

Odour Assessment

Land North of Summer Lane, Pagham

January 2026

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1. Introduction

Background

- 1.1 Phlorum Limited has been commissioned by Northgate Properties Limited, on behalf of LJ&P Langmead Farm Partnership ("the Client") to undertake an odour assessment to support a planning application for a residential development ("the proposed development") to the south-east of Pagham Wastewater Treatment Works (WwTW).
- 1.2 Phase 4b of the Proposed Development is to construct up to 130 residential dwellings to the north of Summer Lane. The National Grid Reference for the centre of the Phase 4b site ("the application site") is 488715, 098640. The location of the site is shown in Figure 1.
- 1.3 The proposed development is located approximately 200m to the south-east of Pagham WwTW, which is operated by Southern Water (SW). An odour assessment was required to understand whether odorous emissions from this WwTW might significantly impact the amenity of future users of the proposed development.

Scope of Assessment

- 1.4 This odour assessment incorporates a thorough and detailed methodology, considered suitably robust for the associated level of risk. In line with Institute of Air Quality Management (IAQM) guidance, this assessment uses a number of tools and several sources of information to determine whether odours from the WwTW have the potential to cause significant nuisance to the proposed development.
- 1.5 Specifically, this report relies on a "weight of evidence", incorporating an analysis of the local odour complaints record, detailed odour dispersion modelling using emissions data collected through olfactometric sampling, and the results of six odour surveys ("sniff tests").
- 1.6 The scope of assessment for the application site was discussed with Arun District Council (ADC), who requested that we engage with SW. SW were subsequently consulted and have agreed with the general scope of assessment.

2. Policy Context and Guidance

- 2.1 The planning process can determine whether and where any developments with a significant potential for odour release can be located. It also has some control over the siting of developments that may be sensitive to odour from nearby potential sources.
- 2.2 Some potentially odorous developments and activities are regulated by the Environmental Permitting Regulations (2016)¹. Statutory nuisance provisions under the Environmental Protection Act (1990) additionally apply where activities are not permitted.

National Planning Policy Framework

- 2.3 The National Planning Policy Framework² (NPPF), which was updated in December 2023, sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development. A principle in the NPPF that relates to odour is set out in paragraph 200:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

Local Planning Policy

- 2.4 Arun District Council's (ADC's) Local Plan³ is aimed at directing planning within the district up to 2031.
- 2.5 Of relevance to odour, the Local Plan states the following, within *Policy QE SP1*:

"The location of existing industrial and commercial uses, including waste management uses, must be taken into consideration when assessing proposals for development sensitive to noise, light, odour and outputs to air. This is to ensure that land allocated for these uses are protected and to ensure that the amenity of new developments and facilities is safeguarded from the impacts of incompatible land uses."

1 The Environmental Permitting (England and Wales) Regulations SI 2016/1154

2 Department for Communities and Local Government (DCLG). (2023). National Planning Policy Framework.

3 ADC (2018). Adoption Arun Local Plan 2011-2031

- 2.6 Also of relevance to this assessment is West Sussex's Waste Local Plan⁴, within which this WwTW is safeguarded. *Policy W19: Public Health and Amenity* states:

"Proposals for waste development will be permitted provided that:

- a) lighting, noise, dust, odours and other emissions, including those arising from traffic, are controlled to the extent that there will not be an unacceptable impact on public health and amenity; [...]"*

Guidance

- 2.7 A number of guidance documents were referred to in preparing this odour assessment. These are outlined under the following headings.

Code of Practice on Odour Nuisance from Sewage Treatment Works

- 2.8 The Defra Code of Practice⁵ (2006) is designed to provide a framework under the statutory nuisance regime enabling the relevant parties to operate, regulate and investigate odour nuisance from sewage treatment works. It provides information on the issues associated with WwTW odour, the characteristics of this odour, odour complaints and odour control measures.
- 2.9 Defra has also produced detailed odour guidance⁶ (2010), which describes investigative techniques, odour control measures, plus communication and intervention strategies.

Odour Guidance: Internal Guidance for the Regulation of Odour at Waste Management Sites

- 2.10 The Environment Agency's Odour Guidance⁷ (2002) provides a useful guide to the monitoring of odour on site, the description of odours and the effect of meteorological conditions.

Environment Agency Horizontal Guidance H4: Odour Management

- 2.11 Also relevant is the Environment Agency's (EA's) Horizontal Guidance H4⁸ (2011), which advises operators on how to comply with permit conditions, with respect to odour. This guidance provides useful information on assessing odour concentrations and on controlling and monitoring odour emissions from permitted processes.

4 West Sussex County Council (2014). WSCC and South Downs National Park Authority: West Sussex Waste Local Plan.

5 Defra. (2006). Code of Practice on Odour Nuisance from Sewage Treatment Works.

6 Defra. (2010). Odour Guidance for Local Authorities.

7 Environment Agency. (2002). Odour Guidance: Internal Guidance for the Regulation of Odour at Waste Management Sites.

8 Environment Agency. (2011). Horizontal Guidance H4: Odour Management – How to comply with your environmental permit.

- 2.12 It is understood that odour emissions from the Pagham WwTW are not covered by an environmental permit. Odorous emissions from processes that require a permit are usually more strictly controlled than those processes that do not require a permit. Therefore, the standards and methods contained within the guidance are stringent, and if applied to non-permitted processes could be considered unreasonably onerous.

IAQM Odour Guidance

- 2.13 The Institute of Air Quality Management's (IAQM) Odour Guidance⁹ is focused on the assessment of odour impacts for planning purposes. It provides an overview of the key tools available for assessing odour impacts, and weighs up their advantages and disadvantages, whilst advocating a multi-tool approach.
- 2.14 With regard to sewage treatment works and the offensiveness of odours from their normal operations, the guidance states the following:

"For odours that are less unpleasant, the level of odour exposure required to elicit the same effect may be somewhat higher, requiring professional judgement to be applied. For example, odours from sewage treatment works plant operating normally, i.e. non-septic conditions, would not be expected to be at the 'most offensive' end of the spectrum (Table 5) and can be considered on par with 'moderately offensive' odours such as intensive livestock rearing".

- 2.15 With regard to odour dispersion modelling, the IAQM guidance states the following:

"Even when the model is a good representation of the real situation and the assumptions and input data are reasonable, the uncertainty for predictions from dispersion modelling can be considerable. It is therefore useful to use empirical, observational tools where they are available and applicable, and combine these with modelling where appropriate."

- 2.16 When drawing conclusions from assessment results, the IAQM guidance states the following:

"When coming to a conclusion on odour impact, the practitioner also needs to give the right amount of weight to the results provided by each tool according to how well-suited it is to the study scenario in question."

For instance, where the assessment is of an existing activity or process, empirical observations will usually be possible of what is happening on the ground: considerable weight should normally be given to the observational findings of community-based tools (complaints analysis, community surveys and odour diaries) and sensory assessments (such as sniff tests). These may be supported by the results of any dispersion modelling (or perhaps ambient air monitoring for specific compounds) if

⁹ Institute of Air Quality Management. (2018). Guidance on the assessment of odour for planning.

these add tangible value to the study, e.g. they provide wider spatial or temporal coverage than observations alone.

However, it should be emphasised that the results from a model should not be used to try to “prove” the absence of an existing adverse odour effect (e.g. nuisance) when strong empirical evidence from complaints analysis, community response data, and sensory tests (by appropriately trained persons) show otherwise. To do so would be to mistake the model for the reality of the situation, rather than a simplified version of it.”

- 2.17 Considering the above, when assessing odour impacts from an existing source, an appropriate weight should be placed on observational and sensory findings. Odour modelling can be a useful tool, particularly for predicting odour effects from a proposed process, as part of an assessment to determine its suitability for a particular location; however, it should not be used to “prove” the presence or absence of an effect, if empirical evidence suggests otherwise.

Scottish Environmental Protection Agency (SEPA) Odour Guidance 2025

- 2.18 The SEPA odour guidance¹⁰ was updated in January 2025 and has been referred to within this assessment.
- 2.19 The guidance provides a list of standard descriptors which can be used to categorise odours (e.g. floral, fishy, earthy) and assign an intensity to each using a scale of hedonic tones. Odours assigned a hedonic tone score between 0 and +4 can be considered pleasant, with odours assigned scores between 0 and -4 considered unpleasant.

Odour Assessment Criteria and Case Law

- 2.20 The EA's technical odour guidance¹¹ (2009) provides useful information on managing and assessing odour emissions.
- 2.21 Odour concentrations are measured in odour units (Ou). There is a European CEN standard for an odour unit which is based on odour detection of a reference compound. The CEN standard is referred to as 1 Ou_E.m⁻³ (1 European Odour Unit) and is roughly comparable to 1 Ou.m⁻³, which can be a more subjective parameter as it is not standardised.
- 2.22 1 Ou_E.m⁻³ is the point of detection. As a general indicator of odour concentration, 1 Ou_E.m⁻³ represents the concentration of an odorous substance, or mixture of substances, that is ‘just detectable’ by 50% of the population, or someone with an average sense of smell.
- 2.23 The EA suggests that for an unpleasant odour, concentrations above the following criteria can be used as a guide to determine whether it might represent a potential nuisance:

 1.5 Ou_E for a highly offensive odour;

10 Scottish Environmental Protection Agency. (2025). *Odour Guidance 2025*.

11 Environment Agency. 2009. Environment Agency Technical Guidance Note H4 – Odour Management. EA: London.

- 3.0 Ou_E for a moderately offensive odour; and
 - 6.0 Ou_E for a less offensive odour.
- 2.24 As such, highly offensive odours are likely to cause a problem at lower concentrations than more pleasant odours.
- 2.25 Determining the character and offensiveness of an odour is a subjective exercise and is difficult to accurately quantify. However, the EA attempts this by providing some examples as follows:
- highly offensive odours = processes involving animal or fish remains, septic effluent or sludge;
 - moderately offensive odours = intensive livestock rearing, wastewater treatment and fat frying;
 - less offensive odours = chocolate manufacture, and breweries.
- 2.26 With regard to sewage treatment works, the H4 guidance recognises that the character of odours from different parts of the process may differ. For example, it states that *"it may only be the sludge handling part of a sewage works that attracts the highest score"* (i.e. a highly offensive odour).
- 2.27 Pagham WwTW does not include any sludge treatment processes but does handle its sludge in the form of two sludge holding tanks (SHTs) and an associated decant liquors tank (DLT). Both the SHTs and DLT are open-to-air sources. As such, it is reasonable to suggest that *some* odour sources within this WwTW could be described as 'highly' offensive in nature, but that the majority can be considered 'moderately' offensive. This is commonly the case at WwTWs.
- 2.28 A further difficulty with odour quantification is that many odours are intermittent, often being emitted over relatively short, non-continuous timescales, which makes accurate measurement of short-term peaks in concentration over extended periods very difficult.
- 2.29 Going some way to deal with this issue, the EA guidance recommends that in dispersion modelling assessments, odour concentrations should be calculated as 98th percentile values of hourly mean concentrations (C_{98,1hour}). This allows for the top 2% of high odour concentrations to be discounted from an assessment and allows results to be directly compared with the EA odour criteria listed above.

CIWEM

- 2.30 The Chartered Institution of Water and Environmental Management (CIWEM) has issued the following statement on odour nuisance potential threshold ranges (where "C₉₈" is the 98th percentile average odour concentration):

"CIWEM considers that the following framework is the most reliable that can be defined on the basis of the limited research undertaken in the UK at the time of writing:

- C₉₈, 1-hour >10 ou_E/m³ - complaints are highly likely and odour exposure at these levels represents an actionable nuisance;*

- *C₉₈, 1-hour >5 ou_E/m³ - complaints may occur and depending on the sensitivity of the locality and nature of the odour this level may constitute a nuisance; and*
- *C₉₈, 1-hour <3 ou_E/m³ - complaints are unlikely to occur and exposure below this level are unlikely to constitute significant pollution or significant detriment to amenity unless the locality is highly sensitive or the odour highly unpleasant in nature."*

- 2.31 The CIWEM framework provides a less conservative range of odour concentrations in relation to potential nuisance impacts from WwTWs than those provided in the EA guidance. It suggests that most WwTW odours less than 3 Ou_E.m⁻³ in concentration would be unlikely to result in a statutory nuisance, unless the odour was characterised as highly unpleasant, or the locality was highly sensitive to odour.

IAQM Odour Guidance

- 2.32 In the absence of agreed standards for odour, the IAQM guidance also summarises key guidance and case law on the issue of development planning and odour risk in order to help define the significance criteria for odour impact assessments.
- 2.33 Of relevance to this assessment, a High Court Judgement relating to odour nuisance from Mogden WwTW stated:

"I would be reluctant to find nuisance if the odour concentration was only 1.5 OU_E per m³ but as the odour concentration rises to 5 OU_E per m³ I consider that this is the area where nuisance from Mogden STW would start and that by the time that 5 OU_E per m³ or above is reached nuisance will certainly be established."

- 2.34 The above conclusion by the Judge in the Mogden case sets a precedent that the 1.5 Ou_E.m⁻³ (C_{98,1hour}) threshold should not normally be appropriate for opposing residential development close to WwTWs.
- 2.35 It is also pertinent to acknowledge the conclusions of a relatively recent Public Inquiry into a residential development near the Cockermouth WwTW in Cumbria, where the inspector concluded:

"I am mindful that the assessment based on a 98th percentile 1-hour average odour concentration (C_{98,1hour}) would not result in a totally odour free scenario, as there is a likelihood of some occasional odour issues with sites such as the WWTW. However, any period of exposure to unpleasant odour should be short lived at some 2% of a year. Moreover, there are varying degrees of odour from sewage treatment..."

Should odours fall within medium offensiveness, rather than low, the C₉₈, 1hour 3 ou_E/m³ level modelled by the appellant indicates that it would not impinge on the appeal dwellings."

Gloucester Appeal

- 2.36 In another recent planning appeal decision in Gloucester (ref: APP/U1620/W/22/3296510), in granting the appeal the inspector stated:

"Although odour is to a degree a subjective matter, I am nevertheless satisfied the up to three odour unit concentration provides an appropriate benchmark to determine acceptability of potential impacts when using dispersion modelling results. Excluding housing from the three odour unit contours modelled would, I agree, facilitate acceptable living conditions for new residents within the appeal site."

- 2.37 The Mogden, Cockermouth and Gloucester WwTWs all accept septic effluent and include sludge handling (and in some cases, also sludge treatment) processes. Despite this, all three exemplify that the application of a $3 \text{ Ou}_E.\text{m}^{-3}$ benchmark is commonly considered appropriate where the majority of odour sources at a WwTW are considered to be of 'moderate' offensiveness.
- 2.38 Two further examples where the $3 \text{ Ou}_E.\text{m}^{-3}$ concentration was deemed an appropriate benchmark when considering the suitability of residential development near WwTWs are discussed below.

Cork's Farm, Marchwood

- 2.39 In 2022, Phlorum undertook an odour assessment for a residential scheme (New Forest District Council Planning Reference: 22/10449) near SW's Slowhill Copse WwTW. The WwTW accepts and treats septic sludge, which might have meant the $1.5 \text{ Ou}_E.\text{m}^{-3}$ could apply at some locations. However, Phlorum deemed the $3 \text{ Ou}_E.\text{m}^{-3}$ threshold to be appropriate based on how the weight of evidence collected (i.e. sniff tests, complaints analysis and dispersion modelling results) offered good agreement with this benchmark.
- 2.40 SW's typical stance is to object to all development which falls within the most stringent $1.5 \text{ Ou}_E.\text{m}^{-3}$ threshold, irrespective of the overall offensiveness of odours expected to emanate from their specific WwTWs. SW objected to the Cork's Farm residential scheme on this basis, but the Environmental Health Officer (EHO) at the local planning authority concluded that the $3 \text{ Ou}_E.\text{m}^{-3}$ benchmark was more appropriate given the evidence presented by Phlorum. The development was approved by the case officer in June 2023.

Ford Airfield, Arun

- 2.41 Phlorum was commissioned by ADC to provide independent odour advice for a major residential development at Ford Airfield (Planning Reference: F/4/20/OUT). In response to the developer's odour assessment (produced by Hoare Lee), SW, Phlorum and ADC all raised concerns regarding the assessment's lack of reliance on observational evidence when determining the overall suitability of the site for residential development, noting that observational data (i.e. sniff tests and complaints analyses) did not align with the results of predictive techniques (i.e. dispersion modelling).

- 2.42 Following further assessment work by Hoare Lee, ADC approved the application in July 2023, subject to conditions. SW maintained their objection, partly on the basis that some of the development would fall within their requested $1.5 \text{ Ou}_E.\text{m}^{-3}$ threshold. However, Hoare Lee, Phlorum and ADC all agreed with the use of the $3 \text{ Ou}_E.\text{m}^{-3}$ threshold, given that Ford WwTW's odour sources were considered 'moderately offensive' overall. ADC's EHO noted that whilst the development site might not be 'odour-free', odour complaints would be unlikely up to the $3 \text{ Ou}_E.\text{m}^{-3}$ threshold.
- 2.43 Ford WwTW is a large WwTW which serves a much greater population than the Pagham WwTW. Ford WwTW also receives sludge, cake and cess imports from other WwTWs and digests them on-site, so the site's potential for highly offensive odour releases can be considered greater than at Pagham WwTW.

A General Note on Odour Nuisance

- 2.44 It should be noted that the stated range of nuisance thresholds are simply guidance to indicate the likelihood of odour complaints occurring at or above the respective concentrations. Odour offensiveness remains a subjective human sensory response to airborne chemicals, and the test of statutory nuisance is to determine whether actual complaints relating to the emission of these chemicals might be reasonable.
- 2.45 Coupled with the difficulties and uncertainties surrounding the monitoring and modelling of odour emissions, the review of odour complaints from uses close to, and particularly downwind of, an established odour source, such as a WwTW, can often provide the most compelling evidence as to the reasonableness of any offensive odours emitted from it.

3. Pagham WwTW

- 3.1 Wastewater treatment at Pagham WwTW consists of the following main processes and plant, the locations of which are presented in Figure 2:
- Inlet works, with screen, grit removal and balancing tank;
 - 2 Primary Settlement Tanks (PSTs);
 - Aeration Lanes and Anoxic Lanes in the Activated Sludge Plant (ASP)
 - 3 Final Settlement Tanks (FSTs);
 - 2 Sludge Holding Tanks (SHTs), with an associated Decant Liquors Tank (DLT); and
 - 2 Storm Tanks.
- 3.2 All sewage flows which arrive at the inlet works pass through to preliminary treatment; a screening plant which removes large solids such as rag. Screened solids are washed, compacted, and dried before discharge to the screenings skip. Screened sewage then flows through grit removal, with the removed grit being screened and added to the skip. These processes prevent blockages and pump-wear downstream.
- 3.3 From the inlet works, sewage effluent accumulates in the balancing tank, before being pumped towards the PSTs, where it is settled into sludge and liquid effluent. Effluent is transferred to the ASP where microorganisms metabolise and degrade pollutants, before being transferred to FSTs, where flow rates are reduced to allow settlement of solids. Settled biological material is returned to the system via the return works.
- 3.4 Settled sludge from the PSTs is pumped to the DLT and then to the sludge holding tanks to be tankered off-site.

WwTW Recent History

- 3.5 In July 2025, Pagham WwTW underwent a series of upgrade works to increase the hydraulic capacity of the system to accommodate local population growth.
- 3.6 Prior to these upgrades, the WwTW relied on four large biological trickling filters instead of the ASP, and contained one fewer FST and one fewer SHT.
- 3.7 SW's Environmental Information Regulations (EIR) team stated these WwTW upgrades would have no overall effect on odour emissions, ensuring the WwTW aligns with the requirements of Policy W19 from WSCC's Waste Local Plan⁴.

4. Methodology

Overview

- 4.1 There are a number of individual tools that can be used to investigate odour. As the IAQM guidance⁹ states, *“because the various assessment tools have different applications, strengths and limitations, they are often used in combination”*, whilst the Defra guidance emphasises that *“confidence in the conclusions can be increased by using multiple assessment tools”*.
- 4.2 These tools may be sensory, observational, or predictive. Based on the information available and the sensitivity of the end-use, the following techniques were identified as most suitable:
- 🌿 Sniff tests (a sensory odour assessment technique);
 - 🌿 Complaints analysis (observational technique) – review of complaints which are held by ADC and SW; and
 - 🌿 Detailed atmospheric dispersion modelling (predictive technique) using observational emissions data obtained through olfactometric sampling at the WwTW.

Sniff Testing

- 4.3 Sniff tests involve the use of the human nose to detect odour. These surveys offer a subjective measure of odour impact based on the assessor’s opinion of the frequency, intensity, duration, and offensiveness of any odours.
- 4.4 It is recognised that sniff tests only provide a snapshot of the local odour environment and so the surveys were carried out and timed in an attempt to best capture conservative conditions at the application site (i.e., when the weather was dry and mild, and winds were light).
- 4.5 The approach to the odour surveys followed the methodologies recommended in the Environment Agency’s odour guidance⁷ and the IAQM’s latest guidance on the assessment of odour for planning⁹, as referred to in Section 2 of this report.
- 4.6 A number of steps were taken to safeguard the quality of each odour survey, as per IAQM guidance. These included:
- 🌿 The olfactory sensitivity of the assessor has been identified using UKAS-accredited methods and established to be within the ‘Normal’ range;
 - 🌿 The odour assessor was in full health, with no cold, flu, or COVID-19 symptoms;
 - 🌿 The assessor had a rest period following the short travel time to the site;

-  The assessor consumed no confectionery, soft drinks, or food prior to the survey.
- 4.7 A total of six surveys were undertaken between 25th April and 26th July 2022, which is double the number of surveys recommended by the IAQM for assessment purposes. Doubling the number of surveys has allowed a greater level of confidence in the conclusions drawn, as the assessor was able to test a broader range of meteorological conditions.
- 4.8 It is appreciated that these sniff tests were undertaken prior to the recent upgrade works in July 2025. Phlorum was unable to undertake further sniff tests in optimal summertime conditions this year, following the upgrade works. However, Phlorum agrees with SW's EIR team that overall odour emissions from the WwTW should not be materially different now to those detected in 2022. This is based on comparative work¹² presented within the adjacent planning approval *Ref: P/35/24/OUT* (albeit, the model results are superseded by this latest assessment), and the results of the latest olfactometric sampling, which suggests the new ASP could be markedly less odorous than the trickling filters they replaced. As such, the results of the six surveys are likely conservative and provide useful evidence.
- 4.9 The six surveys each 'sampled' between 20 and 33 locations in the vicinity of the WwTW to provide a qualitative description of any odours detected, as well as their intensity and frequency.
- 4.10 The wind direction during the surveys was generally north-westerly (the application site was downwind of the WwTW). When this was not the case, "proxy" locations were used, downwind of the WwTW, to ensure a conservative approach to the survey.
- 4.11 At each survey location, 20 samples of odour were taken using the assessor's sense of smell. As advocated in the latest IAQM odour guidance, the German National Guidelines (VDI 3940:1993) for the determination of odorants in ambient air was used to assess the intensity of odours. The VDI standard intensity (I) scale ranges from 0 (no odour), through 1 (slight/very weak), to 6 (extremely strong). Additional notes were taken at each survey location, describing the odour (if recognisable) and the location's sensitivity.
- 4.12 This information was recorded on an odour assessment reporting sheet, which incorporated both the EA and IAQM guidance. The reporting sheet also includes additional information, where appropriate, such as: ambient stressors; locations of other odour sources in the area; and meteorological conditions during the survey. The reporting sheets are provided in Appendix A. Survey location points are indicated on Figure 3, with key results summarised in Figures 4 and 5.

12 Phlorum (2024). Phase 4, Pagham Odour Assessment (Ref 11271 (OD) Rev4 Final).

- 4.13 From this information, the odour exposure at each sample point can be defined by comparing the average intensity from the VDI scale with the percentage odour time during the sample. IAQM guidance provides a matrix for this (IAQM guidance Table 15), which is provided in Appendix B, for reference.

Odour Dispersion Modelling

Odour Dispersion Model Set-up

- 4.14 The atmospheric dispersion modelling assessment was undertaken using the Defra approved ADMS 6 detailed dispersion model (version 6.0.2.1). For completeness, the odour dispersion modelling has considered all known open-to-air sources of odour from the WwTW, including:
-  Inlet works and balancing tank;
 -  Distribution Channel to PST;
 -  2 PSTs;
 -  ASP Selector Zone;
 -  ASP Aerated Zone;
 -  ASP Anoxic Zone;
 -  Surplus Activated Sludge (SAS) Collection Chamber;
 -  FST Distribution Chamber;
 -  4 FSTs;
 -  Tertiary Treatment Plant;
 -  Effluent Works Return;
 -  2 SHTs and DLT;
 -  2 Storm Tanks; and
 -  Tanker Extraction Point.
- 4.15 The list of treatment processes at Pagham WwTW (see Paragraph 3.1) notes that there are presently 3 FSTs. Initially, SW had planned to allow space for a fourth FST, if required, in the future. However, it is not currently clear that such plans remain possible. Nevertheless, adopting a precautionary approach, the fourth FST has been modelled as an active odour source.
- 4.16 Sludge held in the SHTs is extracted and taken off-site for further treatment by dedicated tanker extraction vehicles. SW's EIR team has confirmed that these sludge collections will take place no more than twice per day, meaning that odours generated during this process will be short-lived. Nonetheless, this odour source has been included, for completeness.

Emission Rates

- 4.17 A reasonably conservative emission profile for the WwTW has been produced, incorporating site-specific sampling data. Each emission rate is anticipated to represent a rate equal to or above what would feasibly be expected from these processes annually, especially when acknowledging that emission rates from the most odorous processes would likely be significantly lower in winter compared to summer, due to increased dilution from higher rainfall and reduced bioactivity due to lower ambient temperatures.
- 4.18 Table 4.1, below, lists the odour emission rates used for each process or WwTW component. The site-specific olfactometric sampling was undertaken by Silsoe Odours Limited in May and June 2022, and in September 2025, following best-practice methods. Full results from the sampling are provided in Appendix C. Where sources were not sampled, emission rates were obtained either from sources directly upstream (ensuring that the value used tended towards conservatism), or from Dr. Michael Bull's latest Odour Emission Database¹³, which comprises hundreds of collated odour emission rates from various WwTW sources. All emission rates have been agreed in consultation with SW.
- 4.19 As shown in Table 4.1, emission rates obtained from the olfactometric sampling in September 2025 were substantially lower than data collected in 2022. Although there was rain present during the September 2025 survey, this does not seem to have influenced the influent wastewater flow rates, so it is unlikely that the wastewater was significantly diluted by rainwater; SW's 2024 flow data¹⁴ shows an average April to September sewage flow rate of 32.9 l.s^{-1} , and the September 2025 sampling was undertaken when flow rates were between 29.3 and 35 l.s^{-1} . If rainwater dilution was not a key contributor to the low emission rates measured in September 2025, then the differences with the 2022 data are most likely attributable to the WwTW's process improvements. However, to maintain a conservative approach, the higher emissions factors from 2022 were used in the dispersion modelling.
- 4.20 All odour sources were assumed to emit at a velocity of 0.01 m.s^{-1} to represent their ambient release to air.

13 Michael Bull & Associates. Odour emissions database (August 2025). Available from:

<https://www.odourconsultant.co.uk/odour-emissions-database/>

14 SW (2025). 2024 Flow Data.xlsx available at <https://www.southernwater.co.uk/about-us/environmental-performance/healthy-rivers-and-seas/flow-and-spill-reporting/>

Table 4.1: Modelled odour emission rates from Pagham WwTW

Source	Source Type	Approx. Total Area (m ²)	Emission Height (m)	Odour Emission Rate from Olfactometric Sampling Data (Ou _E .m ⁻² .s ⁻¹)			Modelled Odour Emission Rate (Ou _E .m ⁻² .s ⁻¹)
				May 2022	June 2022	September 2025	
Inlet Works	Area	17	5	-	264	-	264
Balancing Tank	Area	28	3	1,097	140.14	5.2	140.14 ⁽¹⁾
Channel to PST	Area	12	1	-	136.3	-	136.3
PST x2	Area	240	1	1.35	1.17	-	1.35
ASP Selector Zone	Area	25	3	-	-	-	8 ⁽²⁾
ASP Anoxic Zone	Area	196	1.5	-	-	0.3	8 ⁽²⁾
ASP Aerated Zone	Area	345	1.5	-	-	0.3	1.4 ⁽²⁾
SAS Chamber	Area	5	1	-	-	-	7.2 ⁽²⁾
FST Distribution Chamber	Area	5	1	-	-	-	1.4 ⁽³⁾
FST x4	Area	640	1	0.35	-	0.2	0.35
Tertiary Plant	Area	26	1	-	-	-	0.35 ⁽³⁾
Effluent Works Return	Area	6	1	-	-	-	1.35 ⁽³⁾
2 SHTs	Area	86	6	656	198	4.3	198 ⁽¹⁾
DLT	Area	8	6	609	-	-	198 ⁽¹⁾
Tanker extraction	Point	0.0314	1	-	-	-	2,103 ⁽⁴⁾
2 Storm Tanks	Area	230	2	0.38	-	-	0.38

Notes:

⁽¹⁾ A full rationale for the decision to discount the May 2022 results at the Balancing Tank, SHT and DLT are provided in Appendix D.

⁽²⁾ Values obtained from Dr Michael Bull's Odour Emission database – Median values were used, which are representative of rates expected at a typical WwTW.

⁽³⁾ Values taken from the most representative upstream treatment process, for conservatism.

⁽⁴⁾ Emission rate is in OU.s⁻¹ and has been calculated on the assumption that it takes 60 minutes to fill 2x 4000-gallon tankers. At Olfasense UK's recommendation for a previous project, the tankers are predicted to emit at a concentration of 250,000 Ou.m⁻³. A temporal variation factor has been applied in the model, accounting for the fact that these tankers would not be present at the site for longer than 60 minutes per day.

Meteorology and Surface Roughness

- 4.21 Detailed, hourly sequential, meteorological data is used by the model to determine odour transportation and levels of dilution by the wind and vertical air movements. Meteorological data used in the model were obtained from a site-specific Numerical Weather Prediction (NWP) model, provided by Air Pollution Services (APS). The NWP data is for the 3km grid square within which the application site and WwTW are situated. 5 years of meteorological data were used, in line with best practice IAQM guidance, to identify the year representative of the worst-case meteorological conditions. Wind Roses for each year are included in Figure 7.

Terrain

- 4.22 Terrain can influence the dispersion of pollutants in the local area. However, ADMS-6 user guidance¹⁵ suggests terrain effects should only be modelled where the gradient exceeds 1:10. The local area is largely flat and, as such, the impact of complex terrain has not been modelled.

Modelled Receptors

- 4.23 Discrete modelled receptor locations are detailed in Table 4.2 and shown in Figure 6. These were positioned at seven locations within the Phase 4b site red line boundary, where residential uses are currently proposed. Receptors R1 to R3 represent the closest proposed receptors to the WwTW. All receptor points were modelled at breathing height, which is by convention, 1.5m above ground level.

Table 4.2: Discrete Modelled Receptors

Receptor ID	UK Grid Reference	
	X	Y
R1	488538	98669
R2	488615	98671
R3	488679	98685
R4	488711	98729
R5	488603	98591
R6	488724	98633
R7	488799	98572

- 4.24 A contour plot showing the pattern of dispersion of odour across the WwTW and the surrounding area in the worst-case meteorological year was produced (see Figure 6). The grid originated at UK grid reference 488070, 98400 with 104 × 81 points modelled (10m grid spacing). The grid was modelled to show the pattern of dispersion at ground level breathing height (1.5m).

¹⁵ CERC (2021) ADMS 5.2 User Guide

Uncertainty

- 4.25 Dispersion modelling is affected by a number of inherent uncertainties, which include:
- 🌱 Model uncertainty – associated with model formulations;
 - 🌱 Data uncertainty – associated with uncertainties and assumptions of the input data (e.g. emissions estimates and meteorological assumptions); and
 - 🌱 Variability – associated with the inherent randomness of measurements used.
- 4.26 When considering odour dispersion modelling, a major source of uncertainty relates to the choice of odour emission rates, as many factors can influence the emission rate of a particular process at a specific time. For example, it is widely recognised that odour emissions from WwTW tend to be greater in summer as warmer weather increases bioactivity and reduced rainfall results in more concentrated sewage effluent.
- 4.27 To manage the uncertainty associated with the modelling process, a number of conservative steps have been taken, which include:
- 🌱 The use of five years of sequential site-specific meteorological data to account for variability in meteorological conditions, with only the ‘worst-case’ meteorological year then selected for analysis;
 - 🌱 The model assumes no reduction in predicted odour emission rates during winter;
 - 🌱 Modelled emission rates are estimated based on site-specific olfactometric sampling data collected in the summer of 2022, despite more recent September 2025 data indicating that emission rates might be markedly lower; and
 - 🌱 It was assumed that all processes (except tanker extraction) would emit odours for 100% of the year, despite some processes fluctuating in emissions or rarely emitting (e.g. the storm tanks are often empty).

Consultation

Arun District Council

- 4.28 During pre-app consultations, ADC’s EHO acknowledged that the odour threshold recommended by Phlorum (i.e. 3 O_{UE}.m⁻³) is greater than the threshold typically used by SW. The EHO noted that Phlorum’s justification seemed appropriate, but requested that full justification be provided in any future robust assessment (i.e. this report).

- 4.29 In June 2025, ADC's case officer provided further pre-application advice, which mirrored the EHO's stance. The case officer emphasised the need for a comprehensive and robust assessment, and recommended that Phlorum engage with SW to agree the scope of assessment. The case officer was also made aware of SW's plans to upgrade Pagham WwTW and asked for clarity on how these might impact odour.
- 4.30 As requested by the EHO and case officer, full justification for the use of the $3 \text{ Ou}_E.\text{m}^{-3}$ threshold has been presented in Paragraphs 2.32 to 2.43, and 6.10 to 6.13. In summary, observational evidence from sniff testing, complaints data and olfactometric sampling collected for this assessment shows that the $1.5 \text{ Ou}_E.\text{m}^{-3}$ threshold is likely to be inappropriate and unreasonably stringent for this WwTW. Additionally, the use of the $3 \text{ Ou}_E.\text{m}^{-3}$ threshold is supported by numerous case law examples and recent planning decisions of a similar nature to the proposed development, including the Ford Airfield application which the case officer eluded to during pre-application discussions.
- 4.31 At the case officer's request, Phlorum has also engaged fully with SW's odour consultant, Olfasense UK Ltd. Further details are provided below.
- 4.32 Lastly, regarding the case officer's call for clarity on how odour emissions might change following the WwTW upgrades, the upgrade works were completed in July 2025, so Phlorum has been able to assess their effect on the odour sources there. Brief discussions of the possible influences on odour are provided in Paragraphs 4.8 and 4.19.
- 4.33 ADC has also provided information on odour complaints made against the Pagham WwTW.

Southern Water

- 4.34 SW's EIR Team were contacted to provide information on any complaints relating to odour from the WwTW, as well as confirmation on the regularity of tanker visits.
- 4.35 SW's technical odour consultant, Olfasense UK Ltd, was contacted regarding the proposed scope of assessment. Phlorum updated Olfasense on all the evidence collected up to July 2025, and asked for confirmation from them on what they might deem a suitable assessment scope. Olfasense stated that it would seem sensible to supplement the evidence with new olfactometric sampling of the upgraded components of the WwTW, so this was undertaken under their supervision on 3rd September 2025.
- 4.36 The results of the olfactometric sampling were shared with Olfasense, and discussions were had to agree specific methodological details for the dispersion modelling. Their advice has been incorporated fully within this assessment, with the choice of odour sources to include in the model, and their associated odour emission rates, all agreed.

- 4.37 Phlorum mentioned that they would be assessing against the $3 \text{ Ou}_E \cdot \text{m}^{-3}$ threshold. Whilst Olfasense did not provide a direct response to this, they did state that they *"had no further comments"* on the method statement, which suggests they consider the threshold reasonable.

Assessment of Significance

- 4.38 Both the EA and IAQM advocate a multi-tool approach for the assessment of odour. This is because it is widely recognised that odour assessment can be subjective, particularly if it relies on a single tool; each tool having its strengths and limitations. Judgement using several tools therefore typically provides the necessary "weight of evidence" required for the effective assessment of odour.
- 4.39 The overall judgement of the odour effect takes into consideration the odour dispersion modelling, complaints analysis and the odour surveys. Given the uncertainties and limitations surrounding odour dispersion modelling, and in line with IAQM guidance, significant weight will be placed on the results of the ground-based sniff tests and complaints analysis.

Conclusions on Significance

- 4.40 IAQM guidance states that odour assessments should reach a conclusion on the significance of a predicted effect. However, it is noted that a potentially significant effect is not grounds to conclude that a proposed development is unacceptable.
- 4.41 As previously stated, there are no prescribed standards for odour concentrations stated in published guidance, though a great deal of consideration is given to the level of odour that might cause annoyance, which is included within the IAQM guidance.
- 4.42 Tables 6, 7, and 16 of the IAQM guidance (provided in Appendix B) describe a general relationship between the level of odour exposure experienced by a receptor of a given sensitivity, and the magnitude of adverse effect that is likely to result.
- 4.43 The odour effect has been determined using both the qualitative and quantitative methods used in this assessment, according to the corresponding IAQM odour effect descriptor table (Table 16 for qualitative, Tables 6 and 7 for quantitative).
- 4.44 The subsequent significance of effect will vary for each proposed receptor location, within the proposed development. For example, those receptors close to the WwTW might be exposed to significantly adverse odour concentrations, whereas those further away might not.
- 4.45 Where the magnitude of effect for a chosen receptor location is greater than "slight adverse", according to the IAQM criteria, the effect could potentially be considered significant.

5. Assessment of Impacts

Site Baseline Olfactory Surveys

- 5.1 Six odour surveys ('sniff-tests') were carried out in and around the vicinity of the application site and WwTW between 25th April and 26th July 2022. A summary of the meteorological conditions during each of the six surveys is provided in Table 5.1, below.

Table 5.1: Meteorological Conditions for Baseline Olfactory Surveys

Survey	Date	Weather	Temperature (°C)	Beaufort Wind Scale	Wind Direction	Atmospheric Stability
1	25 th April 2022	Dry, 1/8 th Cloud	15	2	Northerly/ North-Easterly	Unstable
2	03 rd May 2022	Dry, 7/8 th Cloud	14	1	North-Easterly	Neutral
3	06 th July 2022	Dry, 3/8 th Cloud	20	2	North-Westerly	Slightly Unstable
4	13 th July 2022	Dry, 2/8 th Cloud	26	2	Northerly	Unstable
5	21 st July 2022	Dry, 7/8 th Cloud	18	2	Northerly/ North-Westerly	Neutral
6	26 th July 2022	Dry, 4/8 th Cloud	20	2	Northerly/ North-Westerly	Slightly Unstable

- 5.2 Table 5.1 highlights that a variety of meteorological conditions were covered across the six surveys, with atmospheric conditions ranging from unstable to neutral. It is estimated that these conditions occur between 70% and 90% of the time in the UK⁷.
- 5.3 Surveys were generally undertaken when winds were blowing in the direction of the application site (blowing from the north and north-west). The first two surveys were undertaken when winds were blowing generally in a north-easterly direction, so "proxy" sniff-test locations were used, downwind of the WwTW, to capture the odours from the WwTW at that time.
- 5.4 Anecdotal, the assessor reviewed weather forecasts daily to identify suitable survey days and noticed that wind directions heading towards the application site were very infrequent. This is supported by the site-specific NWP meteorological data, which suggests that less than 2% of winds were predicted to direct from the WwTW towards the application site when temperatures were at least 15°C.
- 5.5 Following best practice guidance, the odour surveys always started either upwind or well-distanced from the source of odours, to prevent the likelihood of odour fatigue affecting the assessor.

- 5.6 The survey locations and a summary of the results are provided in Table 5.2, below. The locations are also provided in Figure 3, with results summarised in Figures 4 and 5. Figures 4 and 5 show the highest odour exposures and the maximum identified odours, respectively. The six survey sheets are also provided in Appendix B.
- 5.7 The summary table below shows the results of whichever of the six odour surveys identified the strongest odours at each location. As such, the table from which conclusions are drawn present and consider the worst-case odour results only, which is deemed to be an appropriately conservative method.

Table 5.2: Odour Survey Results

Location				Average Intensity	Maximum Intensity	Odour Pervasiveness (% of strong recognisable odours)	Odour Exposure
#	Distance from WwTW (m)	UK Grid Coordinates					
		X	Y				
1	180	488491	98660	0	1	0%	Negligible
2	150	488429	98688	0	1	0%	Negligible
3	90	488389	98751	0	1	0%	Negligible
4	80	488334	98766	1	2	0%	Negligible
5	100	488277	98775	1	2	0%	Negligible
6	90	488255	98821	1	2	0%	Negligible
7	100	488231	98869	2	3	0%	Negligible
8	90	488249	98921	1	3	0%	Negligible
9	50	488293	98941	3	4	40%	Medium
10	50	488290	98882	2	3	0%	Negligible
11	50	488290	98828	2	3	0%	Negligible
12	80	488308	98777	2	3	0%	Negligible
13	40	488345	98794	2	3	0%	Negligible
14	40	488390	98792	2	4	10%	Small
15	40	488436	98788	2	4	5%	Negligible
16	40	488490	98786	3	4	25%	Medium
17	0	488492	98831	4	3	60%	Large
18	0	488431	98836	3	5	40%	Medium
19	0	488388	98835	4	5	65%	Large
20	0	488339	98835	2	3	0%	Negligible
21	0	488321	98808	1	3	0%	Negligible
22	0	488323	98844	1	2	0%	Negligible
23	0	488329	98884	2	3	0%	Negligible
24	0	488335	98917	3	4	5%	Negligible
25	0	488339	98952	2	3	0%	Negligible
26	350	488679	98542	0	1	0%	Negligible

Location				Average Intensity	Maximum Intensity	Odour Pervasiveness (% of strong recognisable odours)	Odour Exposure
#	Distance from WwTW (m)	UK Grid Coordinates					
		X	Y				
27	300	488573	98549	0	1	0%	Negligible
28	250	488573	98603	1	2	0%	Negligible
29	300	488682	98594	0	1	0%	Negligible
30	260	488678	98644	0	1	0%	Negligible
31	200	488574	98657	1	1	0%	Negligible
32	100	488490	98726	2	3	0%	Negligible
33	140	488574	98709	2	3	0%	Negligible
34	230	488683	98697	1	1	0%	Negligible
35	330	488781	98691	0	1	0%	Negligible
36	210	488687	98760	1	2	0%	Negligible
37	110	488576	98768	3	4	20%	Medium
38	90	488578	98831	2	4	5%	Negligible
39	200	488692	98826	1	3	0%	Negligible
40	200	488697	98888	1	3	0%	Negligible
41	90	488579	98894	1	3	0%	Negligible
42	0	488504	98902	2	3	0%	Negligible

- 5.8 It is important to note that all distinguishable odours detected (i.e. those with a score of at least 3 on the VDI standard intensity scale) were anticipated to originate from the WwTW. All of these odours were described to be 'sewage' based and often 'earthy'. According to SEPA guidance¹⁶, these have hedonic tone scores of between -3.68 and -1.94, and are considered to be *unpleasant*.
- 5.9 The summary data in Table 5.2 shows that WwTW-based odours were detected most regularly within 50m downwind of the WwTW. Within this distance, odours were detectable and strong for extended periods of time, and hence the odour exposure scores here were often considered to be *Medium* or *Large*, following IAQM guidance.
- 5.10 The furthest that strong odours (at least 4 on the VDI standard intensity scale) could be detected across the six surveys was 110m downwind of the WwTW boundary (Location 37). Beyond this distance, odours were mostly unrecognisable, faint and impersistent. "Barely recognisable" WwTW-related odours could be identified up to 200m from the WwTW boundary (Locations 39 and 40). The nearest residential uses at the proposed development would be located approximately 175m from the WwTW, with the majority located more than 200m away.

¹⁶ Scottish Environmental Protection Agency. 2010. Odour Guidance 2010

Complaints Analysis

- 5.11 SW were asked whether they had received any odour complaints relating to the WwTW since 2012. They confirmed that they had received just one odour complaint, on 24th April 2022. This complaint was received from a resident on Blondell Drive, more than 2km east of the WwTW. It is unlikely that odours could have reached these distances without enacting complaints from the hundreds of residents located closer to the WwTW; it is more probable that either the odour was not experienced at the complainant's address, or that the odour did not originate from the WwTW. This is supported by historical meteorological data, which suggests that the complainants address was upwind of the WwTW on the day of the complaint, and the five days prior.
- 5.12 No odour complaints were received during the upgrade works at the WwTW, nor since they were completed in July 2025.
- 5.13 ADC were also asked whether they had received any odour complaints relating to the WwTW. They declared that they had not received any complaints.
- 5.14 This provides evidence that odours emanating from the WwTW have not been sufficient to cause any recorded actionable nuisance at existing residential areas in the vicinity of the WwTW site. Early evidence since the completion of the upgrade works in July 2025 suggests the upgraded facility has not posed an actionable nuisance either. There are a large number of residential properties to the east and south-east of the WwTW, with the closest being 250m away.

Dispersion Modelling

- 5.15 The results of dispersion modelling assessments are sensitive to the input parameters used. In particular, models are sensitive to the emission parameters, meteorological conditions, grid resolution, terrain data, and building parameters. As discussed in Paragraph 4.27, a considerable level of conservatism has been built into the model to increase the robustness of this source of evidence.
- 5.16 Table 5.2 below presents the predicted odour concentrations at discrete receptors, based on five years' of meteorological data.

Table 5.2: Modelled 98th Percentile of Hourly Mean Odour Concentrations

Receptor name	Odour units (Ou _E /m ³)				
	2016	2017	2018	2019	2020
R1	2.29	2.60	2.18	2.29	1.86
R2	2.25	2.75	2.30	2.43	1.85
R3	2.19	2.67	2.21	2.52	1.64
R4	2.46	2.61	2.50	2.46	1.61
R5	1.32	1.54	1.37	1.45	1.13
R6	1.53	2.08	1.64	1.91	1.23

Receptor name	Odour units (Ou_E / m^3)				
	2016	2017	2018	2019	2020
R7	1.11	1.53	1.21	1.39	0.84

- 5.17 The data in Table 5.2 show that the predicted odour concentrations at the proposed residential receptors, in all years, were below the $3 \text{ Ou}_E \cdot \text{m}^{-3}$ threshold. All five modelled meteorological years resulted in concentrations below the threshold by at least 8%.
- 5.18 The highest concentration of $2.75 \text{ Ou}_E \cdot \text{m}^{-3}$ was modelled at R2, representing one of the proposed residential receptors closest to the WwTW, in 2017. In all other meteorological years, the predicted odour concentration was even lower, with the 2020 concentration as low as $1.85 \text{ Ou}_E \cdot \text{m}^{-3}$, almost 40% below the threshold.
- 5.19 Figure 6 displays the modelled 98th percentile odour concentration contours generated by the WwTW across the local area. The figure shows that the $3 \text{ Ou}_E \cdot \text{m}^{-3}$ contour has been predicted to extend beyond the red line boundary, but for clarity, no residential properties will be located in any area where the $3 \text{ Ou}_E \cdot \text{m}^{-3}$ threshold is predicted to be exceeded. SW's more stringent $1.5 \text{ Ou}_E \cdot \text{m}^{-3}$ threshold extends across much of the application site, but also across dozens of existing residential units, where no actionable odour complaints have been recorded.

6. Discussion

- 6.1 The odour assessment has used a suite of tools, including observational, sensory, and predictive tools to assess the risk of odours from the WwTW significantly impacting the proposed development.

Observational and Sensory Tools

- 6.2 Since 2012, it is understood that only one odour complaint has been made to either SW or ADC, despite existing residences being located 250m to the east of the WwTW.
- 6.3 As the application site is on greenfield land and there are no sensitive receptors directly between the site and WwTW, a lack of complaints in the general direction of the site does not necessarily mean there is no odour risk, especially considering that proposed residential uses will be located as close as 175m from the WwTW.
- 6.4 Six odour surveys (sniff tests) were carried out between 25th April and 26th July 2022. The sniff tests were planned to coincide with commonly observed and conservative meteorological conditions and found that few odours could be detected beyond 50m from the WwTW, and where these were detected, they were generally faint and intermittent. No strong odours were detected further than 110m from the WwTW.
- 6.5 Based on the results of the surveys in isolation, it is reasonable to assume that under typical meteorological conditions, the WwTW would be unlikely to significantly impact the proposed residential receptors on the application site. Proposed receptors would be located over 100m from any area where strong odours were observed.

Dispersion Modelling

- 6.6 To complement the above assessment tools, a dispersion modelling assessment was undertaken. The modelling assessment took a highly conservative approach, as described in Paragraph 4.27, to account for inherent uncertainties associated with odour modelling.
- 6.7 As discussed throughout this report, odour concentrations below $3 \text{ Ou}_E.\text{m}^{-3}$ are considered unlikely to cause a statutory nuisance.
- 6.8 The results showed that the highest modelled concentration at any proposed receptor was $2.75 \text{ Ou}_E.\text{m}^{-3}$, which is below the $3 \text{ Ou}_E.\text{m}^{-3}$ significance threshold by 8%. The corresponding contour plot in Figure 6 shows that at its closest, the modelled $3 \text{ Ou}_E.\text{m}^{-3}$ contour line, is approximately 13m from the nearest proposed residential use. As such, based on this source of evidence in isolation, the proposed residential land parcel is predicted to be exposed to levels of odour no worse than *slightly adverse*, according to IAQM guidance, which is considered not significant.

Comparing the Modelled Results Against Observational Evidence

- 6.9 The collected evidence indicates that odour complaints from the proposed development would be unlikely.
- 6.10 Figure 6 overlays the sniff test results with the modelled odour contours. The figure shows that significant odours (i.e. *Moderately* and *Substantially* adverse odour effects) detected during the sniff tests are confined to areas where concentrations of $5 \text{ Ou}_E.\text{m}^{-3}$ or greater were modelled. In fact, all locations where strong odours were detected during sniff tests were in areas where concentrations of at least $5 \text{ Ou}_E.\text{m}^{-3}$ were modelled.
- 6.11 Aside from the model results complementing the findings from the six sniff tests, they also strongly suggest that the use of the $3 \text{ Ou}_E.\text{m}^{-3}$ significance threshold can be considered reasonable, if not conservative.
- 6.12 Further supporting the use of this significance threshold is the complaints data, which demonstrates that only one complaint has been received in the past 13 years. The dispersion model contour in Figure 6 indicates that dozens of existing residential properties are currently exposed to odour concentrations in excess of $1.5 \text{ Ou}_E.\text{m}^{-3}$. The fact that complaints against the WwTW are extremely rare indicates that odours of this concentration do not tend to cause significant nuisance, and/or that the conservative nature of inputs in the dispersion modelling has resulted in an overprediction of odour effects.

Significance of Odour

- 6.13 For the purpose of this assessment, multiple assessment tools have been used. Collating the complaints and odour survey data, the modelled odour contour corroborates the finding that significantly adverse odours are unlikely to occur in areas of modelled concentrations below $3 \text{ Ou}_E.\text{m}^{-3}$.
- 6.14 As such, this assessment strongly suggests that whilst odours might sometimes be detectable at some locations where residential uses are proposed (i.e. locations where odours above the 1 European Odour Unit detection threshold might occur), they would unlikely be sufficient to cause an actionable nuisance.
- 6.15 This assertion supports the conclusions from both the complaints records and sniff testing and adds to the "weight of evidence" that odours emanating from the WwTW would not have the potential to significantly impact the amenity of future users of the proposed development.

7. Conclusions

- 7.1 The assessment has relied on a number of tools, including a detailed atmospheric dispersion modelling assessment of the WwTW, analysis of complaints and sniff testing, to consider the potential for odours to significantly affect future users of the proposed development.
- 7.2 Only one complaint has been lodged in relation to the WwTW since 2012, to either Adur District Council or to Southern Water.
- 7.3 No strong odours associated with the WwTW were detected across the proposed residential areas during any of the six sniff tests.
- 7.4 A conservative odour dispersion modelling assessment was undertaken, using site specific odour emissions data collected across three separate dates. The modelling predicted that odour concentrations across the proposed development would be below the relevant odour threshold for potentially significant odour impacts.
- 7.5 Considering the conclusions drawn from the sensory, observational, and predictive odour assessment tools, it is concluded that the proposed development would not be significantly impacted by odours emanating from the WwTW.
- 7.6 The proposed development is considered compliant with the requirements of the National Planning Policy Framework and Local Policy, as proposed receptors would not be expected to be adversely impacted by odours. Odour should not, therefore, be a constraint to the planning process.

Figures and Appendices

Figure 1: Site Location Plan

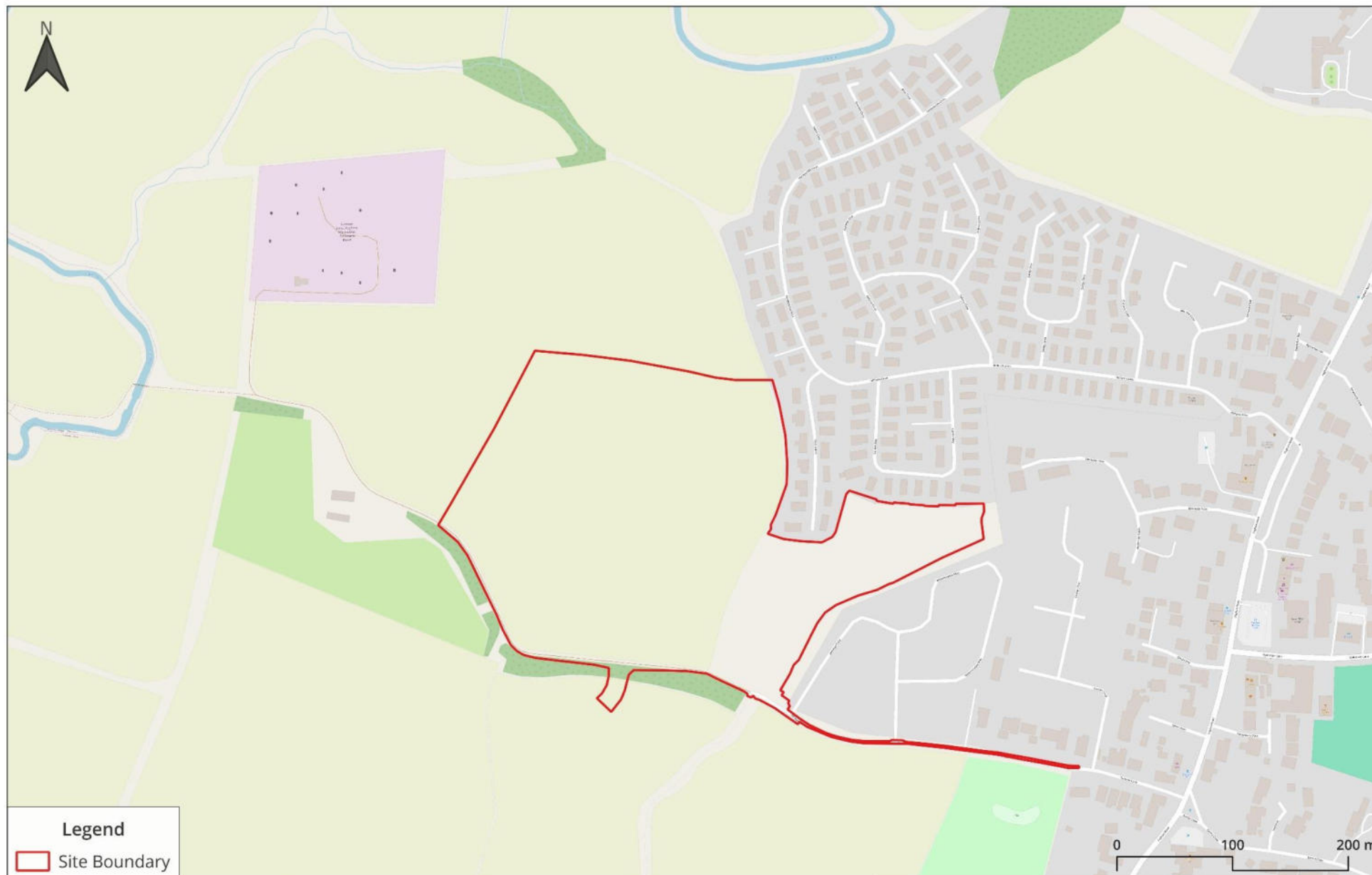


Figure 1: Site Location Plan

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Figure 2: Pagham WwTW Plan

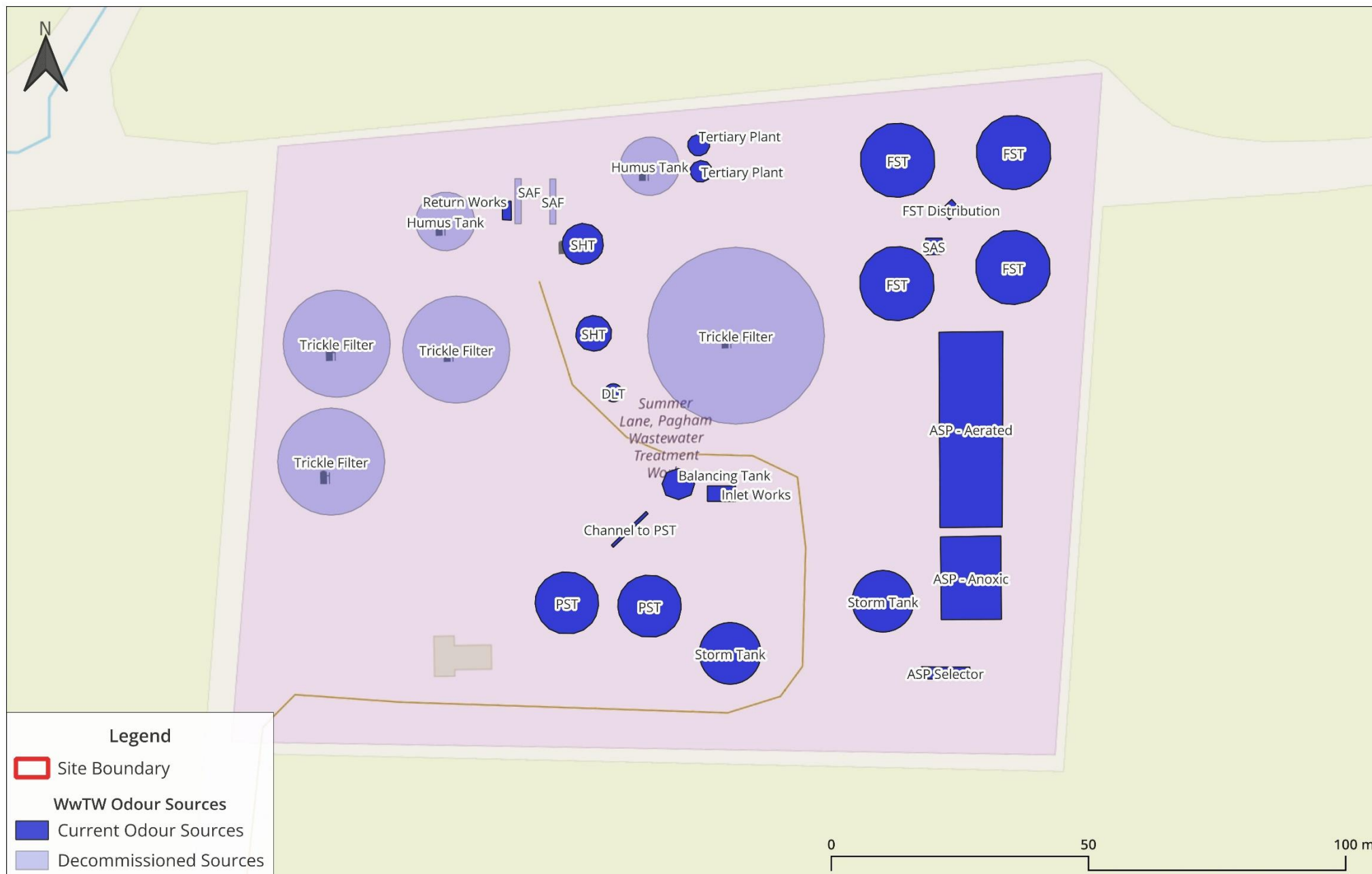


Figure 2: Pagham WwTW Layout Plan

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Figure 3: Odour Survey Locations

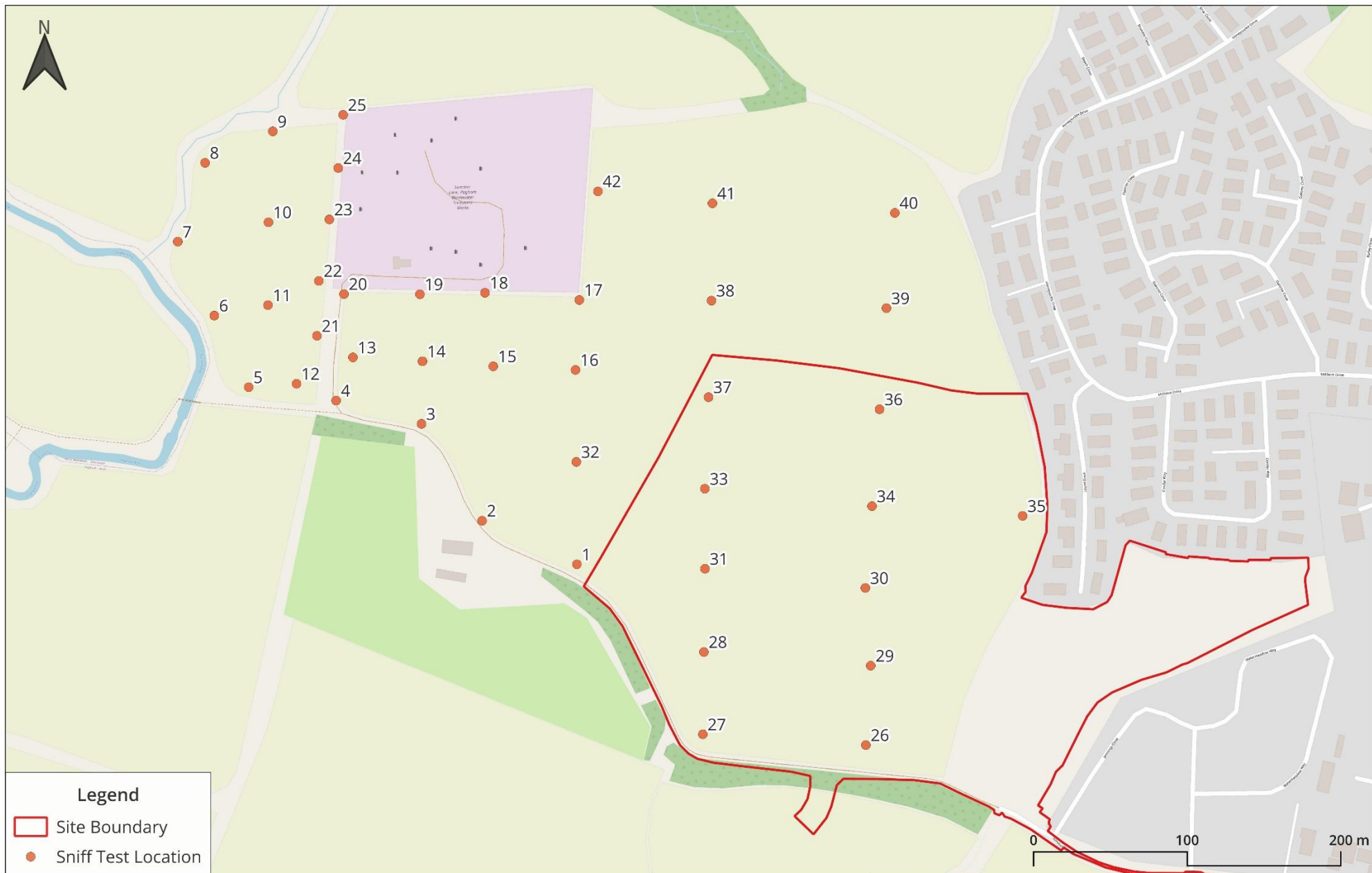


Figure 3: Odour Survey Locations

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Figure 4: Surveyed Odour Exposures



Figure 4: Surveyed Odour Exposure Scores

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Figure 5: Maximum Surveyed Odours



Figure 5: Maximum Surveyed Odours

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Figure 6: Modelled Odour Contours



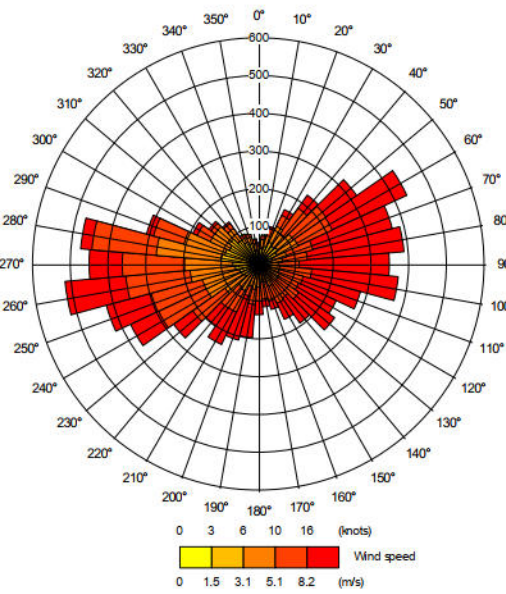
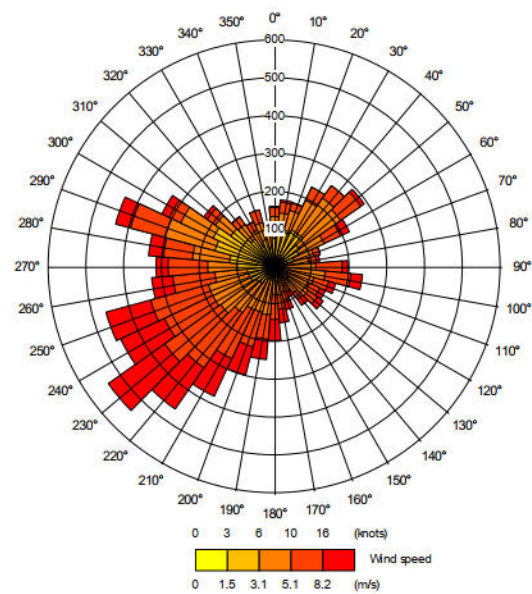
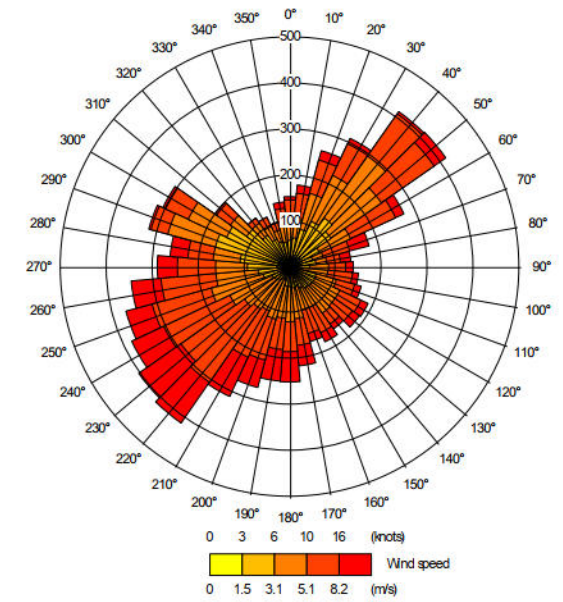
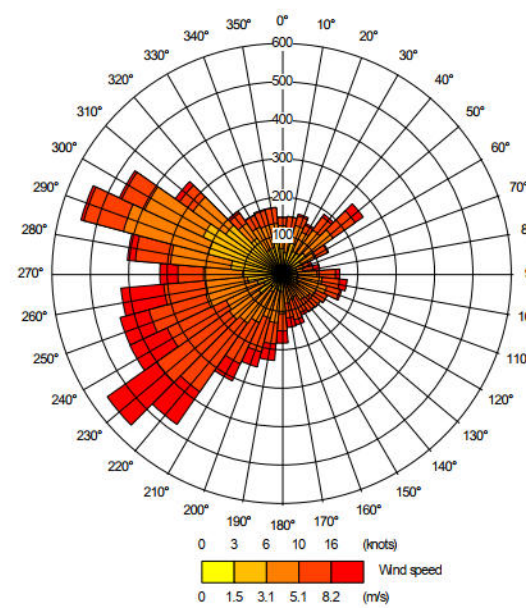
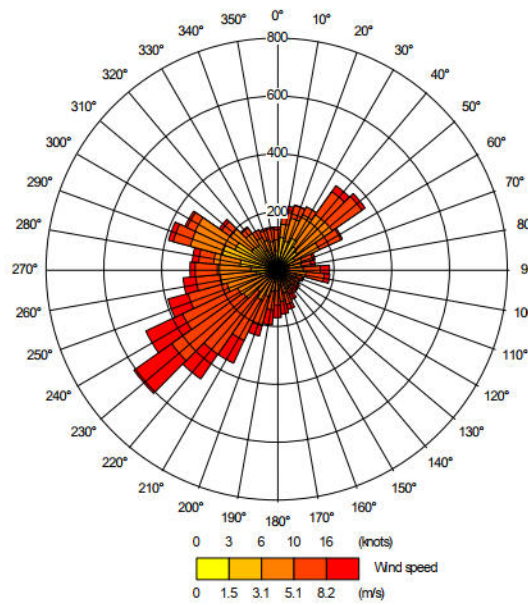
Figure 6: Modelled Odour Contours

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Illustrative Layout provided by DLA

Job No: 13839
Author: R. Boakes
Date: 27/01/2026
www.Phlorum.com



Figure 7: Wind Roses for NWP Data (2016-2020)



Appendix A: Odour Survey Sheets

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Intensity	% Time	Descriptors	Max Intensity	Exposure
1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0%	-	1	Negligible
2	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0%	-	1	Negligible
3	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0%	-	1	Negligible
4	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0%	-	1	Negligible
5	1	1	0	0	2	1	2	2	2	2	0	0	1	2	2	1	2	2	1	0	1	0%	-	2	Negligible
6	0	0	1	1	1	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0%	-	1	Negligible
7	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0%	-	1	Negligible
8	1	1	0	1	1	0	2	1	2	1	2	1	0	0	0	0	0	0	0	1	1	0%	-	2	Negligible
9	2	1	0	0	0	1	0	0	2	2	1	1	2	2	0	0	1	1	1	1	1	0%	-	2	Negligible
10	2	1	2	3	3	2	2	3	1	1	0	0	2	2	3	3	2	2	1	2	2	0%	Earthy	3	Negligible
11	1	2	1	1	2	3	2	1	1	2	2	2	2	1	3	3	2	2	2	1	2	0%	Earthy	3	Negligible
12	1	1	1	2	2	2	1	2	2	1	1	2	3	3	3	2	1	1	1	1	2	0%	Earthy	3	Negligible
13	2	1	2	0	1	2	2	3	3	2	2	3	3	2	0	2	1	2	2	2	2	0%	Earthy / Sewage	3	Negligible
14	3	3	3	2	2	1	1	0	2	1	3	4	4	2	2	2	3	3	3	2	2	10%	Sewage / chemical	4	Small
15	1	2	3	2	3	2	3	3	2	1	0	0	1	1	4	3	1	1	1	2	2	5%	Earthy / Sewage	4	Negligible
16	1	0	0	1	2	1	2	1	2	3	2	3	2	2	2	2	3	2	1	0	2	0%	Sewage	3	Negligible
17	1	0	1	2	2	2	1	2	2	2	2	1	2	3	2	2	2	3	2	1	2	0%	Earthy	3	Negligible
18	3	2	2	3	2	3	3	4	4	4	4	5	4	4	3	3	3	3	2	2	3	35%	Sewage	5	Medium
19	3	4	3	5	5	4	4	4	4	4	3	3	3	5	5	4	3	3	4	4	4	65%	Sewage	5	Large
20	1	1	2	3	3	3	3	2	2	3	2	3	3	3	3	2	1	0	3	3	2	0%	Sewage	3	Negligible
21	3	2	1	0	1	1	1	2	2	0	1	2	3	2	2	2	1	0	0	3	1	0%	Sewage	3	Negligible
22	0	1	1	2	0	1	2	1	1	1	2	2	2	1	2	2	2	2	2	0	1	0%	-	2	Negligible
23	2	3	3	3	2	2	2	3	1	0	0	2	3	2	2	3	3	3	3	2	2	0%	Sewage	3	Negligible
24	3	3	2	2	2	3	2	3	4	2	2	2	3	3	3	3	2	3	3	3	3	5%	Sewage	4	Negligible
25	2	1	2	2	2	3	3	3	2	2	2	2	1	2	2	2	1	2	2	2	2	0%	Sewage	3	Negligible

Weather: Warm, Dry, 1/8 Cloud Cover
 Wind Direction (From): North / North-East
 Beaufort Wind Scale: 2
 Temperature: 15°C
 Pressure: 1015mb
 Relative Humidity: 54%



Date: 25 April 2022
 Time: 09:50 - 12:45

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Avg. Intensity	% Time	Source	Odour Extent	Max Intensity	Exposure
1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0%	-	0	1	Negligible
2	0	0	0	0	1	0	1	0	0	0	1	1	0	0	1	1	1	1	0	0	0	0%	-	0	1	Negligible
3	0	0	1	1	0	1	0	0	1	1	0	0	1	1	0	0	0	0	1	1	0	0%	-	0	1	Negligible
4	2	1	2	0	1	2	2	1	1	0	1	2	1	2	2	2	1	2	2	0	1	0%	-	0	2	Negligible
5	0	1	1	0	0	2	2	1	1	0	1	2	1	2	2	2	1	2	2	0	1	0%	-	0	2	Negligible
6	1	0	0	1	1	2	0	0	1	1	0	1	1	0	1	1	2	0	0	1	1	0%	-	0	2	Negligible
7	1	3	3	2	1	0	1	2	2	2	3	3	2	1	2	1	2	2	3	3	2	0%	Earthy	2	3	Negligible
8	1	3	3	2	2	2	3	2	2	1	0	0	2	1	0	0	2	0	0	1	1	0%	Sewage / Earthy	2	3	Negligible
9	4	3	4	3	4	3	3	4	4	3	2	2	4	4	4	3	3	3	2	1	3	40%	Sewage / Chemical	2	4	Medium
10	2	1	2	1	2	2	0	2	2	0	0	0	1	0	0	1	0	0	0	0	1	0%	-	0	2	Negligible
11	1	0	1	0	1	0	0	0	1	1	0	1	1	0	1	1	0	0	0	1	1	0%	-	0	1	Negligible
12	0	0	0	1	1	0	1	0	0	0	0	0	0	1	1	3	3	2	2	2	1	0%	Earthy	2	3	Negligible
13	0	1	1	1	0	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0%	-	0	1	Negligible
14	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0%	-	0	1	Negligible
15	0	0	0	0	0	1	1	1	0	1	0	0	0	1	1	2	1	1	1	0	1	0%	-	0	2	Negligible
16	0	0	0	1	1	0	0	1	1	1	0	0	1	1	0	0	1	1	0	0	0	0%	-	0	1	Negligible
17	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0%	-	0	1	Negligible
18	1	2	2	1	1	0	2	2	2	2	1	1	1	0	1	1	1	1	1	0	1	0%	-	0	2	Negligible
19	0	1	1	1	0	2	1	0	1	2	2	0	1	2	2	1	2	2	1	1	1	0%	-	0	2	Negligible
20	1	2	2	3	2	1	2	2	3	2	2	2	1	2	2	1	3	2	2	2	2	0%	Sewage / Earthy	1	3	Negligible

Weather: Mild, Dry, 7/8 Cloud Cover

Wind Direction (From): North-east

Beaufort Wind Scale: 1

Temperature: 14°C

Pressure: 1022mb

Relative Humidity: 73%



Date 03 May 2022

Time 09:30-12:45

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Intensity	% Time	Descriptors	Max Intensity	Exposure
26	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0%	-	1	Negligible
28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0%	-	1	Negligible
29	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
30	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0%	-	1	Negligible
31	1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0%	-	1	Negligible
7	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0%	-	1	Negligible
8	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0%	-	1	Negligible
9	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0%	-	1	Negligible
32	2	1	1	1	2	3	2	2	3	3	2	2	3	2	2	3	2	2	2	1	2	0%	-	3	Negligible
33	1	1	1	1	0	0	0	0	1	0	0	1	1	0	0	0	0	1	0	0	0	0%	-	1	Negligible
34	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0%	-	1	Negligible
35	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0%	-	1	Negligible
36	0	1	1	0	1	1	1	1	2	2	2	0	0	1	0	0	0	1	1	1	1	0%	-	2	Negligible
37	3	3	4	3	3	2	2	3	3	3	3	4	3	2	2	4	3	3	4	3	3	20%	Earthy / Sewage	4	Medium
38	2	3	3	3	3	3	3	2	0	2	2	2	0	1	1	4	3	2	2	1	2	5%	Earthy / Sewage	4	Negligible
39	1	1	2	1	1	1	1	1	1	1	2	0	0	0	2	2	2	3	3	3	1	0%	-	3	Negligible
40	0	0	0	0	1	0	0	0	1	1	1	0	1	0	0	1	1	1	1	1	1	0%	-	1	Negligible
41	0	1	3	2	2	0	0	1	1	1	0	0	1	0	0	1	1	1	1	1	1	0%	-	3	Negligible
16	2	3	3	4	3	3	4	2	2	2	2	1	2	3	3	4	4	3	2	4	3	25%	Earthy / Sewage	4	Medium
14	0	1	1	2	1	2	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	0%	-	2	Negligible
19	2	2	3	2	2	2	1	1	1	2	2	2	2	3	3	3	2	2	2	2	2	0%	Earthy / Sewage	3	Negligible
18	4	4	3	3	4	3	3	3	4	3	2	1	2	3	3	4	4	3	3	4	3	35%	Sewage	4	Medium
42	2	2	2	1	1	2	2	1	0	1	2	2	3	3	2	2	1	1	1	1	2	0%	Earthy / Sewage	3	Negligible
17	3	3	3	4	4	3	3	2	2	2	3	3	2	3	4	4	2	2	3	3	3	20%	Sewage	4	Medium
43	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
44	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	0	0%	-	1	Negligible
45	1	1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0%	-	1	Negligible
46	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0%	-	1	Negligible
47	0	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	1	0	0	0	0%	-	1	Negligible
48	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0%	-	1	Negligible
49	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
50	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0%	-	1	Negligible

Weather: Sunny, Dry, 3/8 Cloud Cover

Wind Direction (From): North-West

Beaufort Wind Scale: 2

Temperature: 20°C

Pressure: 1028mb

Relative Humidity: 67%



Date: 06 July 2022

Time: 08.55 - 12.00

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Intensity	% Time	Descriptors	Max Intensity	Exposure
26	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0%	-	1	Negligible
27	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0%	-	1	Negligible
28	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0%	-	1	Negligible
29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0%	-	1	Negligible
30	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0%	-	1	Negligible
31	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0%	-	1	Negligible
7	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0%	-	1	Negligible
8	1	0	0	0	0	0	0	1	1	1	0	0	1	0	1	1	0	0	0	0	0	0%	-	1	Negligible
9	0	0	0	1	0	0	1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0%	-	1	Negligible
32	0	1	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
33	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
34	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0%	-	1	Negligible
35	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
36	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0%	-	1	Negligible
37	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0%	-	1	Negligible
38	1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0%	-	1	Negligible
39	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0%	-	1	Negligible
40	0	0	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0%	-	1	Negligible
41	0	0	0	1	1	1	1	1	1	0	0	0	1	0	1	1	1	1	0	0	0	0%	-	1	Negligible
16	0	1	1	1	0	1	1	0	1	1	1	2	2	1	0	0	0	0	0	0	0	0%	-	2	Negligible
14	1	1	1	0	0	0	1	2	2	1	1	1	1	1	1	1	2	2	2	2	2	0%	-	2	Negligible
19	1	1	1	3	3	2	3	3	2	3	3	2	2	1	2	2	2	3	2	3	3	0%	Sewage	3	Negligible
18	2	2	2	2	3	3	3	2	2	2	3	3	4	3	3	3	3	3	3	3	3	5%	Sewage	4	Negligible
42	0	0	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0%	-	1	Negligible
17	1	1	1	1	1	1	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	0%	-	2	Negligible
43	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
44	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0%	-	1	Negligible
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0%	-	1	Negligible
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0%	-	1	Negligible
47	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
48	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
49	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0%	-	1	Negligible
50	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0%	-	1	Negligible

Weather: Sunny, Dry, 2/8 Cloud Cover

Wind Direction (From): North

Beaufort Wind Scale: 2

Temperature: 26°C

Pressure: 1022mb

Relative Humidity: 46%



Date: 13 July 2022

Time: 09.00 - 12.20

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Intensity	% Time	Descriptors	Max Intensity	Exposure	
26	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	-	1	Negligible	
27	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-	1	Negligible	
28	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	1	Negligible	
29	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	1	Negligible	
30	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	-	1	Negligible	
31	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	Negligible	
7	0	0	0	1	1	2	2	1	1	1	1	0	0	0	1	0	0	0	1	1	1	1	-	2	Negligible	
8	1	0	0	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	1	Negligible	
9	1	1	1	3	2	2	3	2	2	2	1	1	1	2	3	3	2	2	2	2	1	2	0%	Sewage	3	Negligible
32	2	1	2	3	3	3	3	3	2	1	1	1	1	2	1	1	1	1	1	1	1	2	0%	Sewage	3	Negligible
33	0	0	1	0	0	2	2	1	1	1	3	3	3	2	3	2	1	1	2	3	3	2	0%	Sewage	3	Negligible
34	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	1	Negligible	
35	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	1	Negligible	
36	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	1	Negligible	
37	1	1	0	0	1	0	0	1	1	1	1	0	0	1	1	2	1	1	1	1	1	1	-	2	Negligible	
38	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	1	Negligible	
39	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	1	Negligible	
40	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	-	1	Negligible	
41	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	-	1	Negligible	
16	0	1	2	3	3	3	3	2	3	2	1	1	0	2	3	3	3	2	2	1	1	2	0%	Sewage	3	Negligible
14	2	2	3	3	3	3	2	3	3	3	3	3	2	3	2	2	3	2	3	2	3	2	0%	Sewage	3	Negligible
19	4	4	4	4	4	4	5	5	5	5	4	4	4	4	3	3	4	4	3	4	4	85%	Sewage	5	Large	
18	3	4	3	4	4	4	3	3	3	3	3	4	4	4	4	4	3	3	2	3	3	45%	Sewage	4	Medium	
42	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	0	0	0	0	1	0%	-	1	Negligible
17	1	1	2	2	2	2	3	3	3	3	3	2	2	2	1	1	2	2	2	2	2	2	0%	Sewage	3	Negligible
43	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	1	Negligible	
44	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	Negligible	
45	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	1	Negligible	
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	-	1	Negligible	
47	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	1	Negligible	
48	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	Negligible	
49	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	-	1	Negligible	
50	0	0	0	1	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	-	1	Negligible	

Weather: Warm, 7/8 cloud cover

Wind Direction (From): North-NorthWest

Beaufort Wind Scale: 1-2

Temperature: 18°C

Pressure: 1022mb

Relative Humidity: 70%



Date: 21 July 2022

Time: 09.00 - 12.20

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average Intensity	% Time	Descriptors	Max Intensity	Exposure
26	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
27	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0%	-	1	Negligible
28	0	1	1	1	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0%	-	2	Negligible
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0%	-	1	Negligible
30	0	1	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0%	-	1	Negligible
31	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0%	-	1	Negligible
7	0	0	0	1	1	1	0	0	1	1	0	1	0	0	0	0	1	1	1	0	0	0%	-	1	Negligible
8	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0%	-	1	Negligible
9	0	1	1	0	1	1	2	1	1	1	1	1	1	2	2	2	1	1	0	0	1	0%	-	2	Negligible
32	1	1	2	2	2	2	2	3	3	3	2	2	2	2	2	2	2	1	2	2	2	0%	Earthy / Sewage	3	Negligible
33	1	1	1	0	1	1	2	1	1	1	1	2	1	1	1	0	0	1	0	1	1	0%	-	2	Negligible
34	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0%	-	1	Negligible
35	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	1	0	0	1	0	0%	-	1	Negligible
36	0	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0%	-	1	Negligible
37	2	3	3	3	2	2	2	1	2	3	4	3	4	3	3	4	4	2	3	2	2	20%	Sewage	4	Medium
38	1	1	1	1	2	2	2	1	1	1	1	2	2	2	1	1	1	1	1	1	1	0%	-	2	Negligible
39	0	0	0	0	0	1	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0%	-	1	Negligible
40	0	0	1	1	0	1	1	1	2	2	3	3	3	1	1	1	1	2	1	0	1	0%	Earthy / Sewage	3	Negligible
41	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	1	2	2	1	0	1	0%	-	2	Negligible
16	2	3	3	4	3	3	3	2	2	2	2	3	3	4	4	3	3	3	3	2	2	15%	Sewage	4	Medium
14	1	1	1	0	0	1	2	2	1	1	2	2	1	1	2	2	1	1	1	2	1	0%	-	2	Negligible
19	3	3	3	4	3	3	2	2	2	1	1	2	2	3	3	3	3	4	3	4	3	15%	Sewage	4	Medium
18	4	4	4	5	4	4	3	3	3	4	3	3	3	2	2	3	4	3	3	3	3	40%	Sewage	5	Medium
42	1	1	1	2	1	1	0	2	2	2	2	1	1	2	1	1	1	1	1	1	1	0%	-	2	Negligible
17	4	4	4	4	4	4	4	4	3	3	3	5	5	5	3	3	3	3	4	3	3	60%	Sewage	5	Large
43	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	0	Negligible
45	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
46	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
47	0	0	0	0	1		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible
48	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0%	-	1	Negligible
49	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0		0	0	0	0%	-	1	Negligible
50	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0%	-	1	Negligible

Weather: Warm, 4/8 cloud cover

Wind Direction (From): North-NorthWest

Beaufort Wind Scale: 2

Temperature: 20°C

Pressure: 1020mb

Relative Humidity: 67%



Date: 26 July 2022

Time: 08:50-12:15

Appendix B: IAQM Odour Exposure Matrices

Average Intensity (I_{mean})	Percentage odour time (t_{124}) during the test					
		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

Notes: I_{mean} should be rounded to the nearest whole number.

The following overriding considerations 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 $t_{124} = 0\%$, then the odour effect can for practical purposes be considered negligible.

Table 6: Proposed odour effect descriptors for impacts predicted by modelling – “Most Offensive” odours

Odour Exposure Level $C_{99}, \text{ou}_t/\text{m}^3$	Receptor Sensitivity		
	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

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms “adverse” or “beneficial” should be added to the descriptors.

Table 7: Proposed odour effect descriptors for impacts predicted by modelling – “Moderately Offensive” odours

Odour Exposure Level $C_{99}, \text{ou}_t/\text{m}^3$	Receptor Sensitivity		
	Low	Medium	High
≥10	Moderate	Substantial	Substantial
5-10	Slight	Moderate	Moderate
3-5	Negligible	Slight	Moderate
1.5-3	Negligible	Negligible	Slight
0.5-1.5	Negligible	Negligible	Negligible
<0.5	Negligible	Negligible	Negligible

It should be noted that the Table applies equally to cases where there are increases and decreases in odour exposure as a result of this development, in which case the appropriate terms “adverse” or “beneficial” should be added to the descriptors.

Appendix C: Silsoe Odours Olfactometric Sampling Data

Silsoe Odours – Olfactometric Survey 1

Table 2: Average results for Pagham Wwtw site emission rates on 03 May 2022

Sample source	Mean H ₂ S, ppm (Silsoe)	Geometric mean odour concentration, ouE/m ³	odour emission rate, ouE·m ⁻² ·s ⁻¹	Total surface areas, m ²	odour emission rate, ouE/s	Total No. Tanks	Total odour emission rate, ouE·s ⁻¹
Inlet Buffer	2.78	160,366	1,097	32.6	36,995	1	36,995*
PST	0	163	1.35	308.4	208	2	416
Filter 2	0	246	1.89	761.4	719	3	2,157
Filter 3	0	270	2.07	974.5	2,018	1	2,018
Humus	0	45	0.35	226.6	39	2	78
SAF	0.01	5,679				2	
Storm Tank	0	54	0.38	113.3	43	1	43
Picket Fence Thickener	3.37	89,045	609	9.6	5,870	1	5,870
Sludge Tank	3.03	88,685	656	28.3	18,584	1	18,584

Silsoe Odours – Olfactometric Survey 2

Table 2: Average results for Pagham Wwtw site emission rates on 22 June 2022

Sample source	Mean H ₂ S, ppm (Silsoe)	Geometric mean odour concentration, ouE/m ³	odour emission rate, ouE·m ⁻² ·s ⁻¹	Surface areas, m ²	odour emission rate, ouE/s	Total No. Tanks	Total odour emission rate, ouE·s ⁻¹
Detritor after screens	7.25	53158	264	Including before and after screens 17.4 m ²	4585	1	4585
Buffer tank	1.85	29868	140.14	32.2	4509	1	4509
Channel after buffer tank	3.6	28960	136.3	4.81	656	1	656
PST	0.003	224	1.17	154	180	2	360
Sludge holding tank	2.45	39860	198	28.3	5603	1	18,584

Silsoe Odours – Olfactometric Survey 3

4. Results of Odour Measurements

The Laboratory results are contained in Appendix 1.

Table 4: Summary of results for Pagham site emission rates on 3 September 2025

Sample source	Mean H ₂ S, ppm (Silsoe)	Geometric mean odour concentration, ouE/m ³	Odour emission rate, ouE·m ⁻² ·s ⁻¹	*Total surface areas, m ²	Odour emission rate, ouE·s ⁻¹
FST	0	30	0.2	183 x 3	1098
Aeration Lane	0	43	0.3	312	93.6
Anoxic Lane	0	40	0.3	132	39.6
Inlet**	0.0868	722	5.2	44.38	230
Sludge Tank	0.0095	686	4.3	Old = 35 New = 43	335.4

*Areas taken from Google Earth.

**Inlet flow recorded between 29.3 and 35l/s during sampling

Appendix D: Anomalous Olfactometric Sampling Data

Appendix D: Anomalous Olfactometric Sampling Data

Phlorum acknowledges that all evidence collected must be given careful consideration when determining the overall conclusions within an assessment. However, for a piece of evidence to be given substantial weighting when drawing these conclusions, a reasonable level of confidence needs to be had in the robustness of the data and in its representativeness.

Variability in Olfactometric Sampling Results

On the 3rd of May 2022, Silsoe Odours used olfactometric methods to sample odours at multiple locations within the Pagham WwTW. Generally, the odours sampled were similar to emission rates that would be expected at a WwTW of this scale and type, in terms of their orders of magnitude. However, concentrations at the 'Balancing Tank' were markedly higher than would typically be expected from a medium-sized WwTW such as Pagham, with odour concentrations in excess of 100,000 OU_E.m⁻³. The emission rate was higher than anything Phlorum had encountered from similar treatment processes, and well above every WwTW odour emission rate listed within Dr. Michael Bull's emissions database¹³.

Silsoe Odours were commissioned to carry out further sampling of the most odorous processes on the 23rd of June 2022, to validate the above findings. The results showed that the odour emission rate at the 'Balancing Tank' was more than 87% lower than what was sampled on the 3rd of May. The ratio with the 'PST' (the process directly downstream) was approximately 116:1, markedly different to the 813:1 ratio from the 3rd of May. In September 2025, sampled results were more than 99% lower than the May 2022 value.

The odour concentrations from the SHT were also considerably higher than the norm – well above anything previously assessed by Phlorum and above all sludge-related emission rates listed within Dr. Michael Bull's emissions database¹³. Again, Silsoe Odours were commissioned to carry out further sampling of the most odorous processes on the 23rd of June 2022, to validate the above findings. The emission rate for the SHT reduced by approximately 70%. In September 2025, sampled results were more than 99% lower than the May 2022 value.

Site specific, olfactometric measurements should always be treated with a degree of caution. The above results demonstrate emissions at the Inlet and SHT can vary substantially. It is for this reason that, often, library emission data is considered a more appropriate source of emissions data when carrying out dispersion modelling, as they are considered more stable parameters based on average data.

When assessing using only the sampled data from the 3rd of May 2022, the 5 OU_E.m⁻³ contour is exceeded at over 100 existing residences to the east, including newly built residential areas. The 3 OU_E.m⁻³ contour is exceeded at a further few hundred existing residences and covers a large proportion of the village of Nyetimber. These results differ

substantially to those discussed in the main body of this report where odour impacts on Nyetimber are not expected and are not corroborated by other assessment tools. This quite clearly indicates that the emissions monitored were probably outlier data that does not represent the prevailing or average situation at the WwTW.

With reference to the Mogden Case, cited in best practice IAQM odour guidance⁹, it was concluded *“that by the time that 5 OUE per m³ or above is reached nuisance will certainly be established”*.

As this data has emphasised, dispersion models are highly sensitive to the emissions parameters inputted into the model. The only reasonable course to validate a model's subsequent outputs is to compare them to evidence collected through other assessment tools, such as Sniff Tests and Complaints Analyses. It is for this reason that the IAQM stipulate the need to place significant weight on the results of ground-based Sniff Tests and Complaints Analyses when determining the overall odour effect.

Odour Complaints

Firstly, there has only been one odour complaint made against the Pagham WwTW to either Adur District Council or Southern Water. If these contours were representative of the true 98th percentile, it would be reasonable to expect that a very large number of residences, including recently introduced residences in the local area, would be exposed to odours conducive to statutory nuisance.

Moreover, the single odour complaint was received on the 24th of April 2022, just nine days prior to the collection of the seemingly anomalous olfactometric sampling data. This likely means that the WwTW was generating odour emissions which were uncharacteristic of typical emissions of the time. Whilst SW were unable to attribute a specific fault as the cause of the complaint, it is unlikely coincidental that the only complaint made against the WwTW was made just a few days after Silsoe Odours Ltd collected their data. The lack of complaints either side of this period, and the marked reduction in emission rates presented within Silsoe Odours' subsequent sampling visits, strongly suggests that odours emitting from the WwTW around the time of the 3rd May sampling day were *uncharacteristically* high, and unrepresentative of the prevailing situation. The decision to exclude the data from the assessment is therefore justified.

Sniff Tests

Furthermore, the contour does not align with what was evidenced from the six sniff tests carried out between April and July 2022. According to the VDI 3940 Odour Intensity Scale, an odour strength of 4 is likely to be broadly synonymous with the 3 OUE.m⁻³ concentration. The 3 OUE.m⁻³ contour, when using the anomalous data, extends over 520m from the WwTW, whereas the sniff tests conducted did not identify strong odours further than 110m from the WwTW.

Handling of Anomalous Data

The above information highlights, firstly, why olfactometric data should always be treated with caution, but also why the IAQM advocates an approach which leans on a weight of evidence. Dispersion models are just one assessment tool and when used in isolation they cannot generally provide decision makers with the necessary confidence in the results of an assessment.

Here, the sampling data from the 3rd of May shows no correlation with the other pieces of evidence. As such, it was considered reasonable to exclude the results when determining whether odorous emissions from this WwTW facility could significantly impact the amenity of future users of the proposed development.



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