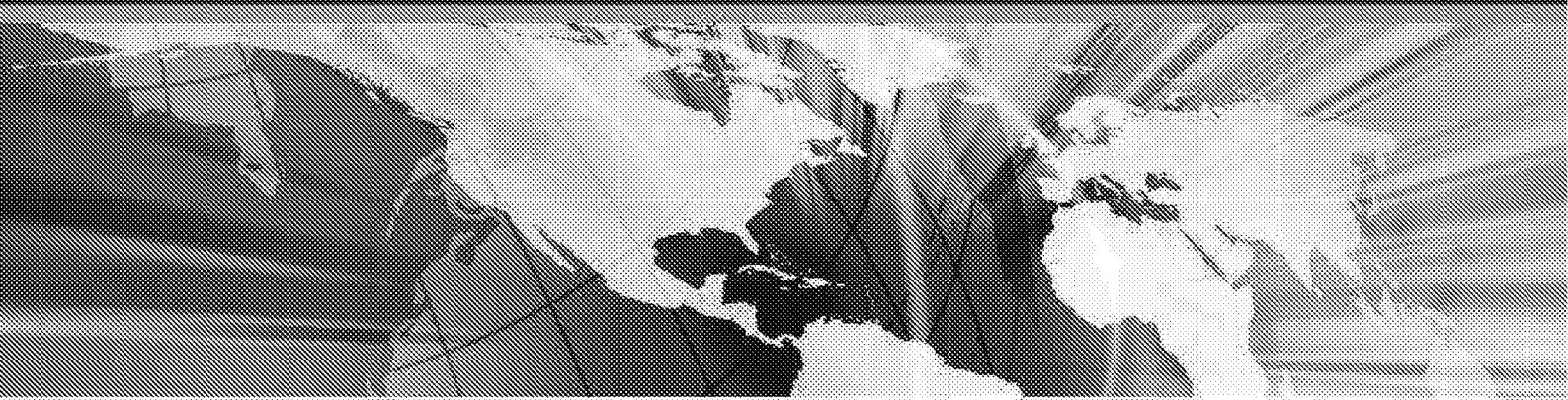


ENERGY AND CLIMATE CHANGE
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WASTE RESOURCE MANAGEMENT



GLADMAN DEVELOPMENTS LTD

LAND WEST OF ARUNDEL ROAD, ANGMERING

ODOUR IMPACT ASSESSMENT

FEBRAURY 2018

your earth our world



DATE ISSUED: FEBRUARY 2018
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GLADMAN DEVELOPMENTS LTD

LAND WEST OF ARUNDEL ROAD, ANGMERING

ODOUR IMPACT ASSESSMENT

FEBRUARY 2018

PREPARED BY:

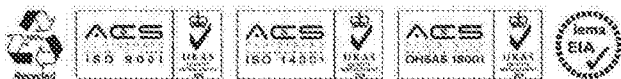
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ENERGY AND CLIMATE CHANGE
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WASTE RESOURCE MANAGEMENT

CONTENTS

1	INTRODUCTION	1
2	LEGISLATION AND PLANNING POLICY	3
3	GUIDELINES AND CRITERIA	4
4	ASSESSMENT METHODOLOGY	7
5	ODOUR RISK ASSESSMENT	12
6	SIGNIFICANCE	16
7	SUMMARY AND CONCLUSION	18

TABLES

Table 1: Description of the FIDOL Factors	8
Table 2: Risk Ratings for Source-Pathway- Receptor	9
Table 3: Risk of odour impact at receptor location	10
Table 4: Likely magnitude of odour effect at the specific receptor location	11
Table 5: Description of the FIDOL Factors	12
Table 6: Effectiveness of odour pathway	14
Table 7: Source Odour Potential	14
Table 8: Potential Odour Effects	15

APPENDICES

Appendix A	Wind Rose – Shoreham Meteorological Station 2012 – 2016
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1 INTRODUCTION

1.1 Purpose of the Study

1.1.1 Wardell Armstrong LLP has been commissioned by Gladman Developments Ltd to undertake an odour impact assessment for a proposed residential development at Land West of Arundel Road, Angmering.

1.1.2 This report details the undertaking of a desk based qualitative meteorological assessment and an odour risk assessment in accordance with the Institute of Air Quality Management (IAQM) document "Guidance on the assessment of odour for planning" (May 2014)¹.

1.2 Scope

1.2.1 The assessment considers the potential for odour to give rise to an adverse effect on the proposed development, and specifically whether unacceptable odour exposure may occur in locations where future residents may be exposed during normal day to day situations.

1.2.2 To consider the potential for odour from the Hammerpot brewery to give rise to an adverse effect on the proposed development, a multi-tool approach has been used, incorporating the following assessment methods:

- A desk based qualitative assessment; and
- an odour risk assessment.

1.2.3 The odour risk assessment also takes into consideration meteorological data provided by ADM Ltd. Meteorological data has been sourced from Shoreham Meteorological Station, which is considered to be the most representative meteorological station of the proposed development site in terms of altitude and location.

1.3 Site Description, Surrounding Area and Odour Source

1.3.1 The proposed development site is located to the north of Angmering, West Sussex, and comprises a parcel of land approximately 9.10 ha in size. The north of the site is bordered by a strip of open land with woodland to the north of this. Part of the north-eastern section of the site is bound by Arundel Road, the majority of the eastern boundary being formed by a small piece of open land. Beyond the Arundel Road to the east is woodland and Acorns Campsite. To the south of the site is a recreation

¹ Institute of Air Quality Management 2014 "Guidance on the assessment of odour for planning"

ground and sports facilities including buildings of the Angmering Sports and Social Club, with residential properties of Decoy Drive and Palmer Road to the south of the sports fields. To the west, the site boundary is formed by a strip of trees/hedgerow with open agricultural land beyond this. The Hammerpot Brewery is situated to the north west of the site, approximately 1.1km away. The south-eastern section of the site is currently occupied by various commercial occupants including a garage/automotive supply business, a window supply/double glazing business, and a small caravan park.

- 1.3.2 We understand that there is a small builder's yard located to the south of the current site access road, and that all the commercial properties currently located within the site will be removed/relocated.
- 1.3.3 We understand that the development proposals are for up to 200 residential properties and associated infrastructure, over a residential development area of 6 ha.
- 1.3.4 The Hammerpot Brewery is a microbrewery. The exact operational conditions for the brewery are unknown. Therefore, for the purposes of this assessment, a worst-case approach has been adopted which assumes the brewery is operational 24 hours a day, 7 days a week. The potential for the microbrewery to give rise to odour will depend on factors such as management and maintenance of the brewing equipment, and the odour mitigation of any odorous emissions resulting from the brewing process.

2 LEGISLATION AND PLANNING POLICY

2.1 Environment Protection Act 1990

- 2.1.1 The Environmental Protection Act 1990 (HMSO, 1990), is the legal framework dealing with odour from premises including industrial, trade or business premises. If odour is present in sufficient quantity this may constitute a statutory nuisance. The Local Authority is placed under a duty to inspect, detect any nuisance and to serve abatement notices where necessary.

2.2 Planning Policies

- 2.2.1 The National Planning Policy Framework (NPPF, 2012) sets out planning policy for England. Paragraph 120 advises planning policies and decisions should ensure that “development is appropriate for its location”, and that “the effects... of pollution on health, the natural environment or general amenity and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account”.
- 2.2.2 The Planning Practice Guidance is an online based resource² which supports the NPPF. The Planning Practice Guidance does not give any definitions of odour nor does it provide any planning guidance in relation to odour. Within the Air Quality section, in Paragraph 001, odour is mentioned; *“Odour and dust can also be a planning concern, for example, because of the effect on local amenity”*.
- 2.2.3 Pollution is defined within the Planning Practice Guidance as *“anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including...odour”*. This definition is also given in the NPPF.

² <http://planningguidance.communities.gov.uk/>

3 GUIDELINES AND CRITERIA

3.1 Environment Agency

- 3.1.1 The Environment Agency produced a horizontal guidance note 'Technical Guidance Note H4 – Odour Management'³ on odour management, designed for operators of Environment Agency regulated processes. The guidance document provides examples of methods to control and manage the release of odours, but also contains a series of recommended assessment methods that can be used to assess potential odour effects.
- 3.1.2 The guidance note recognises that not all odours have the same potential to cause annoyance, and odours from, for example, waste water treatment tend to be more “offensive” than, for example, from the brewing or baking industries. This has led to a suggested indicative odour exposure criterion of 1.5ou_E/m³ (European odour units per cubic metre of air) for odours associated from waste water treatment compared to 6.0ou_E/m³ for brewery and bakery processes.
- 3.1.3 European odour units per cubic metre of air (ou_E/m³) is the number of repeated dilutions needed with a fixed amount of odour-free air or nitrogen, until the odour is just detectable to 50% of a panel of trained observers, following strictly the requirements of the European Standard for the technique of olfactometry 'BS EN 13725: 2003, *Air Quality - Determination of Odour Concentration by Dynamic Olfactometry*'.
- 3.1.4 Odour can be detected at concentrations as low as 1 ou_E/m³. As a very approximate guide:
- 1-5ou_E/m³ the odour is recognisable;
 - 5ou_E/m³ is a faint odour;
 - 10ou_E/m³ is a distinct odour.
- 3.1.5 The values for normal background odours such as from traffic, grass cutting and plants amount to anything from 5 to 40ou_E/m³.

³ Environment Agency 2011, Environmental Permitting: H4 Odour Management [Available at: <https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management>]

3.1.6 Odour is subjective and therefore what one person may find offensive the next person may not. Therefore, all odours have the potential to be a nuisance. A rapidly fluctuating odour is often more noticeable than a steady background odour at a low concentration. People can detect and respond to odour exposure that lasts as little as one or two seconds. Factors that are examined when considering the existence of a statutory nuisance are:

- Type of odour;
- Meteorological conditions – temperature, humidity, wind strength and direction;
- Duration of odour;
- Time of day;
- Behaviour of odour – waves, constant; and
- How often it occurs.

3.2 Institute of Air Quality Management (IAQM)

3.2.1 The Institute of Air Quality Management have published Guidance for the assessment of odour entitled ‘Guidance on the assessment of odour for planning’⁴. This guidance states what information, monitoring and report information is required for an odour assessment, in support of planning applications. The IAQM Guidance is the only UK odour guidance containing methods for estimating the significance of potential odour effect.

3.2.2 The IAQM guidance endorses the use of multiple assessment tools for odour, stating that, “*best practice is to use a multi-tool approach where practicable*”.

3.2.3 The guidance recognises that onsite observations are subject to the constraints of the planning application timetable and budget and it is rarely practicable to undertake multiple sniff tests throughout the course of the year. Additionally, given the timetable constraints it is not always possible to wait for the ideal meteorological conditions to conduct the sniff tests, for example sniff tests may be conducted at a representative location away from or around the development site.

3.3 Information Sources

3.3.1 The following sources have been used in the preparation of this report

⁴ Institute of Air Quality Management 2014, Guidance on the Assessment of Odour for Planning

- Department for Environment, Food and Rural Affairs 2010, Odour Guidance for Local Authorities.
- Environment Agency Technical Guidance Note H4 'Odour Management', 2011.
- Institute of Air Quality Management Guidance on the assessment of odour for planning (May 2014).
- Scottish Environmental Protection Agency (SEPA) Odour Guidance (2010)
- Wind rose from ADM Ltd, for the Shoreham Meteorological Station, for years 2012 – 2016.

4 ASSESSMENT METHODOLOGY

4.1 Consultations

4.1.1 Consultation has been undertaken with Mr Colin Giddings, Senior Environmental Health Officer at Arun District Council (ADC), between the 8th December 2017 and 3rd January 2018 to determine the level of odour complaints resulting from the microbrewery. It is understood that there are no records of any odour complaints associated with the brewery on the Council's system.

4.1.2 As part of the consultation with Mr Giddings, the following was discussed:

- A desk-based impact assessment will be undertaken in accordance with the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Odour for Planning (May 2014), to assess the impact and resulting effects of odour arising from the brewery. The assessment will involve the review of 5 years of wind data from the closest meteorological station to the proposed development site. The odour impact at the development site will be determined using the results from the desk-based assessment and complaint history.

4.1.3 Mr Giddings confirmed via email on the 17th January 2018 that he agreed with the proposed methodology outlined above.

4.2 Assessment Criteria

4.2.1 To consider the potential for odour from the existing brewery to give rise to an adverse effect on the proposed residential development, a qualitative odour risk assessment has been undertaken which takes into consideration meteorological data obtained for the Shoreham Meteorological Station, for years 2012 – 2016.

Qualitative Risk Based Assessment

4.2.2 The IAQM guidance discusses the basis of the Source-Pathway-Receptor approach, which focuses on the concept that for an odour impact to occur, there must be a source of odour, a pathway to transport odour and a receptor to be affected by the odour.

4.2.3 The probability of an odour impact occurring and the likely magnitude of the effect resulting from the exposure determine the risk of an odour effect occurring. The risk of an odour effect can therefore be estimated using the following relationship:

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

- 4.2.4 The dose can be considered to be equivalent to the odour exposure (impact) and can be determined using a number of factors. These factors, referred to as the 'FIDOR' factors in the Environment Agency's H4 guidance and 'FIDOL' in the IAQM odour guidance are defined in Table 1.

Table 1: Description of the FIDOL Factors	
Factor	Description
Frequency	How often an individual is exposed to odour.
Intensity	The individual's perception of the strength of odour.
Duration	The overall duration that individuals are exposed to an odour over time.
Odour unpleasantness	Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.
Location	The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity and socio-economic factors.

- 4.2.5 In accordance with the IAQM guidance, the FIDO of the FIDOL factors is used to determine the dose (impact). The response (i.e. receptor sensitivity) is determined by the location factor (L) of FIDOL.
- 4.2.6 The IAQM guidance provides a framework for considering the potential for the risk of odour impacts, taking into account the odour-generating potential of relevant site activities (i.e. the Source Odour Potential) and the effectiveness of the pollutant

pathway as the transport mechanism through the air to the receptor (i.e. the Pathway Effectiveness).

- 4.2.7 The Source Odour Potential takes into account the scale (magnitude) of the release from the odour source, how inherently odorous the emission is and the relative pleasantness/unpleasantness of the odour.
- 4.2.8 The Pathway Effectiveness is determined based on the distance between the receptor and source, whether the receptors are downwind, the effectiveness of the release point in promoting good dispersion and the surrounding topography and terrain.
- 4.2.9 Table 2 describes the risk-rating criteria (high, medium and low) for source magnitude, pathway effectiveness and receptor sensitivity used within the assessment adopted from the IAQM guidance.

Table 2: Risk Ratings for Source-Pathway- Receptor			
Risk Rating	Source Magnitude	Pathway Effectiveness	Receptor Sensitivity
High/Large	Large scale source Odorous compounds with low odour detection thresholds Hedonic tones (where known) of -2 to -4 Mitigation: Open air operation with no containment	Distance: Receptor is adjacent to source/site boundary Direction: high frequency (%) of winds from source to receptor or receptors downwind of source with respect to prevailing wind direction Effectiveness of dispersion/dilution: open processes with low level releases	Examples: residential dwellings, hospitals, schools, education and tourist/cultural.
Medium/Moderate	Medium scale source Moderately unpleasant odours Hedonic tones (where known) of -2 to 0. Mitigation: Some controls but significant residual odour remains	Distance: Receptor local to source Where mitigation relies on dispersion/dilution: releases are elevated but comprised by building effects	Examples: places of work, commercial/retail premises and playing/recreation fields
Low/Small	Small scale source	Distance: receptor	Examples: Industrial,

Table 2: Risk Ratings for Source-Pathway- Receptor			
Risk Rating	Source Magnitude	Pathway Effectiveness	Receptor Sensitivity
	Mildly odorous compounds with relatively high odour detection thresholds Hedonic tones (where known) 0 to +4 Mitigation: effective mitigation with little or no residual odour	remote from source and exceeds set back distances where applicable Direction: Low frequency (%) of winds from source to receptor or upwind of source with respect to prevailing wind. Mitigation: high level stacks/vents not compromised by surrounding buildings	farms, footpaths and roads

4.2.10 Hedonic scores are the quantitative values assigned to the unpleasantness of source emission samples, by measurement in the laboratory by a panel of trained assessors following the German method VDI 3882 Part 2. Hedonic tone is scored on a nine-point scale ranging from very pleasant (score of +4, e.g. bakery smell) through neutral to highly unpleasant (score of -4, e.g. rotting flesh).

4.2.11 The risk ratings above are then combined with the matrix in Table 3: Risk of odour impact at receptor location (as taken from the IAQM guidance) to estimate the overall risk of odour impact at the proposed residential development.

Table 3: Risk of odour impact at receptor location			
Pathway Effectiveness	Risk Rating based on Source-Pathway-Receptor		
	Small	Medium	Large
Highly effective	Low Risk	Medium Risk	High Risk
Moderately effective	Negligible Risk	Low Risk	Medium Risk
Ineffective pathway	Negligible Risk	Negligible Risk	Low Risk

4.2.12 The next stage of the risk assessment is to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity, using Table 4: Likely

magnitude of odour effect at the specific receptor location as taken from the IAQM guidance.

Table 4: Likely magnitude of odour effect at the specific receptor location			
Risk of odour exposure (impact)	Receptor Sensitivity		
	Low	Medium	High
Large	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Small	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

5 ODOUR RISK ASSESSMENT

5.1 Existing Odour Sources

5.1.1 The main sources of odour at the proposed development site are likely to arise from the emissions associated with the microbrewery as detailed within this report. The precise operational measures and mitigation of the microbrewery emissions are unknown and therefore a worst-case approach has been adopted for this assessment. In accordance with Table 2, the magnitude of odour release is considered to be **medium/moderate**.

5.2 FIDOL Assessment

5.2.1 The source-odour-potential has been considered with respect to FIDOL as per the IAQM guidance. This is summarised in Table 5.

Table 5: Description of the FIDOL Factors	
Factor	Description
Frequency	The regional prevailing wind is from the south west. During calm conditions, higher odour concentrations may linger in the local area due to the absence of wind to dilute and disperse the odours. The wind rose in Appendix A shows that this is likely to be, at worst, 1.22% of the time. Due to the nature of the brewery, the site activity is likely to be constant throughout the year.
Intensity	It has not been possible to determine the intensity of the odour; however, the intensity is considered likely to be low due to the dilution/dispersion that will take place over the distance between the source and receptors.
Duration	The source emissions are likely to be constant throughout the year.
Odour unpleasantness	In accordance with guidance from the EA, odours associated with a brewery may be described as 'less' offensive.
Location	The proposed land use is residential in nature. The closest boundary of the site is located approximately 1.1km south east of the brewery.

Pathway Effectiveness

5.2.2 It is important to consider the proposed receptors in terms of proximity to the odour source and the prevailing wind direction to determine the pathway effectiveness.

5.2.3 To provide information on how odour may disperse, wind speed and wind direction data has been obtained from the Shoreham Meteorological Station. The Shoreham

Meteorological Station is located approximately 13km to the east of the proposed development site and is considered to be the most representative. The Shoreham annual wind rose for 2012 to 2016 is available at Appendix A.

- 5.2.4 The wind rose is displayed as 12 compass directions. The prevailing wind direction is from the south west. The proposed residential development lies to the south east of the brewery and therefore is not located directly downwind with respect to the prevailing wind direction.
- 5.2.5 Low wind speeds are most effective at carrying odour (i.e. less than 3ms^{-1}) as the wind fails to dilute and disperse the odour effectively. Higher wind speeds become increasingly effective at diluting and dispersing odour.
- 5.2.6 The meteorological data shows when taking into account all wind speeds, the proposed development is predicted to be downwind of the brewery for 16.10% of the time. However, worst case conditions when the site is downwind of the brewery and wind speeds are less than 3ms^{-1} occur for approximately 4.84% of the time.
- 5.2.7 It should be noted that there is an existing residential property approximately 570m south west of the brewery as well as further houses within 1.3km south west of the brewery. During the consultation with ADC, it is understood that there is no history of odour complaints relating to the brewery.
- 5.2.8 The assessment has considered the highest sensitivity receptors (i.e. the proposed residential dwellings), as occupants are expected to be present continuously or at least for extended periods of time and therefore are at a greater risk of impact from odour exposure.
- 5.2.9 The optimum conditions for odour generation are periods when there are lower wind speeds (typically less than 3m/s). When considering that the potential for odour effects is likely to be highest when both the proposed receptors are located downwind of the brewery and wind speeds are less than 3m/s , this further reduces the proportion of time when odour effects may be experienced.
- 5.2.10 The effectiveness of the odour pathway is presented in Table 6.

Table 6: Effectiveness of odour pathway				
Receptor	Distance from Source	Direction from Source	Downwind	Pathway Effectiveness
Proposed Residential Development	1.1km	South east	No	Ineffective

5.2.11 It is concluded that the pathway effectiveness is **ineffective**, in accordance with the IAQM Guidance criteria.

Receptor Sensitivity

5.2.12 The proposed development is residential and is therefore judged to be of **high** sensitivity.

Potential Odour Effects

5.2.13 The precise operational measures and mitigation of the brewery are unknown and therefore a worst-case approach has been considered to determine the Source Odour Potential.

5.2.14 Based on the hedonic tones scores in the SEPA odour guidance, and the categories included within the EA H4 guidance, odours from breweries can be classed as being within the 'less offensive' category. The hedonic score could range between -2.45 (sulphurous) and -0.14 (beery).

5.2.15 A summary of the risk factors for the Source Odour Potential are detailed in Table 7.

Table 7: Source Odour Potential	
Factors affecting Source Magnitude	Risk Factors
Magnitude of Odour Release	Medium scale
Inherent Odorous Nature of Compounds	Odorous compounds with low odour detection thresholds
Odour Unpleasantness	Hedonic tones likely to be between 0 to -3

5.2.16 In accordance to the criteria detailed in Table 2, the Odour Source Potential is judged to be **Medium** (assumed a worst-case scenario).

5.2.17 The potential for the source to cause odour, the pathway effectiveness and the receptor sensitivity are combined to determine the overall likely odour effect, in accordance with the IAQM guidance and tables 2 to 4 of this report.

5.2.18 The potential odour effects at the proposed residential development is presented in Table 8.

Table 8: Potential Odour Effects						
Receptor	Distance from Source	Activity Source Odour Potential	Effectiveness of Pathway	Receptor Sensitivity	Risk of Odour Impact	Likely Odour Effect
Future Residential Receptor	1.1km	Medium	Ineffective	High	Negligible risk	Negligible Effect

5.2.19 Based on a medium source odour potential, where the pathway is deemed to be ineffective, the risk of odour impact (dose) is deemed to be negligible with an overall negligible effect, in accordance with IAQM guidance for the proposed residential dwellings closest in proximity to the brewery.

5.2.20 The final stage of the assessment is to draw an overall conclusion on the potential significance, based on professional judgement. This is considered within Section 6 and 7 of this report.

6 ASSESSMENT OF SIGNIFICANCE

- 6.1.1 A qualitative risk based assessment has been undertaken to consider the potential for odour from the Hammerpot Brewery to give rise to an adverse odour effect at the proposed residential development on land west of Arundel Road, Angmering. A worst-case approach has been adopted as the precise operational measures and mitigation of the brewery are unknown.
- 6.1.2 With regard to reaching a conclusion on the overall significance of likely odour effects, the IAQM guidance states that the findings of the different odour assessment tools should be drawn together. This includes community-based tools, such as odour complaint histories, which should normally be given “*considerable weight*”.
- 6.1.3 The significance of the overall odour effects arising from the brewery has been assessed, taking into account the following points:
- The results of the risk based qualitative assessment which represent a worst-case scenario for brewery and its effect on the proposed receptors;
 - The existing residential dwelling situated 570m to the south west of the brewery and the existing residential dwellings situated within approximately 1.3km south west of the brewery;
 - The lack of odour complaints relating to the brewery. It is understood that ADC have no record of any complaints relating to odour from the brewery;
 - The proposed development is located approximately 1.1km away, to the south east of the brewery. The wind rose indicates that for an average year, the majority of the wind originates from a south westerly direction. This demonstrates that for the majority of the time the proposed development site is not directly downwind of the brewery.
 - Considering all wind speeds, the proposed development is predicted to be downwind of the brewery for 16.10% of an average year. However, taking in to account low wind speeds of less than 3m/s, when the potential for odour propagation is at its highest, this falls to 4.84%. Furthermore, calm conditions are estimated for 1.22% of an average year. Higher wind speeds become increasingly effective at diluting and dispersing odour; and
 - When considering that the potential for odour effects is likely to be highest when both the proposed receptors are located downwind of the brewery and wind speeds are less than 3m/s, this further reduces the proportion of time when odour effects may be experienced.

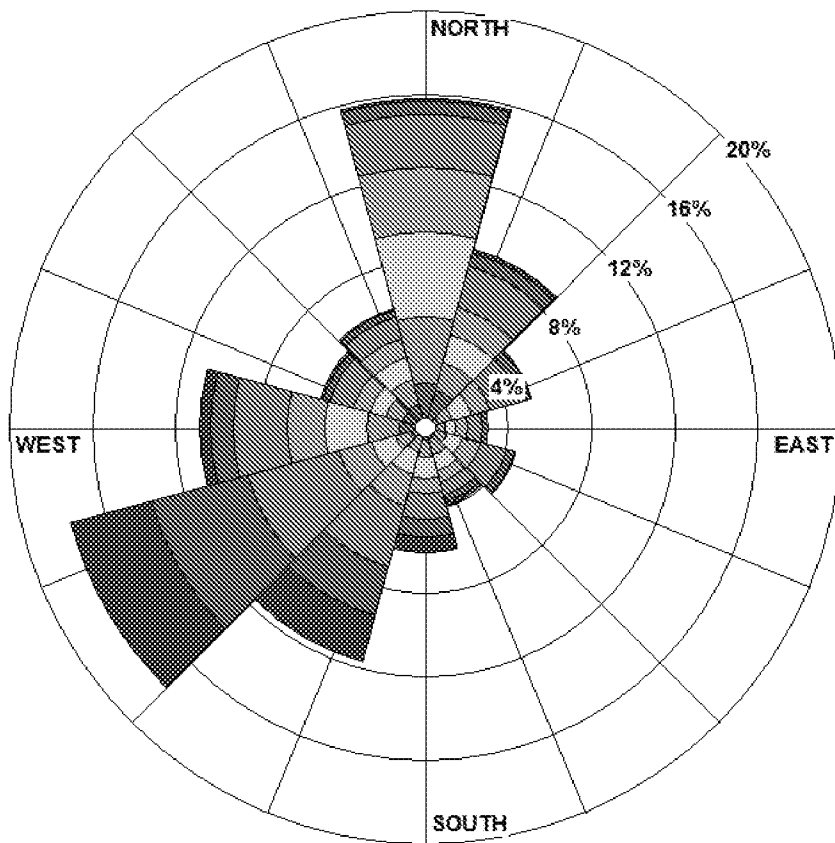
- 6.1.4 Overall, taking in to account the results of the qualitative risk based assessment which are based on a worst-case scenario, the local meteorological data, the proximity of the existing residential dwellings and the lack of odour complaint history, the potential impact from odour at the proposed development site is judged to be **‘not significant’**.

7 SUMMARY AND CONCLUSION

- 7.1.1 A qualitative risk based assessment has been undertaken to consider the potential for odour from the Hammerpot brewery to give rise to an adverse odour effect at the proposed residential development at land west of Arundel Road, Angmering.
- 7.1.2 Overall, the assessment demonstrates that the risk of odour effects is '**negligible**' based on the odour risk assessment undertaken. It is worth noting that this represents a worst-case scenario.
- 7.1.3 The results of the odour assessment indicate that the potential for odour effects at the proposed development from the Hammerpot Brewery is '**not significant**' based on the points raised in Section 6 of this report and in accordance with IAQM guidance.

Appendix A
Wind Rose – Shoreham Meteorological Station 2012 – 2016

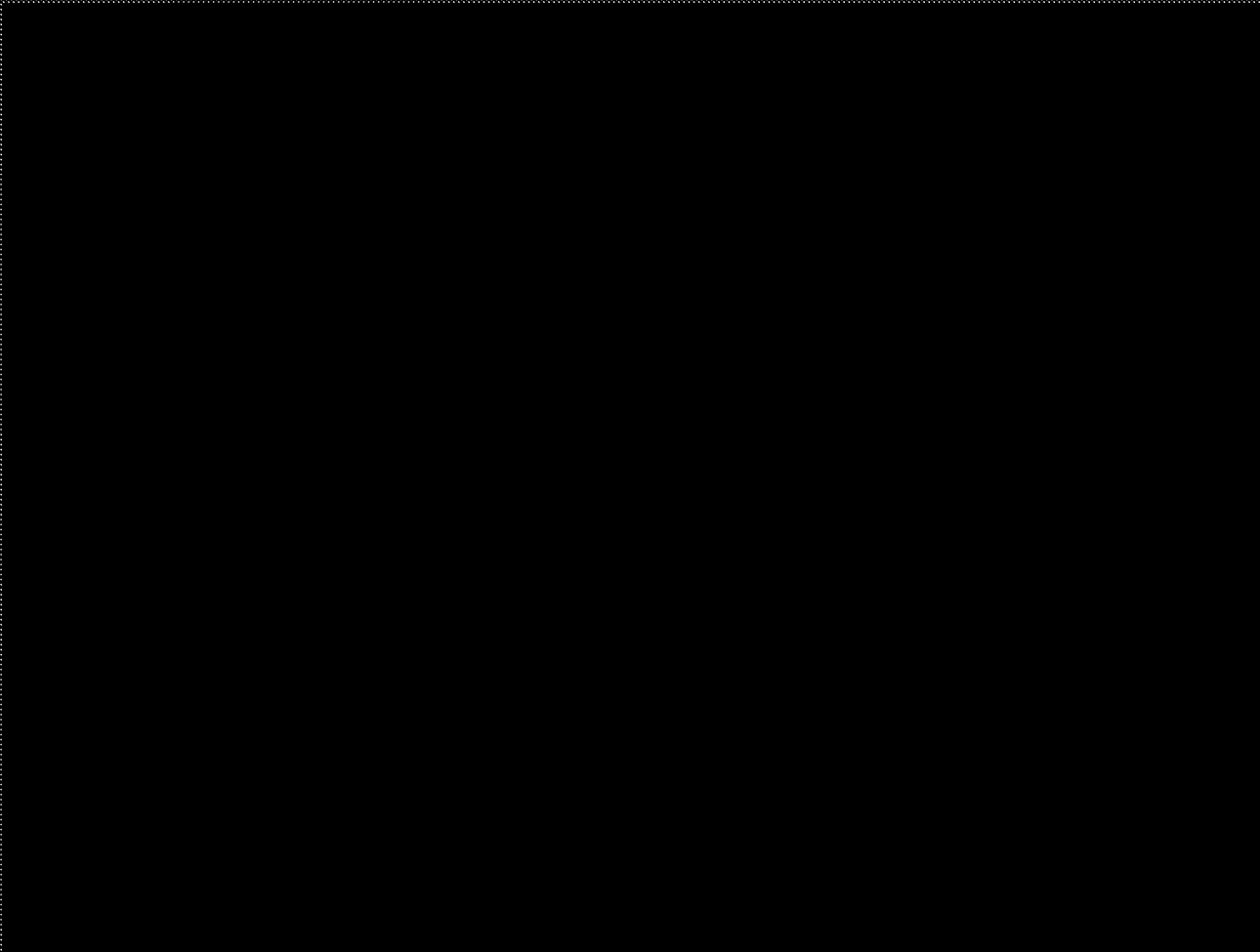
Shoreham, UK 2012-2016



Wind Speed
(m/s)

- >= 9.0
- 7.0 - 9.0
- 5.0 - 7.0
- 4.0 - 5.0
- 3.0 - 4.0
- 2.0 - 3.0
- 0.5 - 2.0

Calms: 1.22%



your earth our world

