first step was to classify the source odour potential of Pilsworth South Landfill. The Source Odour Potential was categorised as **large** for the following reasons:

- The landfill is regulated by the EA in accordance with an Environmental Permit (Reference: EPR/BS7951IB). In line with the Environmental Permitting (England and Wales) Regulations 2016, this should include appropriate conditions to ensure that odour emissions are effectively controlled and do not result in pollution;

¹⁵ Guidance on the Assessment of Odour for Planning v1.1, IAQM, 2018.

- The MRF in the north-western portion of the landfill site will have a capacity to process 250,000-tonnes of waste per year;
- Odours associated with waste materials processed at the facility would be classified as 'moderately offensive' in accordance with EA guidance 'H4: Odour Management'¹⁶. Where waste with a high odour risk is accepted, the waste is buried immediately on site to a depth of 300mm and covered with suitable materials;
- 42% of cells at the facility are non-operational and review of aerial imagery indicates a large area of the site is covered with a geo-membrane;
- The facility operates in accordance with an OMP¹⁷ which includes measures to minimise and control odours from landfill operations;
- Leachate is transported via sealed pipe work and stored within enclosed tanks;
- Landfill gas is transported via gas extraction wells connected to a main carrier in order to minimise the potential for fugitive emissions; and,
- Most waste type odours have negative hedonic scores.

5.2.3 The pathway effectiveness was subsequently defined based on the separation distance between the Assessment Boundary and Pilsworth South Landfill, the prevailing meteorological conditions and the emission dispersion arrangements.

5.2.4 The pathway effectiveness was defined as **ineffective**. This is due to the following considerations:

- The Project for Assessment is remote to odour sources. There is a minimum distance of 250m from the facility to the Assessment Boundary. It should be noted this does not include the access road to the north;
- The Assessment Boundary is not located downwind of the Pilsworth South Landfill with respect to the prevailing meteorological conditions, as shown in Table 10.4.1 and Figure 10.1.3; and,
- Odour releases from the facility are low-level due to the nature of landfill operations. However, the OMP¹⁸ includes a number of measures to limit the transfer of emissions from exposed surfaces to atmosphere such as:
 - Minimising the operational area;

¹⁶ H4: Odour Management, EA, 2011.

¹⁷ OMP Pilsworth South Landfill, Valencia, 2025.

¹⁸ OMP Pilsworth South Landfill, Valencia, 2025.

- Progressive compaction of waste during the day;
- Use of non-odours cover materials; and
- Progressive capping of completed cells;

5.2.5 The above information has been used with the land use sensitivity identified within Table 10.4.5 to assess odour risk and effect significance at the Project for Assessment. This is summarised in Table 10.4.16.

Table 10.4.16 Odour Risk Assessment

Source	Source Odour Potential	Pathway Effectiveness	Exposure Risk	Sensitivity	Effect Significance
Pilsworth South Landfill	Large	Ineffective	Low	High	Slight

5.2.6 As shown in Table 10.4.16, the predicted odour effect significance is **slight** as a result of potential odour emissions from Pilsworth South Landfill. It should be noted that a **high** sensitivity classification was used in order to ensure an assessment of worst-case impacts. In reality, the odour effect significance is likely to be lower across the Project for Assessment due to the majority of the land use sensitivity being classed as **medium**.

5.2.7 The IAQM guidance states that only if the impact is **moderate** or **substantial**, the effect is considered **significant**. As such, potential impacts at the Project for Assessment as a result of emissions from Pilsworth South Landfill are considered to be **not significant**, in accordance with the stated methodology.

5.2.8 It should be noted that the existing permission for the Pilsworth South Landfill site extends to 31st December 2028¹⁹. As the Project for Assessment is anticipated to be operational by 2039, it is possible that waste operations at the facility will have ceased prior to occupation.

¹⁹ <https://consult.environment-agency.gov.uk/gmmc/information-on-pilsworth-south-landfill-pilsworth/>

6.0 DISCUSSION

6.1 Field Odour Surveys

- 6.1.1 As shown in Table 10.4.11 to Table 10.4.13 a range of odours were detected during the three Field Odour Surveys.
- 6.1.2 Odours associated with agriculture, including manure, were detected at positions 7, 8 and 10 during Survey 3. These were likely detected due to muck spreading in fields on site. These resulted in **negligible** impacts at all monitoring locations. It should be noted that these fields are within the Assessment Boundary. Odours associated with muck spreading on site will therefore not occur during the operational phase of the Project for Assessment.
- 6.1.3 Vehicle emission and smoke type odours were detected at positions 9 and 10 during Survey 2 and positions 1 and 9 during Survey 3. These resulted in **negligible** impacts at all locations.
- 6.1.4 Odours attributed to landfill activities were detected at two positions during Surveys 1 and 3 and at one position during Survey 2. These included leachate, sulphur and metallic type odours which resulted in **negligible** impacts at all locations during all surveys.

6.2 Risk Assessment

- 6.2.1 The Odour Risk Assessment indicated that the predicted odour effect significance was **slight** as a result of emissions from Pilsworth South Landfill.

6.3 Summary

- 6.3.1 Three Field Odour Surveys were undertaken in accordance with the IAQM methodology. The results indicated odour impacts to be **negligible**. This is predicted to result in **negligible** effects at the Project for Assessment.
- 6.3.2 The risk of potential odour effects at the Project for Assessment was also assessed using the IAQM methodology. This included consideration of the source odour potential, pathway effectiveness and receptor sensitivity. The results of the assessment indicated the

predicted odour effect significance was **slight** at the Project for Assessment as a result of emissions from Pilsworth South Landfill.

- 6.3.3 The IAQM guidance²⁰ states that only if the impact is **moderate** or **substantial**, the effect is considered **significant**. As such, impacts are considered **not significant**, in accordance with the stated methodology.

²⁰ Guidance on the Assessment of Odour for Planning V1.1, IAQM, 2018.

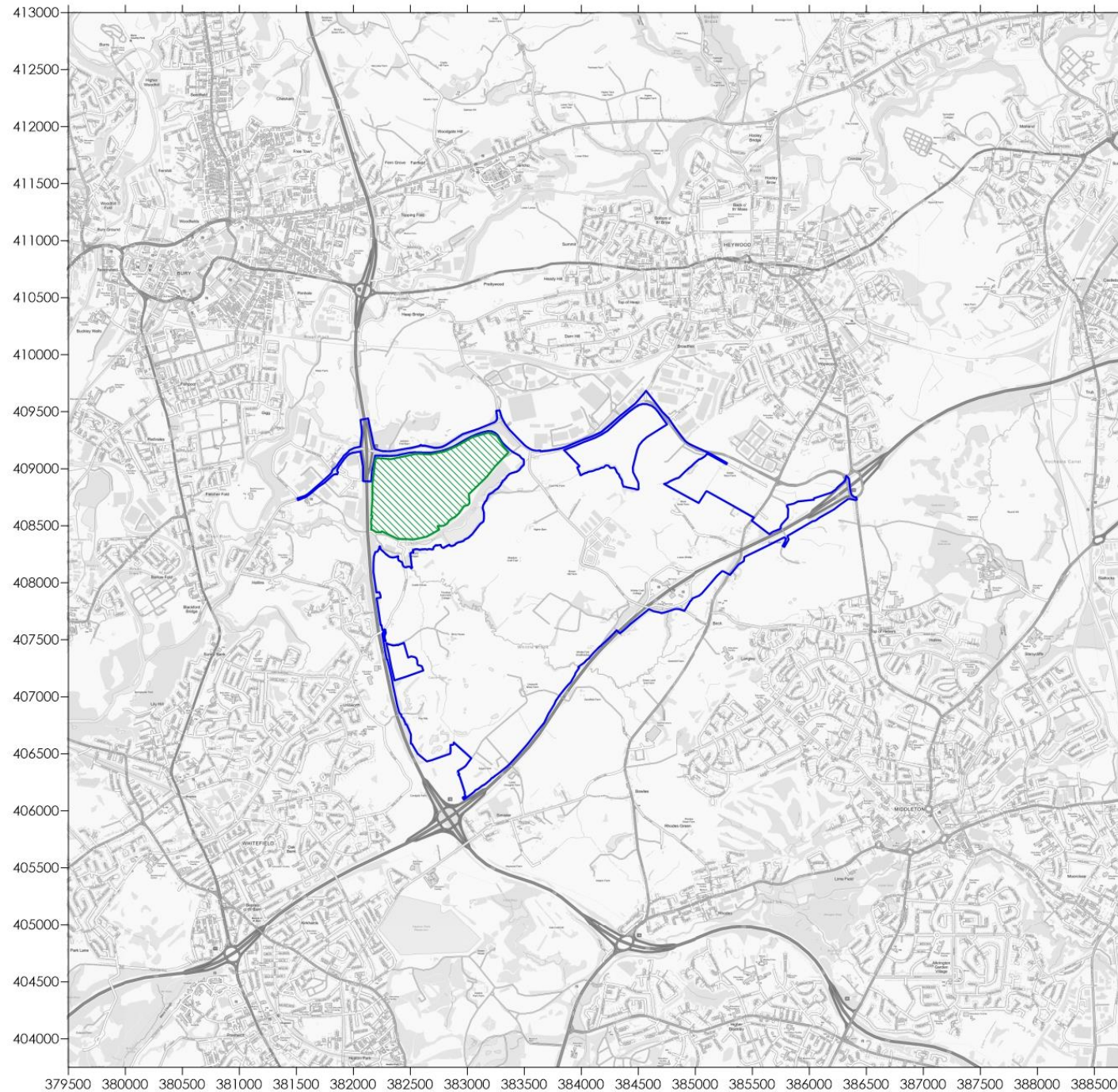
7.0 CONCLUSION

- 7.1.1 The Project for Assessment has the potential to cause loss of amenity of future site users as a result of potential odour emissions associated with operations at Pilsworth South Landfill. As such, a two-stage Odour Assessment was undertaken to determine baseline conditions at the site and consider its suitability for the proposed end-use.
- 7.1.2 Three Field Odour Surveys were undertaken in accordance with the IAQM methodology. The results indicated odour impacts were **negligible** at the Project for Assessment. This is predicted to result in **negligible** effects.
- 7.1.3 The risk of potential odour effects at the Project for Assessment was assessed using the IAQM methodology. This included consideration of the source odour potential, pathway effectiveness and receptor sensitivity. The results of the assessment indicated the predicted odour effect significance was **slight** at the Project for Assessment.
- 7.1.4 Based on the results of the staged assessment, overall odour effects on the Project for Assessment as result of emissions associated with operations at Pilsworth South Landfill are considered to be **not significant** in accordance with stated guidance.

8.0 **ABBREVIATIONS**

BC	Bury Council
EA	Environment Agency
H ₂ S	Hydrogen Sulphide
I _{max}	Maximum odour intensity
I _{mean}	Average odour intensity
IAQM	Institute of Air Quality Management
NGR	National Grid Reference
ODT	Odour Detection Threshold
OMP	Odour Management Plan
STW	Sewage Treatment Works
t _{≥4}	Percentage odour time

Figures



Legend



Assessment
Boundary



Pilsworth South
Landfill Boundary

Title

Figure 10.4.1 - Pilsworth South Landfill
Boundary

Project

Northern Gateway JPA1.1

Project Reference

4805-14

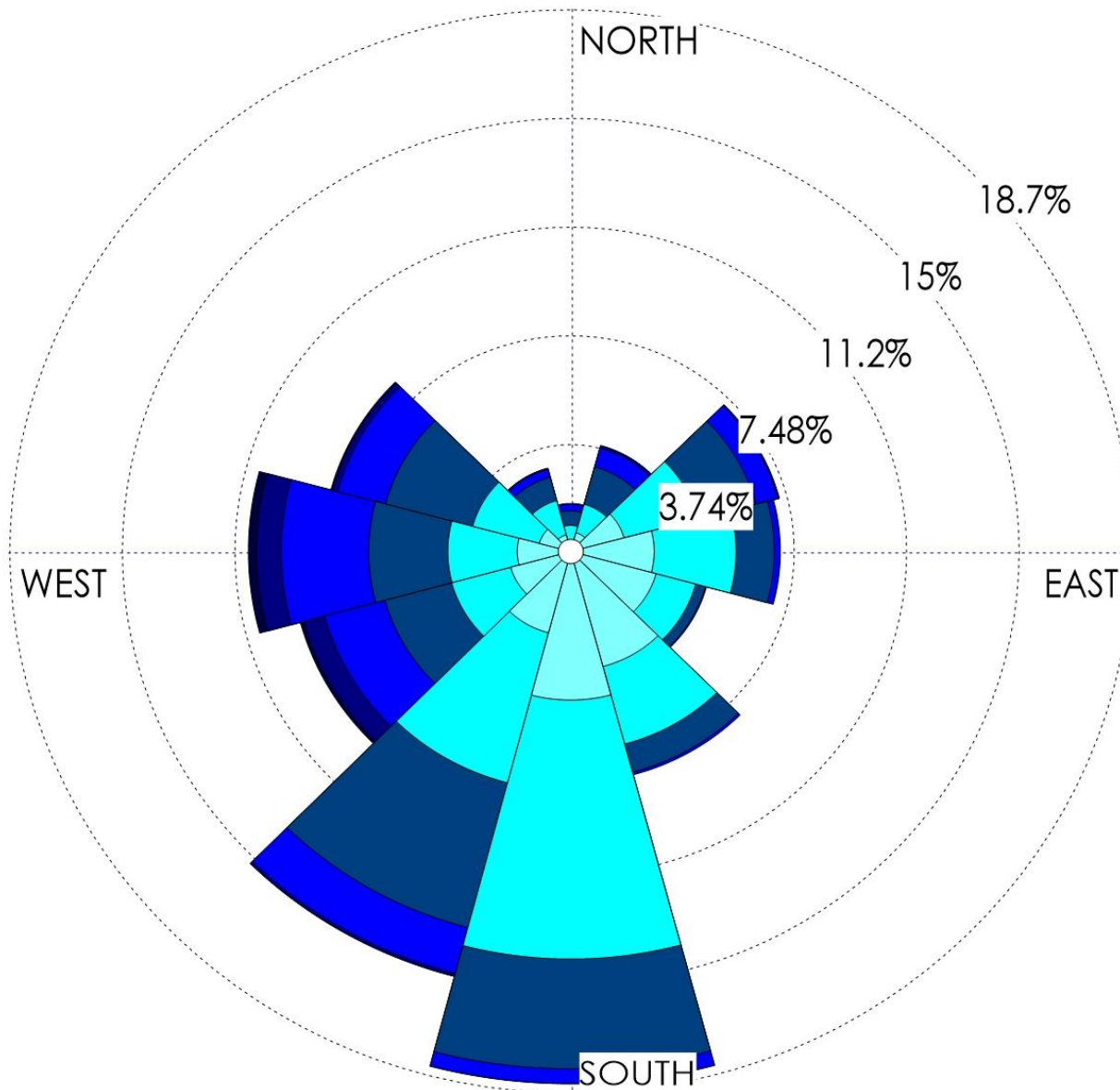
Date

11th April 2025

Contains Ordnance Survey Data
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Legend

WIND SPEED
(m/s)

- ≥ 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 1.15%

Title

Figure 10.4.2 - Wind Rose of 2019 to 2023 Manchester Airport Meteorological Data

Project

Northern Gateway JPA1.1

Project Reference

4805-14

Date

11th April 2025



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