



Odour Assessment: Land adjacent to Acornfield Road, Knowsley

August 2022



Experts in air quality
management & assessment

Document Control

Client	Stericycle	Principal Contact	Robert Riding (Pegasus Planning Group Limited)
---------------	------------	--------------------------	--

Job Number	J10/12949B/10
-------------------	---------------

Report Prepared By:	George Chousos and Adam Dawson
----------------------------	--------------------------------

Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J10/12949B/10/1/F2	4 August 2022	Final	Martin Pierce (Associate Director)

This report has been prepared by Air Quality Consultants Ltd on behalf of the Client, taking into account the agreed scope of works. Unless otherwise agreed, this document and all other Intellectual Property Rights remain the property of Air Quality Consultants Ltd.

In preparing this report, Air Quality Consultants Ltd has exercised all reasonable skill and care, taking into account the objectives and the agreed scope of works. Air Quality Consultants Ltd does not accept any liability in negligence for any matters arising outside of the agreed scope of works. The Company operates a formal Quality Management System, which is certified to ISO 9001:2015, and a formal Environmental Management System, certified to ISO 14001:2015.

When issued in electronic format, Air Quality Consultants Ltd does not accept any responsibility for any unauthorised changes made by others.

When printed by Air Quality Consultants Ltd, this report will be on Evolve Office, 100% Recycled paper.



Air Quality Consultants Ltd
23 Coldharbour Road, Bristol BS6 7JT Tel: 0117 974 1086
24 Greville Street, Farringdon, London, EC1N 8SS Tel: 020 3873 4780
aqc@aqconsultants.co.uk

Registered Office: 23 Coldharbour Road, Bristol BS6 7JT
 Companies House Registration No: 2814570

1 Introduction

- 1.1 This report describes the assessment of odour effects associated with the proposed extension of Stericycle's healthcare waste treatment and transfer station on land adjacent to Acornfield Road, Knowsley. The assessment has been carried out by Air Quality Consultants Ltd (AQC) on behalf of Stericycle and is provided to support the planning application.
- 1.2 The site is proposed to expand its waste treatment capacity from 22,000 tonnes per annum (tpa) to 50,000 tpa. The sources of odour considered from the proposed development are the healthcare waste reception and storage area, the volatile organic compound (VOC) emissions from the three stacks of the Heat Disinfection Units (HDU), and the subsequent storage of treated waste in walking floor trailers pending offsite transport.
- 1.3 The assessment identifies the potential odour effects associated with the expansion of the site using a qualitative odour risk assessment.
- 1.4 The location of the proposed development in relation to the surrounding area is shown in Figure 1.

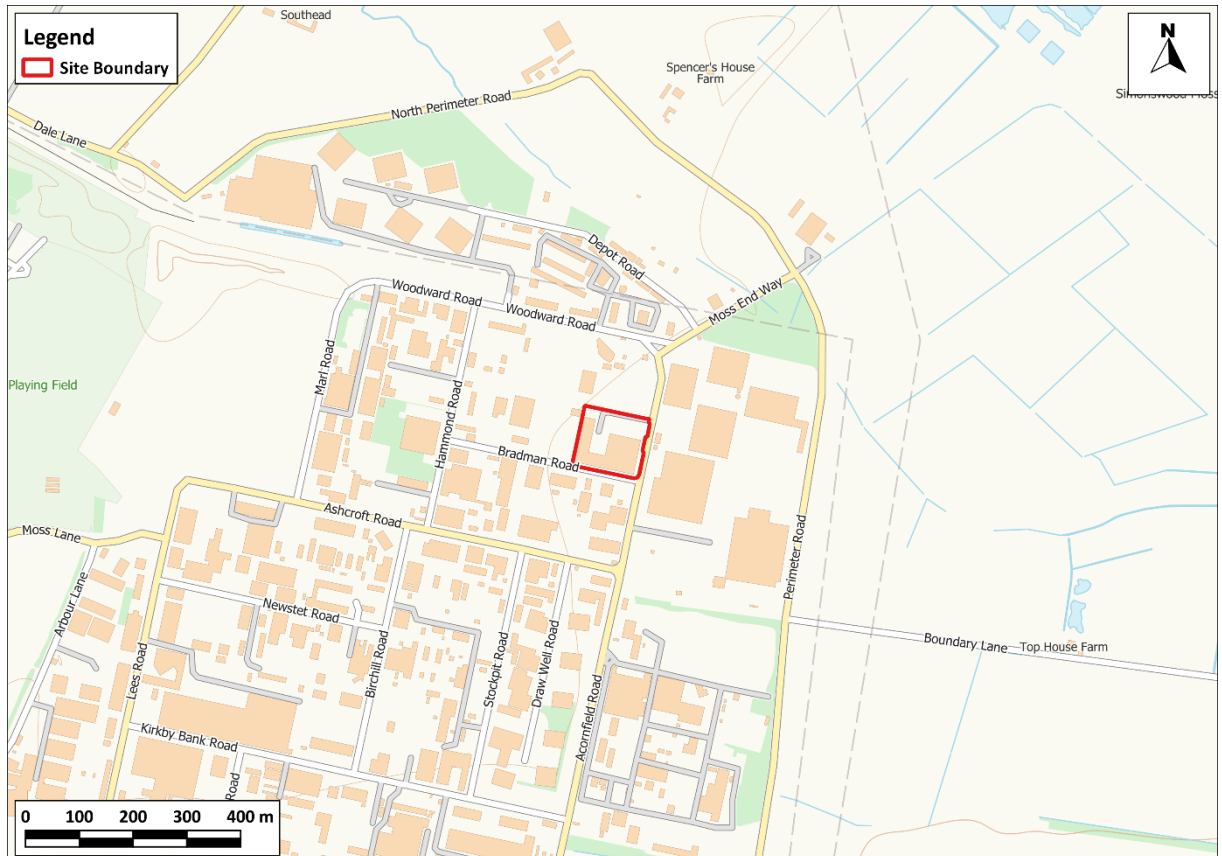


Figure 1: Location of the Proposed Development

Contains Ordnance Survey data © Crown copyright and database right 2022. Ordnance Survey licence number 100046099.

2 Odour in Legislation, Policy and Guidance

National Legislation

Environmental Protection Act

- 2.1 There are currently no statutory standards in the UK covering the release and subsequent impacts of odours. This is due to complexities involved with measuring and assessing odours against compliance criteria, and the inherently subjective nature of odours.
- 2.2 It is recognised that odours have the potential to pose a nuisance for residents living near to an offensive source of odour. Determination of whether or not an odour constitutes a statutory nuisance in these cases is usually the responsibility of the local planning authority or the Environment Agency. The Environmental Protection Act 1990 (1990) outlines that a local authority can require measures to be taken where any:

“dust, steam, smell or other effluvia arising on an industrial, trade and business premises and being prejudicial to health or a nuisance...” or

“fumes or gases are emitted from premises so as to be prejudicial to health or cause a nuisance..”

- 2.3 Odour can also be controlled under the Statutory Nuisance provisions of Part III of the Environmental Protection Act.

Planning Policy

National Planning Policy Framework

- 2.4 The National Planning Policy Framework (NPPF) (2021a) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which is an environmental objective:

“to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy”..

- 2.5 To prevent unacceptable risks from pollution, the NPPF states that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by...preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality”.

and

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development”.

- 2.6 Regarding sites that will operate under an Environmental Permit, PPG states that:

“It is not necessary for air quality assessments that support planning applications to duplicate aspects of air quality assessments that will be done as part of non-planning control regimes, such as under Environmental Permitting Regulations”.

- 2.7 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2021b), which makes clear that *“Odour...can also be a planning concern, for example, because of the effect on local amenity”*. It also provides guidance on options for mitigating impacts, and states that *“Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact”*.

Odour Guidance

Environment Agency Guidance

- 2.8 The Environment Agency has produced a horizontal guidance note (H4) on odour assessment and management (Environment Agency, 2011), which is designed for operators of Environment Agency-regulated processes (i.e., those which classify as Part A(1) processes under the Pollution Prevention and Control (PPC) regime). The H4 guidance document is primarily aimed at methods to control and manage the release of odours, but also contains a series of recommended assessment methods which can be used to assess potential odour impacts.

Institute of Air Quality Management Guidance

- 2.9 The latest UK guidance on odour was published by the Institute of Air Quality Management (IAQM) in 2018 (IAQM, 2018). The IAQM guidance sets out assessment methods which may be utilised in the assessment of odours for planning applications. It is the only UK odour guidance document which contains a method for estimating the significance of potential odour impacts.

3 Assessment Approach

- 3.1 Odour impact assessment is a challenging and subjective science. There are a number of odour assessment methods and tools that have been developed which are widely used in the UK, including desk-based methods, such as complaints analysis and qualitative risk assessment, through to field odour testing (sniff testing) and dispersion modelling. Each has its advantages and disadvantages and not all assessment methods are appropriate in every case; for example, where a potentially odorous process is proposed rather than existing, then assessment methods such as sniff testing and odour sampling are less relevant than predictive methods such as odour risk assessment. The scale and location of odorous processes is also important in selecting appropriate assessment methodologies, with more simple methodologies often sufficient for small or remotely located processes.
- 3.2 The approach to assessing the odour effects from the site has been to utilise the qualitative risk-assessment approach described in the IAQM guidance on assessment of odours for planning (IAQM, 2018).

Odour Risk Assessment

- 3.3 The odour risk assessment set out in the IAQM guidance follows a Source-Pathway-Receptor approach. This approach describes the concept that, in order for an odour impact (such as annoyance or nuisance) to occur, there must be a source of odour, a pathway to transport the odour to an off-site location, and a receptor (e.g., people) to be affected by the odour.
- 3.4 The risk of odour effects at a given receptor location may be estimated using the following fundamental relationship:

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

- 3.5 In this relationship, the **dose** is a measure of the likely exposure to odours, in other words the **impact**. The **response** is determined by the sensitivity of the receiving environment and thus the overall **effect** is the result of changes in odour exposure at specific receptors, taking into account their sensitivity to odours.
- 3.6 In order to determine the risk of potential odour effects from the proposed development, the 'FIDOR' factors for odour exposure have been used. These factors are commonly used in the assessment of odours and are outlined in the IAQM guidance but are also described in the Environment Agency's H4 guidance document on odour management (Environment Agency, 2011). The FIDOR factors are:
- **F**requency – the frequency with which odours are detected;
 - **I**ntensity – the intensity of odours detected;

- **D**uration – the duration of exposure to detectable odours;
- **O**ffensiveness – the level of pleasantness or unpleasantness of odours; and
- **R**eceptor – the sensitivity of the location where odours are detected, and/or the proximity of odour releases to an odour-sensitive location.

3.7 Odour emissions from the proposed development have been assigned a risk-ranking based on the “effect $\approx$ dose x response” relationship, whereby the dose (impact) is determined by the “FIDO” part of FIDOR, and the response is determined by the “R” (receptor sensitivity). The risk of odour effects can therefore be described as:

$$\text{Effect} \approx \text{Impact (FIDO)} \times \text{Receptor Sensitivity (R)}$$

- 3.8 The key factors that will influence the effects of odours are the magnitude of the odour source(s), the effectiveness of the pathway for transporting odours, and the sensitivity of the receptor. The methodology set out in the IAQM guidance document describes in detail a Source-Pathway-Receptor approach to odour risk assessment and includes tables and matrices to assist in determining the likely risk of odour effects. The IAQM methodology is outlined below. It includes an element of professional judgement.
- 3.9 The assessment examines the source odour potential (source magnitude) of the site, and then identifies the effectiveness of the pathway and receptor sensitivity at sensitive locations.
- 3.10 Table 1 describes the risk-rating criteria (high, medium and low) for source odour potential, pathway effectiveness and receptor sensitivity applied in this assessment. This table has been adapted from Table 8 in the IAQM odour guidance.

Table 1: Source-Pathway-Receptor Risk Ratings

Source Odour Potential	Pathway Effectiveness	Receptor Sensitivity
Large Source Odour Potential: Large-scale odour source and/or a source with highly unpleasant odours (hedonic tone -2 to -4); no odour control.	Highly Effective Pathway: Very short distance between source and receptor; receptor downwind of source relative to prevailing wind; ground level releases; no obstacle between source and receptor.	High Sensitivity: Highly sensitive receptors e.g., residential properties and schools.
Medium Source Odour Potential: Medium-scale odour source and/or a source with moderately unpleasant odours (hedonic tone 0 to -2); basic odour controls.	Moderately Effective Pathway: Receptor is local to the source; releases are elevated but compromised by building effects.	Medium Sensitivity: Moderately sensitive receptors e.g., commercial and retail premises, and recreation areas.
Small Source Odour Potential: Small-scale odour source and/or a source with pleasant odours (hedonic tone +4 – 0); best practise odour controls.	Ineffective Pathway: Long distance between source and receptor (>500 m); receptors upwind of source relative to prevailing wind; odour release from stack/high level.	Low Sensitivity: Receptors not sensitive e.g., industrial activities or farms.

- 3.11 The risk ratings for source magnitude and pathway effectiveness (for each receptor) identified using the criteria in Table 1 are then combined using the matrix shown in Table 2 to estimate an overall risk of odour impact at each specific receptor location.

Table 2: Assessment of Risk of Odour Impact at a Specific Receptor Location

Pathway Effectiveness	Source Odour Potential (Source Magnitude)		
	Large	Medium	Small
Highly Effective	High Risk	Medium Risk	Low Risk
Moderately Effective	Medium Risk	Low Risk	Negligible Risk
Ineffective	Low Risk	Negligible Risk	Negligible Risk

- 3.12 The next stage of the risk assessment is to identify the potential odour effect at each receptor location. This is done using the matrix presented in Table 3, which combines the overall odour impact risk descriptor for each receptor with the receptor sensitivity determined using the criteria in Table 1.

Table 3: Assessment of Potential Odour Effect at a Specific Receptor Location

Risk of Odour Impact	Receptor Sensitivity		
	High	Medium	Low
High Risk	Substantial Adverse Effect	Moderate Adverse Effect	Slight Adverse Effect
Medium Risk	Moderate Adverse Effect	Slight Adverse Effect	Negligible Effect
Low Risk	Slight Adverse Effect	Negligible Effect	Negligible Effect
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

- 3.13 As a final stage of assessment, an overall significance of odour effects is determined, based on professional judgment and taking into account the significance of the effect at each specific receptor location.

4 Odour Impact Assessment

Odour Risk Assessment

Process Description

- 4.1 Details of the Stericycle healthcare waste treatment facility, as described below, were obtained via a discussion between Adam Dawson (Air Quality Consultants) and John Anderson (Permit Compliance Manager) at Stericycle.
- 4.2 The centre receives healthcare waste; it is then disinfected and repurposed as an alternative fuel source / solid recovered fuel (SRF). Upon arrival at the site, the waste is transferred to a secure storage area. Wastes suitable for incineration are transferred off site and waste suitable for on-site treatment are moved to the treatment plant. Prior to waste being disinfected, it is weighed and tipped into a pre-tipper; this allows plant operatives to undertake a visual inspection. If any inappropriate waste is found, a compliance report is sent back to the waste producing site, and the waste is removed offsite.
- 4.3 Following visual inspection, the waste is then tipped into a secondary enclosed tipper which sends the waste to a shredder unit via a vertical bin lift. Shredded waste is then moved through the HDU. At 100°C, steam disinfects the waste as it moves through the unit. Once disinfected, the waste is moved into walking floor trailers prior to offsite transfer as an alternative fuel source / SRF at energy-from-waste plants or cement kilns.

Source Odour Potential

- 4.4 The first step of the odour risk assessment is to identify the source odour potential or odour magnitude. This takes into account the scale and nature of the odorous processes; the continuity, intensity and offensiveness of odour releases; and any odour control measures that are used. In essence, it must consider the odour potential of the source with respect to the FIDO part of FIDOR.
- 4.5 Based on the above description of the processes, the main potential odour sources and overall source odour potential for the proposed development are described in Table 4.

Table 4: Identification of Odour Sources and Overall Source Odour Potential

Odour Source	Description	Frequency and Duration	Intensity and Offensiveness
Waste reception	Waste is received within a reception area and after inspection sent for shredding. All activities are undertaken indoors.	While this process will occur in batches, it has been assumed to occur continually.	Healthcare waste has the potential to be highly offensive, especially when agitated.
Heat Disinfection Unit stacks	Waste is disinfected using steam. VOCs from the wastes off-gassing are sent through a HEPA/carbon filter and out a 11.5 metre stack.	This process is continuous.	VOC's have the potential to be moderately offensive; however, the flue gas from the HDU will pass through a carbon filter before being discharged and therefore is likely to have a low odour potential.
Storage pending offsite transportation	Waste is transferred to waling floor trailers within the building for removal offsite.	This process is continuous.	Even when disinfected, the healthcare waste has the potential to be highly offensive, especially when agitated. As the walking floor trailers are indoors, and lorries are covered when full, the odour potential is judged to be low.
Overall Source Odour Potential	While the waste has the potential to be highly offensive, based on the fact that the operations are all conducted indoors and the relatively small size of the operation (in comparison to larger waste operations such as landfills), the overall source odour potential of the healthcare waste treatment facility is judged to be Medium .		

Pathway Effectiveness

- 4.6 In order to consider the effectiveness of the pathway, it is important to consider receptor locations in terms of their proximity to the odour sources and the prevailing wind direction. One specific residential receptor location has been selected for this assessment, which represents the worst-case location in the near vicinity of the proposed development. The impacts on the general industrial units surrounding the site have also been considered (Receptor 2 in Tables 5 and 6). The receptor location is shown in Figure 2.



Figure 2: Receptor Location

- 4.7 The wind rose for 2017 - 2021 from the Crosby meteorological station presented in Figure 3 demonstrates that the prevailing wind in the region is from the west, with strong signals from the north-west and south-east. In general, odours will be transported by the wind and will not be detectable at locations upwind of a source. The exception to this is during very light wind conditions when odours may disperse against the wind direction, although typically only for relatively short distances.

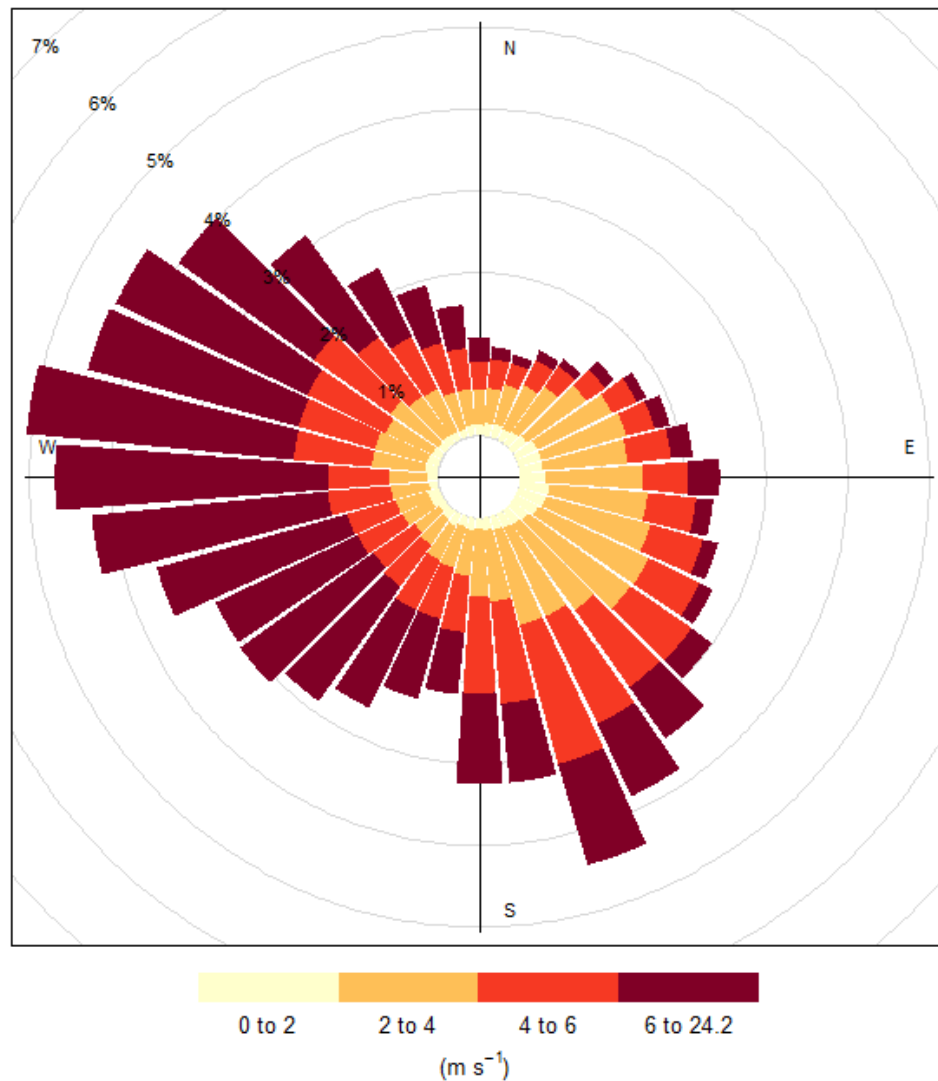


Figure 3: Wind Rose for Crosby 2017 – 2021

- 4.8 The effectiveness of the odour pathway between the Stericycle waste treatment facility and the nearby sensitive receptors is summarised in Table 5, which draws upon the guidance set out in Table 1.

Table 5: Effectiveness of Odour Pathway

Receptor		Distance from Source ^a	Direction from Source (°)	% Winds from Source	Pathway Effectiveness ^b
ID	Location				
1	Residential Property	310	180	3.3	Moderately Effective
2	Nearby Industrial Locations	10	All	100%	Highly Effective

^a Measured as the approximate distance from the Stericycle waste treatment centre.

^b Overall pathway effectiveness is based on professional judgement, taking account of distance between source and receptor, and frequency of winds with respect to the average.

- 4.9 The effectiveness of the pathway to the receptors has been based on percentage wind direction and proximity to the receptors. As the only nearby residential receptor is greater than 300 m but less than 500 m from the site, the pathway to this receptor is judged to be moderately effective. Based on the percentage of wind directions likely to impact on the receptor, this judgment is deemed to be conservative. As a number of nearby industrial receptors are in close proximity to the site, they could be impacted by a large number of wind directions. The pathway to these receptors is therefore judged to be highly effective.

Receptor Sensitivity

- 4.10 The sensitivity of each of the receptors is set out in Table 6. Receptor sensitivities are based on the descriptors presented in Table 1.

Potential Odour Effects

- 4.11 The assessments of the potential odour effects at sensitive receptor locations are presented in Table 6. This brings together the source odour potential, effectiveness of pathway and receptor sensitivity identified using the criteria described in Table 1, to identify an overall potential for odour effects, using the matrices set out in Table 2 and Table 3.

Table 6: Assessment of Potential Odour Effects from the Stericycle Waste Treatment Centre

Receptor	Risk of Odour Impact (Dose)			Receptor Sensitivity	Likely Odour Effect
	Source Odour Potential	Effectiveness of Pathway	Risk of Odour Impact		
1	Medium	Moderately Effective	Low	High	Slight Adverse
2	Medium	Highly Effective	Medium	Low	Negligible

- 4.12 The potential odour effects have been identified using the effect $\approx$ dose x response relationship identified in Paragraph 3.4. The process is described as follows:

1) Identify the impact:

- 4.13 Based on a medium source odour potential; where the pathway is deemed to be moderately effective, then the risk of odour impacts (dose) is judged to have a low risk (see Table 2). Where the pathway is deemed to be highly effective, then the risk of odour impacts (dose) is judged to be medium risk (see Table 2)

2) Consider the response:

- 4.14 Based on the matrix presented in Table 3, the odour effects at each receptor are identified as follows: A low risk of odour impacts will lead to a **slight adverse** odour effect at high sensitivity receptors. A medium risk of odour impact at a low sensitivity receptor will lead to a negligible effect.
- 4.15 The potential odour effects at each receptor location are summarised in the final column of Table 6. The final stage of the risk assessment is to make an overall judgement as to the likely significance of effects.
- 4.16 In this case, it is judged that the overall significance of odour effects is **not significant**. This conclusion is based on the findings of the risk assessment, that has identified a **slight adverse** odour effect at a single receptor location (representing two residential properties) and **negligible** effects at all other locations.
- 4.17 The IAQM guidance states that “*where the overall effect is greater than “slight adverse”, the effect is likely to be considered significant*” and thus there should be no significant effect from the proposed expansion at properties in this area.

5 Summary

- 5.1 The odour effects of the expansion of the healthcare waste treatment facility on nearby sensitive receptor locations has been assessed, utilising an odour risk assessment.
- 5.2 The odour risk assessment has identified a potential for **slight adverse** odour effects at sensitive receptor locations resulting from the operation of the healthcare waste treatment facility. However, this adverse effect is experienced at just two residential properties. Furthermore, guidance considers a **slight adverse** odour effect to be **not significant**.
- 5.3 Overall, and considering the location of the receptors, within a heavily industrialised area where other significant odour sources are present, it is judged that the odour effects associated with the medical waste treatment facility will be **not significant** at nearby sensitive receptor locations.

6 References

Environment Agency. (2011). H4 Odour Management. How to comply with your environmental permit.

HMSO. (1990). Environmental Protection Act 1990.

IAQM. (2018). Guidance on the assessment of odours for planning v1.1.

Ministry of Housing, Communities & Local Government. (2021a). National Planning Policy Framework. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

Ministry of Housing, Communities & Local Government. (2021b). Planning Practice Guidance. Retrieved from <https://www.gov.uk/government/collections/planning-practice-guidance>

Scottish Environmental Protection Agency. (2010). SEPA Odour Guidance 2010.

7 Appendices

A1	Professional Experience.....	19
----	------------------------------	----

A1 Professional Experience

Martin Peirce, BSc (Hons), MSc, MIEncSci, MIAQM

Mr Peirce has some thirty years' experience in environmental modelling and assessment, most relating to air quality and carbon and greenhouse gases (GHGs). He has extensive experience in the calculation of emissions to air and compiling emission inventories, for both local air quality assessments and carbon footprinting. For air quality, he also has extensive expertise in modelling the atmospheric dispersion of pollutants for comparison against regulatory limits and for assessment of health and environmental impacts. He has prepared assessments in support of Environmental Impact Assessments (EIA), permit applications and planning applications (under both Town and Country Planning Act (TCPA) and Development Consent Order (DCO) regimes). He has particular experience in modelling aviation and transport sources, non-road mobile machinery, construction and industrial sources.

Mr Adam Dawson, BSc (Hons) MSc MIAQM AMIEnvSc

Mr Dawson is a Senior Consultant with AQC with over seven years' experience in the field of air quality assessment. He undertakes air quality and odour assessments for AQC, covering residential and commercial developments, industrial installations, energy centres and waste facilities. He has experience using a range of dispersion models including ADMS-Roads, ADMS-5 and Breeze AERMOD to complete quantitative modelling assessments, for both planning and permitting purposes. He previously spent over two years as part of the Environment Agency's permitting team, so has extensive experience of the permitting process and industrial emissions. He is a Member of the Institute of Air Quality Management and an Associate Member of the Institution of Environmental Sciences.

George Chousos, BSc MSc AMIEnvSc AMIAQM

Mr Chousos is an Assistant Consultant with AQC, having joined in May 2019. Prior to joining AQC, he completed an MSc in Air Pollution Management and Control at the University of Birmingham, specialising in air pollution control technologies and management, and data processing using R. He also holds a degree in Environmental Geoscience from the University of Cardiff, where he undertook a year in industry working in the field of photo-catalytic technology. He is now gaining experience in the field of air quality monitoring and assessment.