Suffolk Coastal Local Plan Review Examination Hearings

Matter 3 – Area Specific Strategies – Development Allocations

Hearing Statement on Behalf of Capital Community Developments Ltd. Responding to Inspector's Questions in Respect of Emerging Policy SCLP12.62 Land West of Garden Square, Rendlesham

2nd Addendum

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1 Addendum 2

1.1 This second addendum accompanies our hearing statement and its addendum and includes a copy of the Odour Assessment referred to in paragraph 3.11 of our Matters Statement. We apologise for the late submission of this report, the consultants were awaiting vital data from Anglia Water.

1.2 As can be seen from the report (Fig. page 19 and Table 5 page 20) the results of the odour assessment continue to show that under normal working conditions the odour levels from the sewage treatment plant are at least 10 times lower than the statutory nuisance level of 1.5 ouE/m^3.

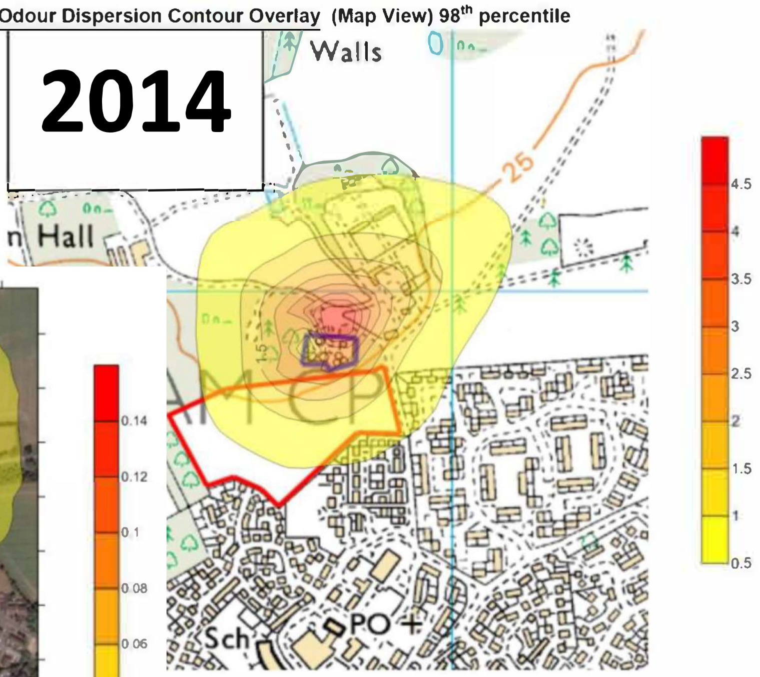
1.3 The cordon sanitaire referred to in the emerging policy SCLP12.62 (and the adopted policy SSP12 before it), which originated from the 2014 odour assessment was based on anomalous results caused by the abnormal functioning of the plant; itself caused by industrial pollutants being flushed into the domestic system from the nearby Bentwaters industrial estate.

1.4 The cordon sanitaire is based on anomalous data. It was not a limiting factor justifying the reduction of the historic allocation from 75 dwellings to 'approximately 50' in the adopted policy SSP12 and should not be a limiting factor in the emerging policy. There is no evidence to support the retention of the reference to the cordon sanitaire in the emerging policy SCLP12.62.

1.5 Criterion a) should be removed from emerging policy SCLP12.62, references to the cordon sanitary, 'land not suitable for building' and other related text should be removed from supporting paragraphs 12.705 and 12.706.

1.6 The reference to 'approximately 50 dwellings' in the emerging policy should be corrected to 'approximately 75 dwellings' in order to be sound; reflecting the best evidence.

Odour Dispersion Contour Overlay (Map View) 98th percentile



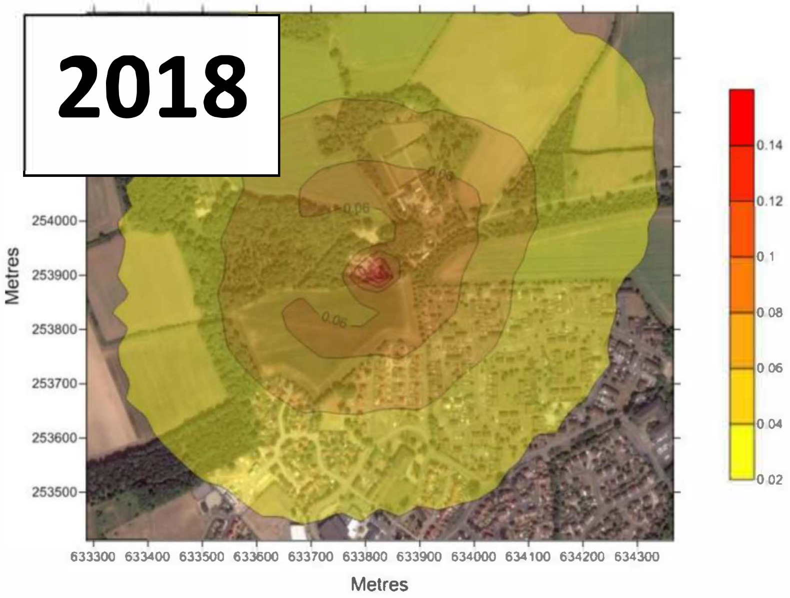
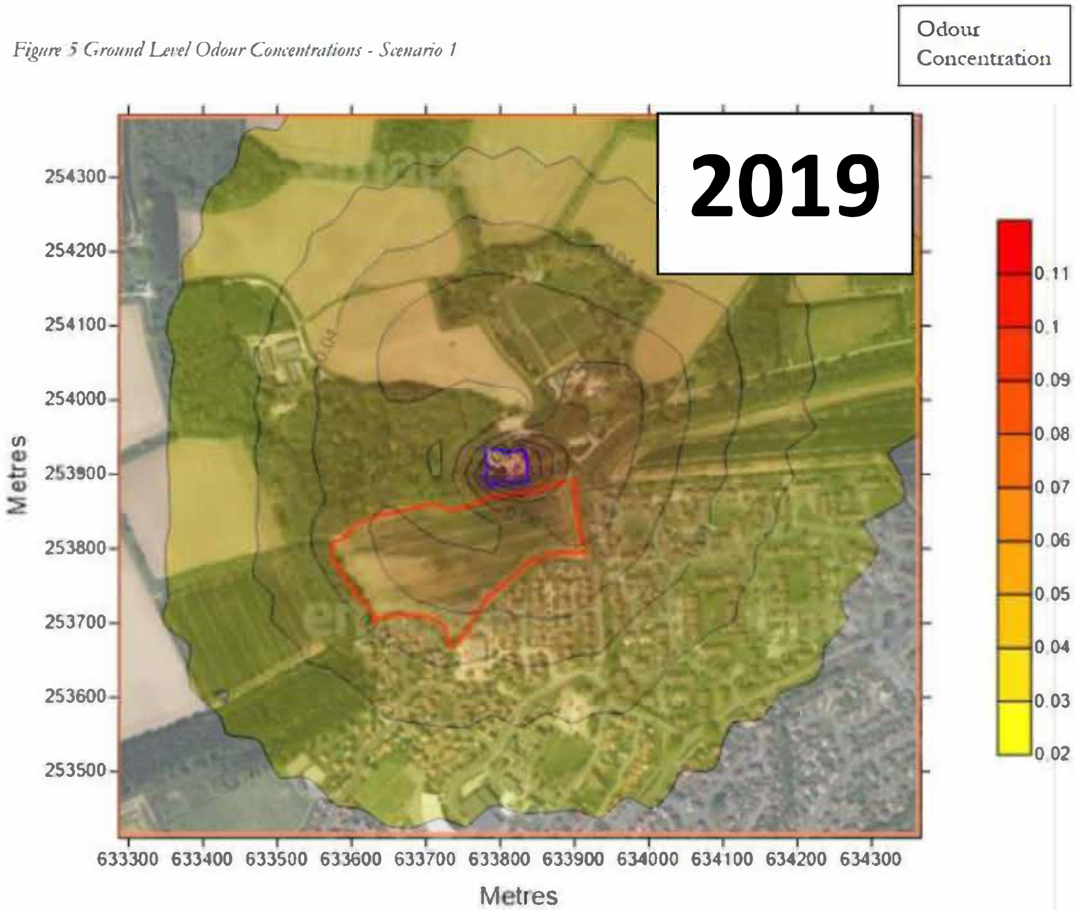


Figure 5 Ground Level Odour Concentrations - Scenario 1



Addendum Appendix

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Odour Impact Assessment

Capital Community Developments

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JL 20471
Version 1.0

14/09/2019

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ABBREVIATIONS

ASE	Air Spectrum Environmental Limited
BS EN	British Standard European Norm
DEFRA	Department for Environment, Food & Rural Affairs
EA	Environment Agency
IPPC	Integrated Pollution Prevention and Control
NPPF	National Planning Policy Framework
SES	Spectrum Environmental Support
STW	Sewage Treatment Works
UKWIR	UK Water Industry Research
WWTW	Waste Water Treatment Works

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EXECUTIVE SUMMARY

Air Spectrum Environmental Ltd (ASE), were commissioned By Capital community developments to undertake an odour dispersion modelling assessment to evaluate the potential odour impact of a Sewage Treatment Works on a proposed site development by Capital Community Developments situated near Jays Croft Road, Rendlesham, Woodbridge IP12 2TQ.

Data entered within the dispersion model was based upon odour emissions data supplied and verified by Anglian Water.

The results of this assessment indicate that ground level odour concentrations at the proposed residential development are well below the 1.5 ou_E/m^3 98th percentile (hourly average) limit. Therefore, based on the findings within this assessment, it appears that the proposed residential development would not be subjected to odour nuisance from the STW site.

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1.0 INTRODUCTION

1.1 Background

Air Spectrum Environmental Ltd (ASE), were commissioned to undertake an odour dispersion model of a proposed site development by Capital Community Developments situated near Jays Croft Road, Rendlesham, Woodbridge IP12 2TQ. Data entered within the dispersion model was based upon emission data for the Rendlesham Sewage Treatment works, which was supplied by Anglian Water.

Capital Community Developments propose to develop the site into a residential area and have procured ASE to report on the impacts of the odour release from the adjacent STW. The STW is situated to the North of the development in Rendlesham. During the planning stages, concerns have been raised about the off-site odours which may cause nuisance to the future residents of the development.

To assess the risk that off-site odours may cause a nuisance to the future residents of the development, ASE has completed an odour impact assessment for the odour sources identified. ADMS 5 software was used to prepare the dispersion model to quantify the odour risk to the planned development. Figures 1 & 2 display the planned development site and the adjacent STWs.

Figure 1 - Planned Development site layout (2019)

Figure 2 below displays the development site boundary in relation to the sewage treatment works and cordon sanitaire zone.

Figure 2 - Development site boundary in relation to the STW & Cordon Sanitaire Zone

1.2 Limitations

Air Spectrum Environmental Limited has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed.

The report may not be relied upon by any other party without the express agreement of the client. No other warranty, expressed or implied is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by ASE for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of ASE and the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the Safety, Health, Environment and Quality Management System of ASE.

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2.0 REGULATORY GUIDANCE

2.1 Odour guidance and legislation

There are currently no statutory standards or regulations in the UK for the release and subsequent impacts of odours. This is due to the complexities involved with measuring and assessing odours against compliance criteria, and the inherent subjective nature of odours.

It is recognised that odours have the potential to pose a nuisance for residents living near a source of offensive odour. In these cases, determination of whether or not an odour constitutes a statutory nuisance is usually the responsibility of the local planning authority or the Environment Agency. The Environmental Protection Act 1990 (Stationery Office, 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…"

Within the Environment Agency H4 Guidance on Odour Management there are benchmark levels of odour on the site boundary dependent on its offensiveness, ranging between $C98,_{1\ hour}$ $1.5ou_E/m^3$ and $C98,_{1\ hour}$ $6\ ou_E/m^3$. This is due to variations in an odours apparent offensiveness and a receptors sensitivity.

The benchmarks are:

- 1.5 odour units for most offensive odours
- 3 odour units for moderately offensive odours
- 6 odour units for less offensive odours.

2.2 National Planning Policy

The National Planning Policy Framework (NPPF) was published in March 2012. This sets out the Government's planning policies for England and how they are expected to be applied. In relation to conserving and enhancing the natural environment, paragraph 109 states that:

"The planning system should contribute to and enhance the natural and local environment by…… preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability."

Pollution is defined by the NPPF 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 smoke, fumes, gases, dust, steam, odour, noise and light."

2.3 Odour measurement

Odour exposure and impact can be measured via two methods; by specific compound measurement or; by total odour by dynamic dilution olfactometry.

Specific gas measurement is often used when an emission from a site is dominated by an individual odorous compound, such as hydrogen sulphide at a Waste Water Treatment Works (WWTW). Monitoring of the odorous compound, both at its source and receptor location, can provide a simple evaluation of the odour emission.

Total odour by dynamic dilution olfactometry determines the odour threshold for a complex mixture of chemicals. Odour threshold is a measurement of concentration for an odorous gas. The measurement is achieved by presenting a dilution range of the test gas to a panel of acuity assessed panellists. Panellists indicate when they can detect an odour or not, at each dilution range presented. The detection point is the dilution at which 50 % of the panel can detect an odour, which in turn represents an odour concentration of 1 ou_E/m^3. The test sample odour concentration is calculated by multiplying detection concentration (1 ou_E/m^3) by the dilution required to achieve detection point. Odour threshold is measured in accordance with BS EN 13725:2003[1] "Determination of odour concentration by dynamic Olfactometry". Once threshold analysis is completed it gives the point of detection of the odour and its apparent strength in ou_E/m^3.

For the purposes of this model the odour emission values were given by Anglian Water.

2.4 UK case law

The most commonly applied criterion in relation to odour assessment is the 'Newbiggin criterion'. This criterion was originally introduced into a public inquiry for a new sewage works at Newbiggin-by-the-sea in 1995, defended by Northumbrian Water Limited. It equates to an odour exposure level of 5 European odour units per cubic meter ($C98,_{1\ hour} > 5\ ou_E/m^3$). The Newbiggin criterion has been successfully applied during numerous planning and nuisance assessment studies since 1995, for sewage, waste, food and a range of other industrial and agricultural activities.

These indicative criteria aim to differentiate between odours of different offensiveness, and range from $C98,_{1\ hour} > 1.5\ ou_E/m^3$ (for highly offensive odours) to $C98,_{1\ hour} > 6\ ou_E/m^3$ (for low offensive odours). It should be noted that the sewage treatment sector does not currently fall under the IPPC regime and that these criteria are based on relatively limited data and have not undergone any robust validation in terms of their applicability to the sewage treatment sector in the UK.

The comparison of odour exposure levels generated by the works before and after completion of the proposed sludge dewatering schemes was focused on the Newbiggin criterion ($C98,_{1\ hour} = 5\ ou_E/m^3$), and the most stringent EA criterion ($C98,_{1\ hour} = 1.5\ ou_E/m^3$).

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

Table 1 Newbiggin criterion

Relative Offensiveness	Indicative Criteria
High	1.5 ou_E/m^3 98th percentile (hourly average)
Medium	3 ou_E/m^3 98th percentile (hourly average)
Low	6 ou_E/m^3 98th percentile (hourly average)

2.5 UK Water Industry Research

A published study by the UK Water Industry Research (UKWIR)[2] detailed the correlation between the modelled odour impact areas with receptor responses. Published in 2001 the document shows from a study of 9 wastewater treatment works, how the complaints vary:

- At $C98,_{1\ hour}$ 5ou_E/m^3 – complaints rare; 3% registered
- Between $C98,_{1\ hour}$ 5ou_E/m^3 and $C98,_{1\ hour}$ 10ou_E/m^3 – increase in complaints; 38% registered
- Above $C98,_{1\ hour}$ 10ou_E/m^3 – significant increase in complaints; 59% registered.

2.6 DEFRA compost guidance

The compost guidance in 2009 relating to good practise and odour control for composting sites (excluding those processing slaughterhouse waste) gives $C98,_{1\ hour}$ 3ou_E/m^3 as an odour impact criteria taken from dispersion modelling.

[2] Odour Control in Wastewater Treatment – A Technical Reference Document. Ref 01/WW/13/3 – UKWIR, 2001

3.0 IMPACT ASSESSMENT METHOD

3.1 Odour emission sources

A desktop study revealed two potential odour sources which are in close proximity to the proposed development site at Rendlesham. Firstly, the Anglian Water STW to the North of the development site and secondly, the Stokes Sauces factory to the North-East. Within this study only the STW has been considered in the dispersion model. The sauce factory has been omitted because the operation is small and is deemed to have negligible effect.

The odour emission data used in the dispersion model was supplied and verified by Anglian Water. This data is presented in table 2 below.

Table 2 Odour Emission Data

Name	Shape	No	L (m)	W (m)	Dia (m)	Elev (m AOD)	Area (m^2)	Emission rate ($ou_E/m^2/s$)	Comments
Inlet works reception chamber	circular	1	N/A	N/A	1.5	27	1.8	50	UKWIR: typical rate to reflect pumped flow
Screenings skip	rectangular	1	3	2	N/A	27	6.0	20	AW internally derived from model library
Screen chamber	rectangular	1	10	2.5	N/A	30	25.0	20	UKWIR: low rate to reflect low risk of septicity
Balance tank	circular	1	N/A	N/A	15	30	176.6	0.8	Use UKWIR low rate for PST to reflect diffused air and no settlement
Bio-bubble reactor 1	circular	1	N/A	N/A	13	32	132.7	4	Use UKWIR typical rate for activated sludge plant
Bio-bubble reactor 2	circular	1	N/A	N/A	13	32	132.7	4	Use UKWIR typical rate for activated sludge plant
Bio-bubble desludging chambers	rectangular	2	1	1	N/A	27	2.0	140	Use UKWIR low rate for agitated raw sludge to reflect aerobic process
Sludge storage tank	circular	1	N/A	N/A	3	29	7.1	40	Use UKWIR low rate for quiescent raw sludge to reflect aerobic process
New sludge storage tank	circular	1	N/A	N/A	7.5	29	44.2	40	Use UKWIR low rate for quiescent raw sludge to reflect aerobic process
Wash water storage tank	circular	1	N/A	N/A	7.5	0.3	44.2	0.3	Use UKWIR low rate for final tank
Attenuation tank	Circular	1	N/A	N/A	7.5	0.3	44.2	0.3	Use UKWIR low rate for final tank

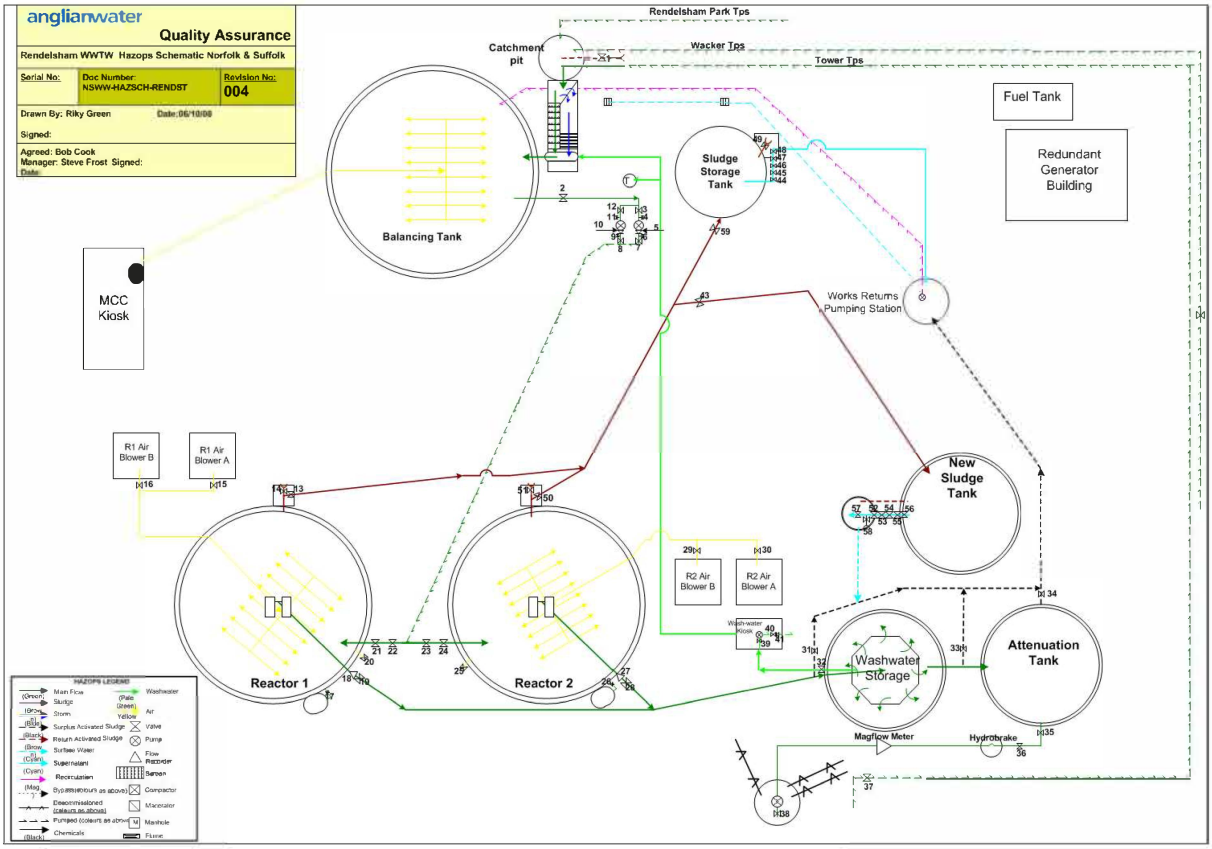

Figure 3 Rendlesham STW Site Schematic

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3.2 Receptor locations

Within this assessment 4 receptor locations have been used to predict ground level odour concentration across the planned site. The receptor locations have been chosen to represent two locations within the cordon sanitaire zone of the site and two further locations situated in other areas of the site.

Figure 4 – Receptor location map

Table 3 Receptor locations

	Receptor	Location	
		x	y
R1	Northern edge of cordon sanitaire	633813	253868
R2	Westerly section of cordon sanitare	633769	253840
R3	Western area of development site	633603	253811
R4	Centre of development site	633738	253717

3.3 Meteorological data

The relevant meteorological data used was from Wattisham, following discussions with the data provider. The proposed site is approximately 30 km from the weather station and contained all relevant weather parameters used within the model for the 5 years' worth of data required. The years covered in this assessment are 2014-2018.

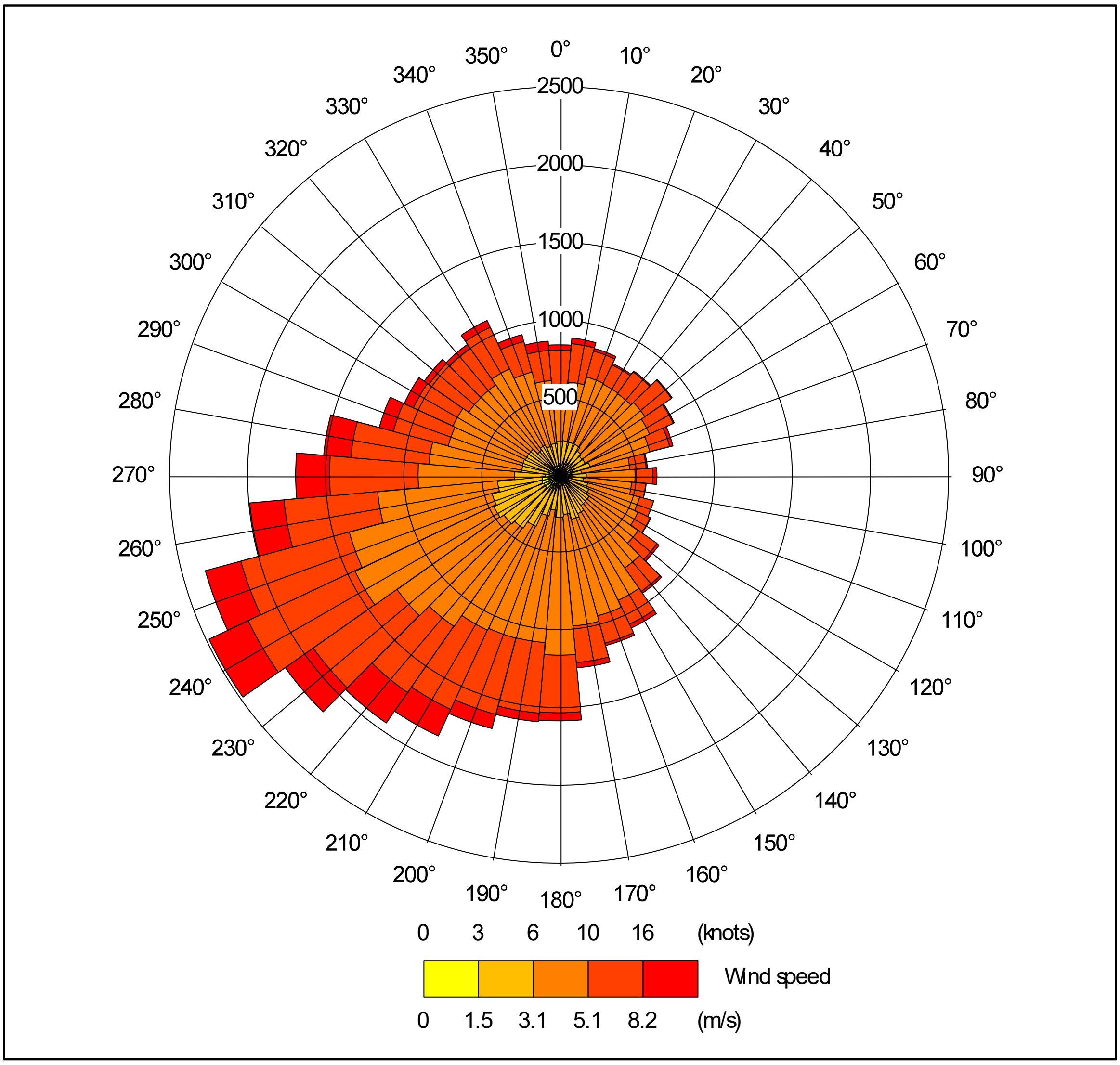

Figure 5 Windrose data for Wattisham 2014-2018

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3.4 Dispersion model inputs

The dispersion model was run using the input parameters which are detailed in Table 4.

Table 4 Model input parameters

	Parameter	Source Type	Central Location x	Central Location y	Emission Velocity m/s	Flow Rate m³/s	Total Emission Rate OU_E/s
Source	Inlet works Reception Chamber	Point	633806	253927	0.1	0.177	90
	Screenings Skip	Line	633823 633827	253922 253922	0.1	0.079	20
	Screen Chamber	Line	633806 633804	253925 253916	0.1	0.079	60
	Balance Tank	Area	633796 633803 633793 633788	253930 253920 253918 253925	0.1	17.671	2.4
	Bio-bubble reactor 1	Point	633783	253899	0	0	12
	Bio-bubble reactor 2	Point	633801	253897	0	0	12
	Bio-bubble desludging chambers	Point	633779 633791	253911 253907	0.1	0.079	420 420
	Sludge Storage Tank	Point	633813	253919	0.1	0.707	120
	New Sludge Storage Tank	Point	633822	253904	0.1	4.418	120
	Wash water Storage Tank	Point	633819	253892	0.1	4.418	1.2
	Attenuation Tank	Point	633829	253895	0.1	4.418	1.2

All input locations are based on estimates made using satellite images and cannot be verified as being accurate. All sources have been modelled to emit 24 hours a day to ensure worst case scenario is predicted.

3.5 Dispersion model scenarios

To characterise the impact of the odour emissions from the STW, a single scenario was modelled:

- Scenario 1 – All sources considered. No near field buildings included (including proposed buildings) and odour emission rates as defined in Table 4.

3.6 Modelling software

The site information was input into ADMS to determine the relationship between the STW and the proposed development land. Emission data and meteorological data was then fed into the model to enable prediction of the level of exposure to odours at locations surrounding the site under the normal operational regime for the facility. The results of the modelling are presented in the form of contours (or isopleths - lines connecting points with equal frequency of occurrence) for a 1-hour average limit concentration of x ou_E/m^3 as a 98% (percentile) ($C98,_{1\ hour} = X\ ou_E/m^3$) which defines the area where odour nuisance may occur.

ADMS[3] is a state-of-the-science dispersion modelling system that simulates essential atmospheric physical processes and provides refined concentration estimates over a wide range of meteorological conditions and modelling scenarios. It is based on atmospheric boundary layer turbulence structure and scaling concepts, including treatment of multiple ground-level and elevated point, area and volume sources. It handles flat or complex, rural or urban terrain and includes algorithms for building effects and plume penetration of inversions aloft. It uses Gaussian dispersion for stable atmospheric conditions (*i.e.*, low turbulence) and non-Gaussian dispersion for unstable conditions (high turbulence).

ADMS includes two data pre-processors for streamlining data input. A meteorological pre-processor, computes boundary layer and other necessary parameters for use with ADMS and uses standard hourly sequential data supplied from the UK Met Office. There is also a terrain pre-processor option that simplifies the computation of receptor elevations and effective height scales for numerous types of digital data formats, including OS Landform Panorama digital terrain maps. The model is considered appropriate by the UK Environment Agency for assessments of the nature described in this report

[3] Software used: ADMS 5.1 model version: 5.1.2.0.

3.7 Odour impact assessment criteria

The objective of this assessment was to establish whether the odour emissions resulting from the STW at Rendlesham would result in predicted odour nuisance at the proposed residential development.

Taking into consideration the guidance discussed we assume that sensitive receptors would be able to detect odour resulting from the STW at between 1.5 - 3 ou_E/m^3, and odours above 3 ou_E/m^3 98th percentile would cause nuisance.

3.8 Odour modelling uncertainties

Uncertainty in dispersion modelling predictions can be associated with a variety of factors, such as:

- **measurement error** – error in input data, including emission estimates, operational procedures, land use characteristics and meteorology which can be detected and corrected;
- **systematic error** – unnoticed error which may occur during the sampling (data collection);
- **model uncertainty** – model limitations and assumptions based on which it was computed;
- **inherent randomness** – knowledge of starting conditions does not result in certainty related to the final modelling outcome;
- **natural variation** – change in time and place in natural systems;
- **subjective judgement** – data interpretation, especially when data is scarce.

Potential uncertainties in the model results were minimised as far as practicable and worst-case inputs used to provide an accurate assessment. This included the following:

- choice of model - ADMS-5 is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible; in the UK odour assessments are almost exclusively undertaken using the ADMS or AERMOD models;
- meteorological data - modelling was undertaken using meteorological data set from an observation site within 30 km of the facility to take account of local conditions; a few years of data minimise the risk of inclusion of abnormal weather conditions;
- plant operating conditions - SES have attempted to model information in the worst-case scenario, where all considered odour sources emit constantly;
- emission rates - emission rates were derived from monitoring undertaken at similar facilities. As such, they are considered to be representative of potential releases during normal operation;

- sensitive receptor locations - a Cartesian grid was included in the model to provide suitable data for contour plotting. Receptor points were also included at sensitive locations to provide additional consideration of these areas; and,
- variability - all model inputs are as accurate as possible and worst-case conditions were considered as necessary to ensure a robust assessment of potential pollutant concentrations.

Results were considered in the context of the relevant odour benchmark level and IAQM criteria. It is considered that the use of the stated measures to reduce uncertainty and the use of worst-case assumptions when necessary has resulted in model accuracy of an acceptable level.

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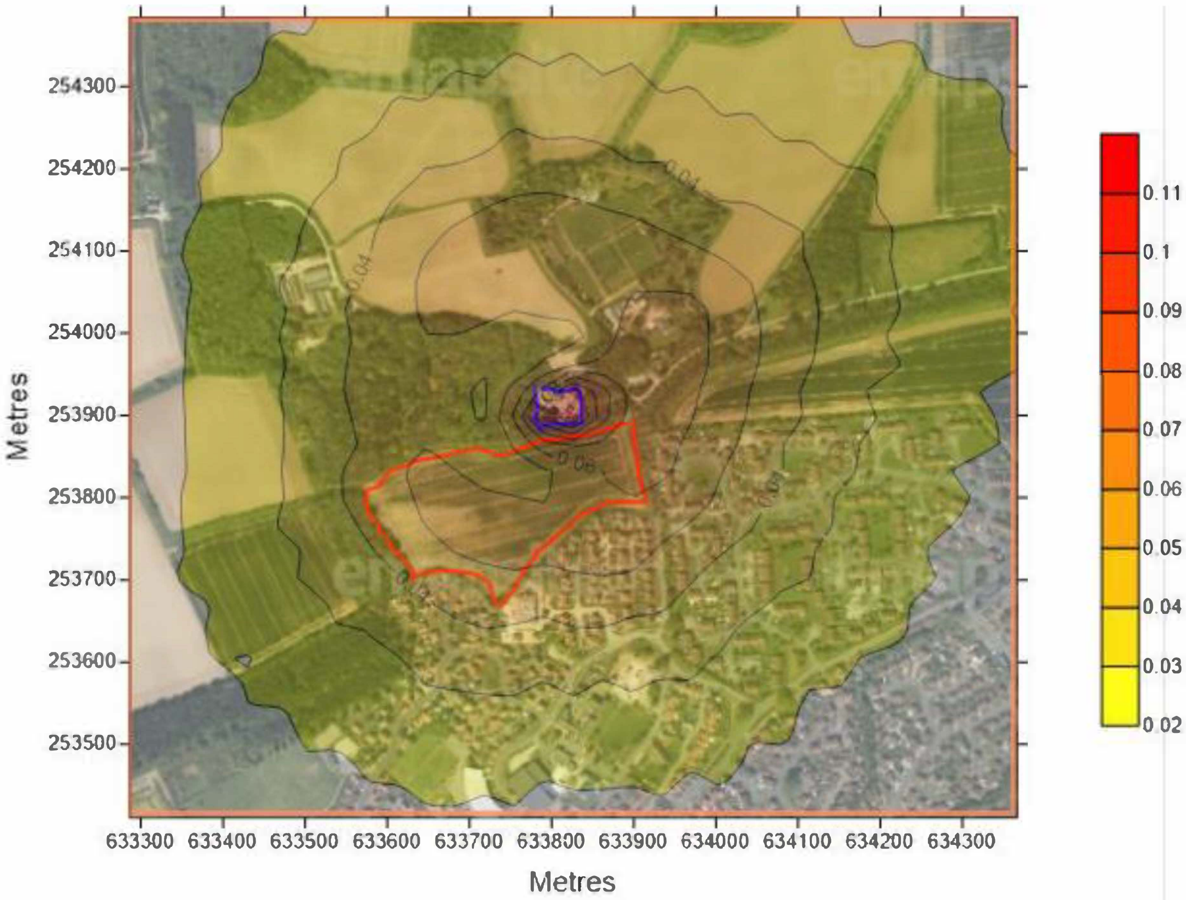
4.0 CONTOUR MAPS

Within this section the long term 98th percentile ground level odour concentrations are presented as a contour map overlayed over a base map of the local area. The colour graded key represents ground level odour concentrations (C98, $_{\text{1-hour}}$ x ou_E/m^3) at the specific point with odour concentrations increasing as the colour turns yellow to red.

4.1 Long term 98th percentile odour concentrations as a result of normal operations of the Anglian Water STW.

Odour Concentration



KEY

Development site boundary

STW site boundary

Figure 6 ***Ground Level Odour Concentrations - Scenario 1***

5.0 ASSESSMENT OF IMPACTS

Based on the findings within this assessment, it appears that the proposed residential development would not be subjected to odour nuisance from the STW site.

Table 5 details the ground level odour concentrations for the scenario that has been run in ADMS. Where odour levels fall above $C98,_{1\,hour} = 1.5\ ou_E/m^3$ the table cell is highlighted in pink, indicating the likely chance of odour nuisance at that receptor.

Table 5 Receptor ground level odour concentrations

Receptor Name	Ground Level Concentration ($C98,_{1\,hour}$ x ou_E/m^3) Scenario 1	Odour nuisance benchmark level (ou_e/m^3)
R1 – Northern section of cordon sanitaire zone	0.072	1.5
R2 – Wester section of cordon sanitaire zone	0.050	
R3 – Western area of whole development site	0.048	
R4 – Central area of whole development site	0.051	

The predicted long-term 98th percentile odour concentrations at the receptors located within the cordon sanitaire zone were all considerably lower than the benchmark odour nuisance limit of 1.5 ou_E/m^3. The maximum long-term 98th percentile odour concentration that was predicted throughout the whole of the modelled area was 0.12 ou_E/m^3. This again is below the benchmark odour nuisance limit of 1.5 ou_E/m^3.

The findings from this assessment, indicate that the future occupants of the proposed development site would not be subject to odour nuisance. However, the odour emission measurements which were supplied by Anglian Water may be greater or less than what has been modelled.

APPENDIX

BS EN 13725:2003 Air Quality – Determination of Odour Concentration by Dynamic Olfactometry

Odour Control in Wastewater Treatment – A Technical Reference Document. Ref 01/WW/13/3 – UKWIR, 2001

Software used: ADMS 5.1 model version: 5.1.2.0.

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