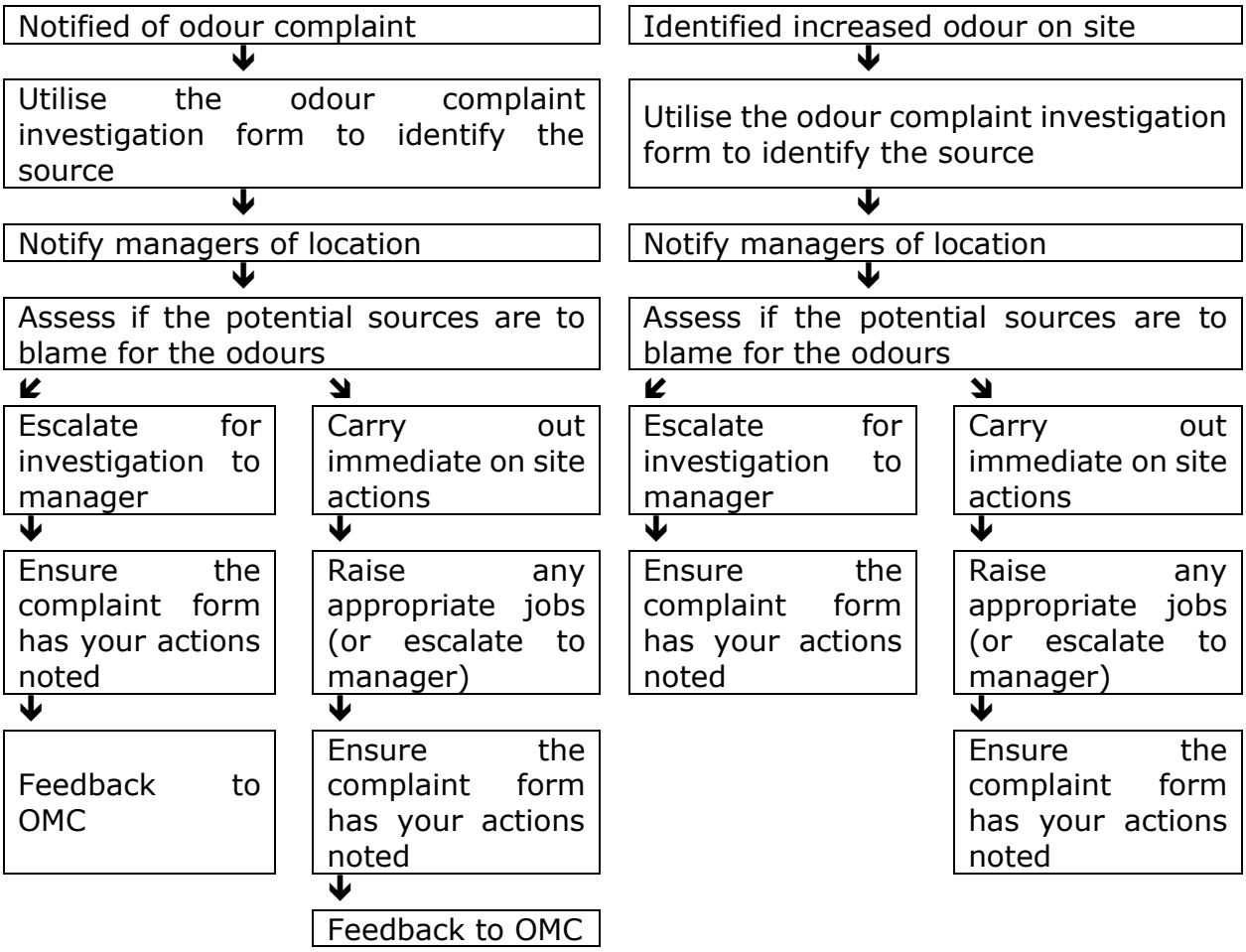
Anglian Water Services Ltd

Odour Management Plan

Site name	Anglian Water Basildon STW
Address	Courtauld Road
Post code	SS131DB
Short code	BASIST
Grid Reference	TM 73798 90738
Permit References	STC: EPR/GB3735RL CHP: EPR/CP3038HT



Introduction

This plan refers to the site mentioned on the cover sheet and is in response to the First Odour Risk Assessment (FORA) process having been completed.

Details of the FORA process can be found on online (https://anglianwater.sharepoint.com/:w:/r/sites/pubWaterRecyclingQuality/_layouts/15/Doc.aspx?sourcedoc=%7B5E274593-B7E6-477B-B3C3-8DF04165D9BB%7D&file=Odour%20Management%20-%20Water%20Recycling.doc&action=default&mobileredirect=true)

and the outcome for this site shows that an OMP is required.

This plan will be reviewed every 12 months, and will be audited as part of the wider business audit programme. The OMP has been produced in accordance with the Environment Agency's H4 Odour management guidance

Any significant changes, including process changes, plans changes or increase in complaints or odours detected will result in this plan being reviewed.

This plan will be stored on Light house.

Business Management Systems

There are various documents and processes within the business management systems for AWS that address odour and the management of complaints. The list below details some of the key processes and how they can be found online:

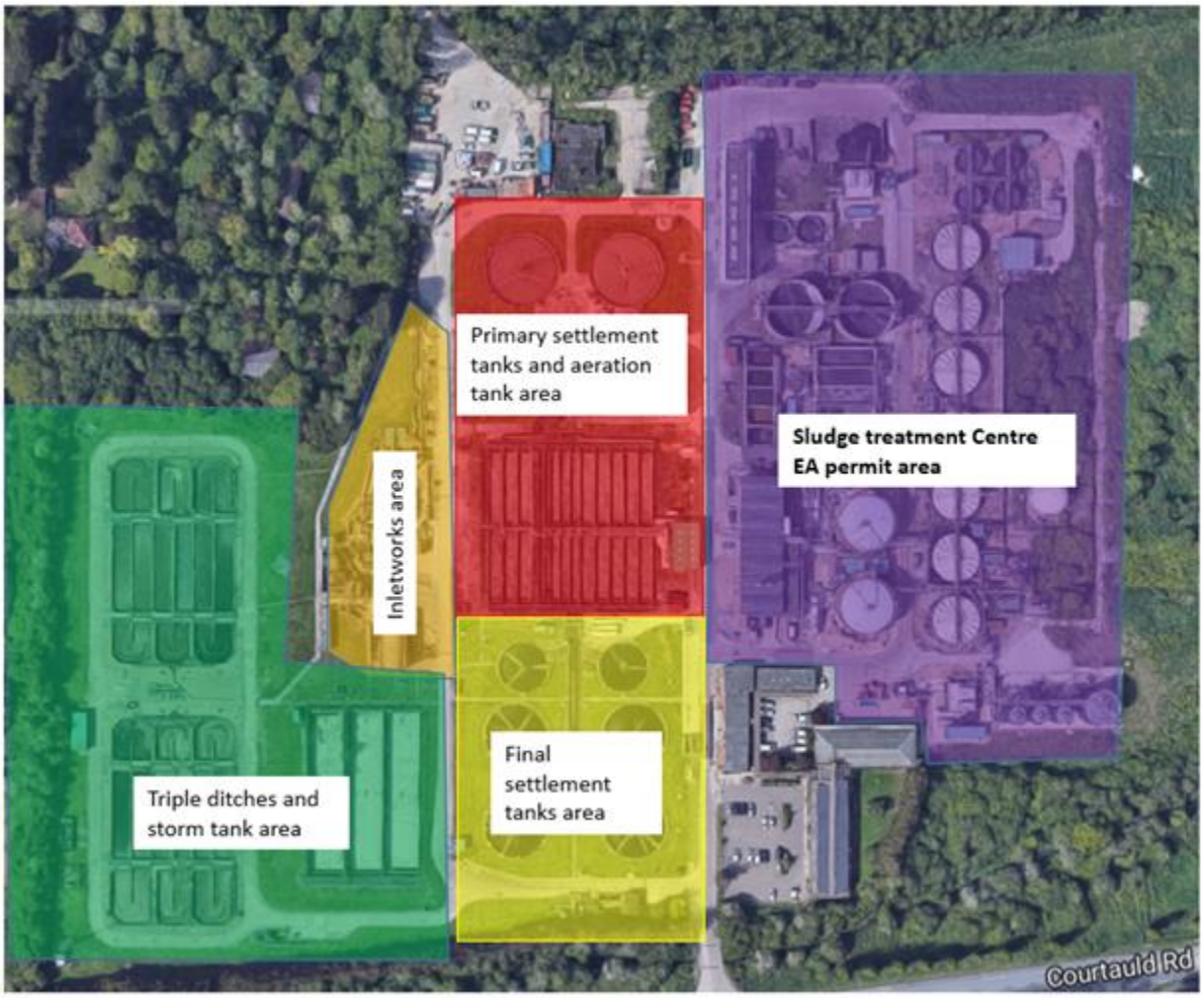
- POSWASTE section 10 – Odour Control holds all the standard documents relating to managing odour https://anglianwater.sharepoint.com/sites/pubWaterRecyclingQuality/SitePages/POSWASTE-Section-10.aspx
- Where further investigation CAP process will be followed.
- Customer Complaint process
- Current Odour Model can be obtained from the modelling team, contact Omid Shafibeik.

The site

The following maps show the site, odour sources, odour investigation points, weather information and sensitive/common receptors.

WRC & STC Potential Sources Sampling Log Locations

These points on the map below will be surveyed using the Jerome meter on a 2-weekly basis, records will be kept electronically on the 'Potential Sources Sampling Log' and reviewed for trends.



Overview

Basildon Sludge Treatment Centre processes imported sludge from satellite sites in Anglian Water and the daily make of the Sewage Treatment Works at Basildon. This is processed through the HPH process to produce gas to power 2 CHP engines to produce electricity. The advanced digestion process also produces compliant Cake which is able to go to land.

Sludge Treatment and Dewatering Processes

Sludge Holding Tanks

The Sludge Holding tanks which contain both Primary and SAS sludge then feed the HPH process for treatment. After treatment then flows on to 2/ Digesters, continuing on to be de-watered via 2 * Dewatering Centrifuges

Returned Liquor

The Returned Liquor Is pumped to an Ammonia treatment plant (Amtreat) before it is returned to the head of the Fine Bubble process for treatment.

Sludge Storage Tanks

All the sludge on site from the old and new works, Primary and SAS, are mixed in these tanks.

Boiler

There are 2 Steam Raising boilers used to provide heat for the HPH and Digester Process. This is supported by an odour control system.

Gravity Belt Thickeners

One of the two Gravity Belt Thickeners thickens the combined SAS before pumping onto the Sludge Storage Tank. This process is supported by an odour control system.

Thickening Centrifuges

The combined Primary, Imported and Thickened SAS is processed through the Thickening Centrifuges and then pumped into the HPH Process. This process is supported by an Odour control System

HPH Process

Thickened sludge is processed through the HPH process in a batching sequence. It is first heated to 40 degrees in the heating tank. From here it is pumped into one of two pasteurisers over a period of 6 hours. At the same time the remaining Pasteuriser is held for 5 hours at a temperature of 57 degrees. It is then pumped to the hydrolysis tank. This is repeated every 6 hours. From here it is pumped to the two digesters on site.

Digesters Sludge from the HPH processes feed into the two digesters. This is held for a minimum of 13 days at a temperature of over 36 degrees.

Dewatering Centrifuges

Digested sludge from the Post Digester Tanks are mixed with polymer and de-watered via one of two dewatering Centrifuges. Supernatant Liquor returning to the Head of the Old Works via the Amtreat Plant and the Sludge Cake is held on a cake pad.

Dewatering bund

A bund has been installed under the dewatering centrifuges in case of overspill from conveyors on start up. This is to monitored and cleaned on a weekly basis to reduce odours.

Cake Pad

Cake is removed in by RES to agricultural land for spreading.

Modelling

The frequency of wind direction and the distance to the nearest properties are key factors in determining likely odour impacts.

Odour modelling has been commissioned for this site as part of the IED permit application – refer to this for more information (Basildon Odour Modelling Report). Wind rose and information generated for the bio-aerosol risk assessment have been used to determine the direction of any potential odours released from the site (Basildon Bioaerosol Risk Assessment).

The model was run using the meteorological 2018 to 2020 years to test the variability of the odour concentration results among the different years.

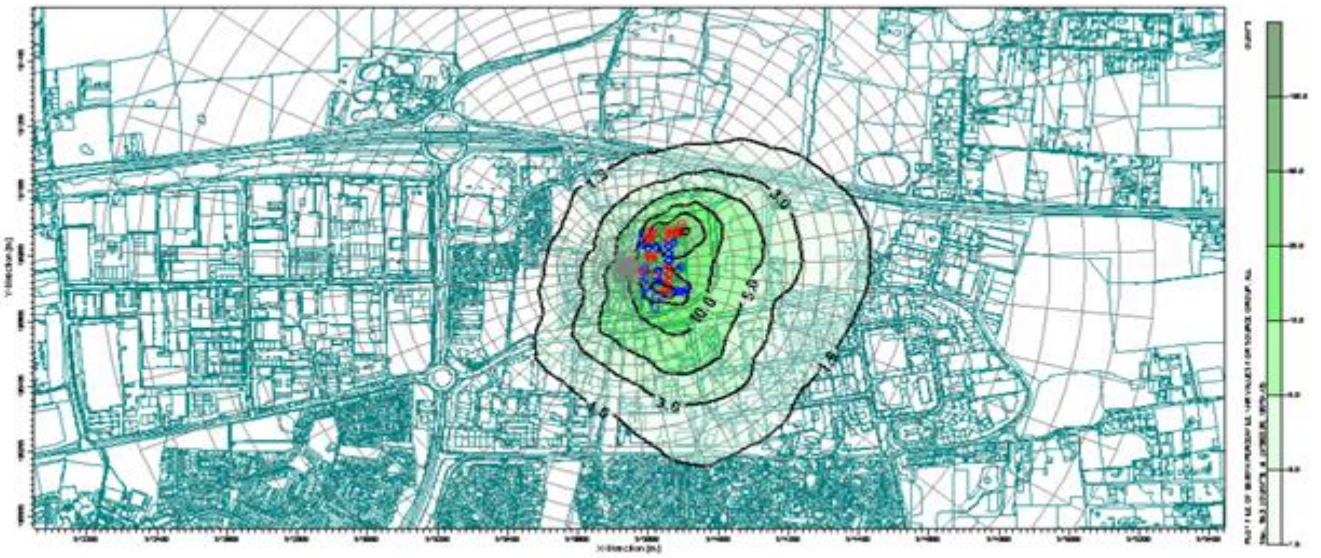
On any future odour modeling report this is how the odour offensiveness will be categorised. In the odour modelling report these contour lines are shown for the odour concentrations of 1.5, 3, 5, and 10 OUE/m3. The significance of these odour concentrations is explained below:

- 1 OUE/m3 is the level of odour detection under laboratory conditions.
- 3 OUE/m3 is the level of odour detection in open environment. Complaints are unlikely to occur and exposure below this level are unlikely to constitute significant pollution.
- 5 OUE/m3 is when odour becomes detectable & recognisable. Complaints may occur and de-pending on the sensitivity of the locality and nature of the odour.
- 10 OUE/m3 is when odour becomes distinct and intrusive. Complaints are highly likely and odour exposure at these levels represents an actionable nuisance.

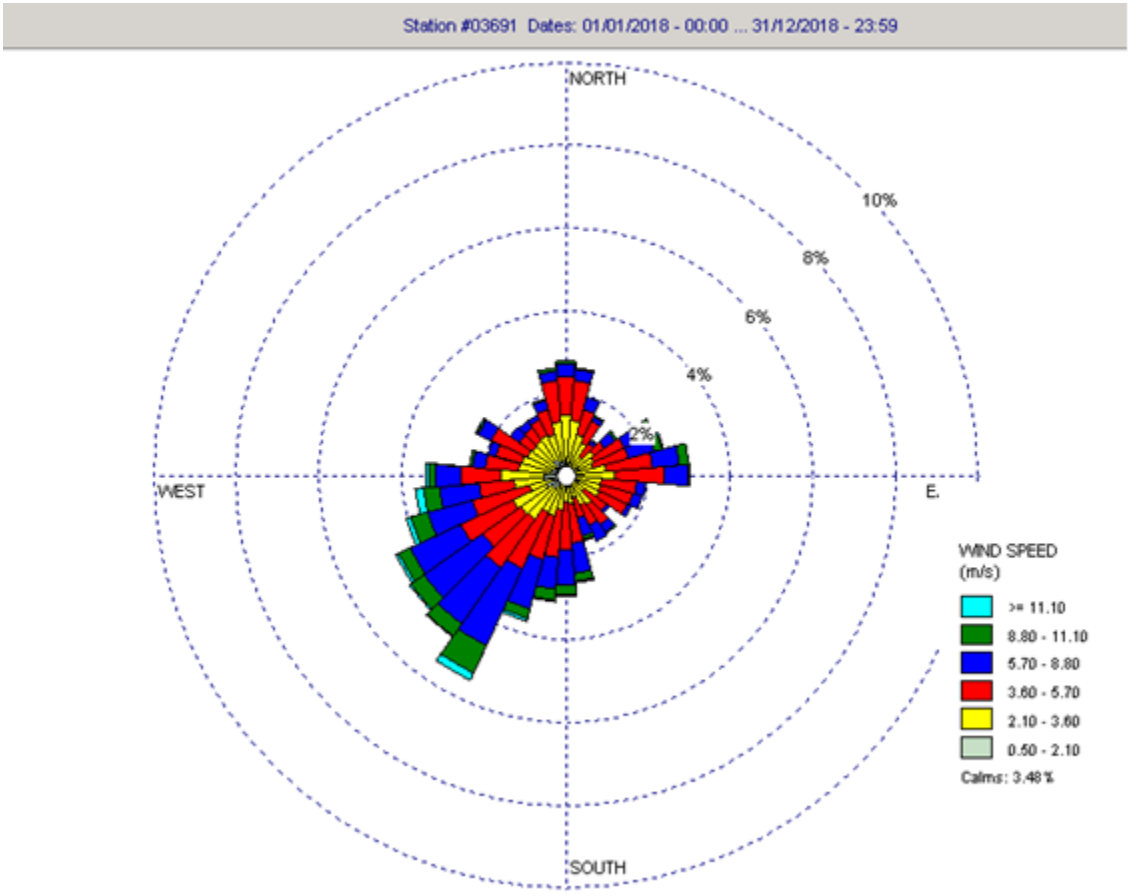
An odour concentration of 1.5 Odour Units Per Cubic Metre (OU/m_3) has been taken as the benchmark level at which nuisance and potential loss of amenity would be anticipated. This assessment criterion for the protection of public nuisance/amenity is in line the Environment Agency (EA) H4 Planning Guidance,

including septic effluent and sludge in amongst a range of substances categorised as most offensive and for which a low detection threshold should be taken into consideration.

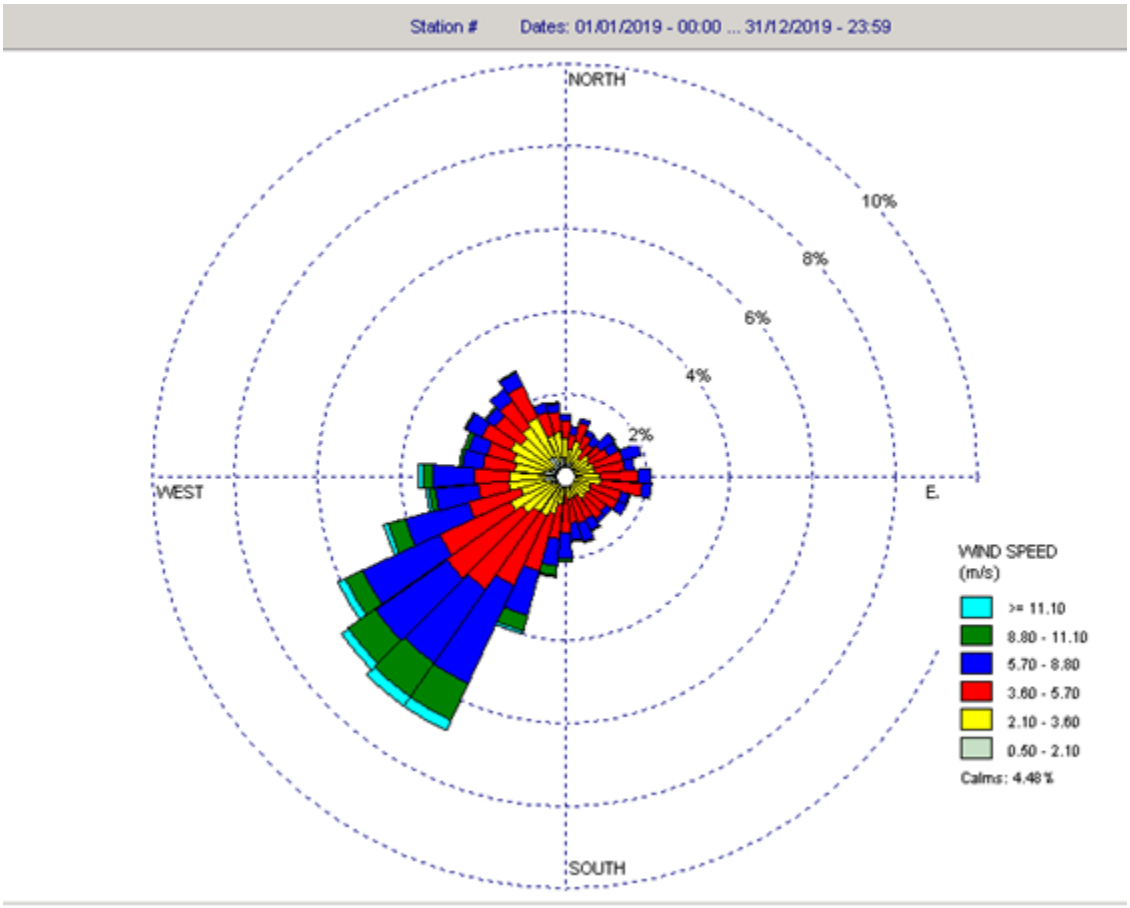
This is the model output using prevailing wind direction and current site operations. This highlights the key customers likely to be impacted when odour leaves site. No significant changes to operations have taken place since the modelling was undertaken.



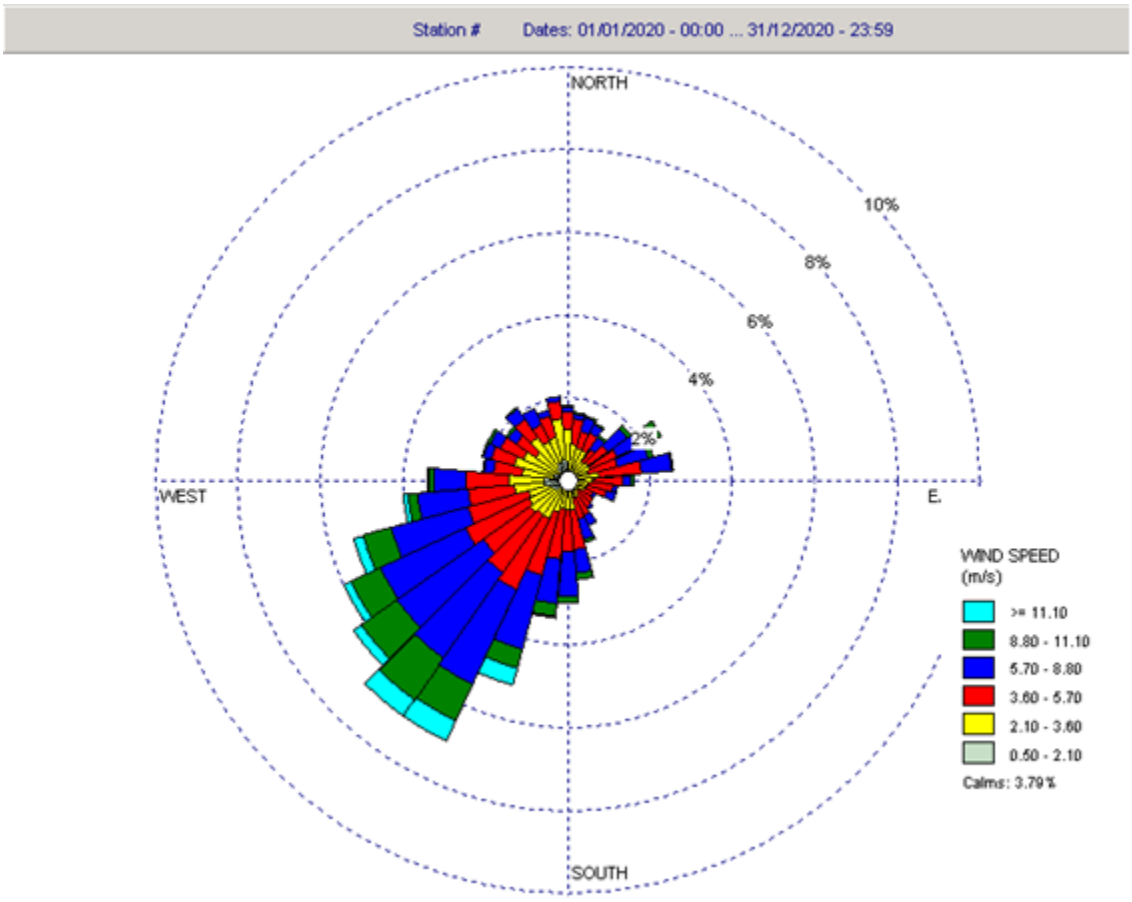
Wind Direction



2018 wind rose for Southend Meteorological Station



2019 wind rose for Southend Meteorological Station



2020 wind rose for Southend Meteorological Station

Sensitive receptors

Receptors sensitive to odour include users of the adjacent land, which may vary in their sensitivity to odour. The level of sensitivity will be defined using the Institute of Air QualityManagement guidance[2]

- High sensitivity receptors e.g. residential dwellings, hospitals, schools/education andtourist/cultural.
  - users can reasonably expect enjoyment of a high level of amenity; and
  - people would reasonably be expected to be present here continuously, or at leastregularly for extended periods, as part of the normal pattern of use of the land.
- Medium sensitivity receptor e.g. places of work, commercial/retail premises andplaying/recreation fields.
  - users would expect to enjoy a reasonable level of amenity, but wouldn't reasonablyexpect to enjoy the same level of amenity as in their home; or
  - people wouldn't reasonably be expected to be present here continuously or regularly forextended periods as part of the normal pattern of use of the land.
- Low sensitivity receptor e.g. industrial use, farms, footpaths and roads.
  - the enjoyment of amenity would not reasonably be expected; or
  - there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.

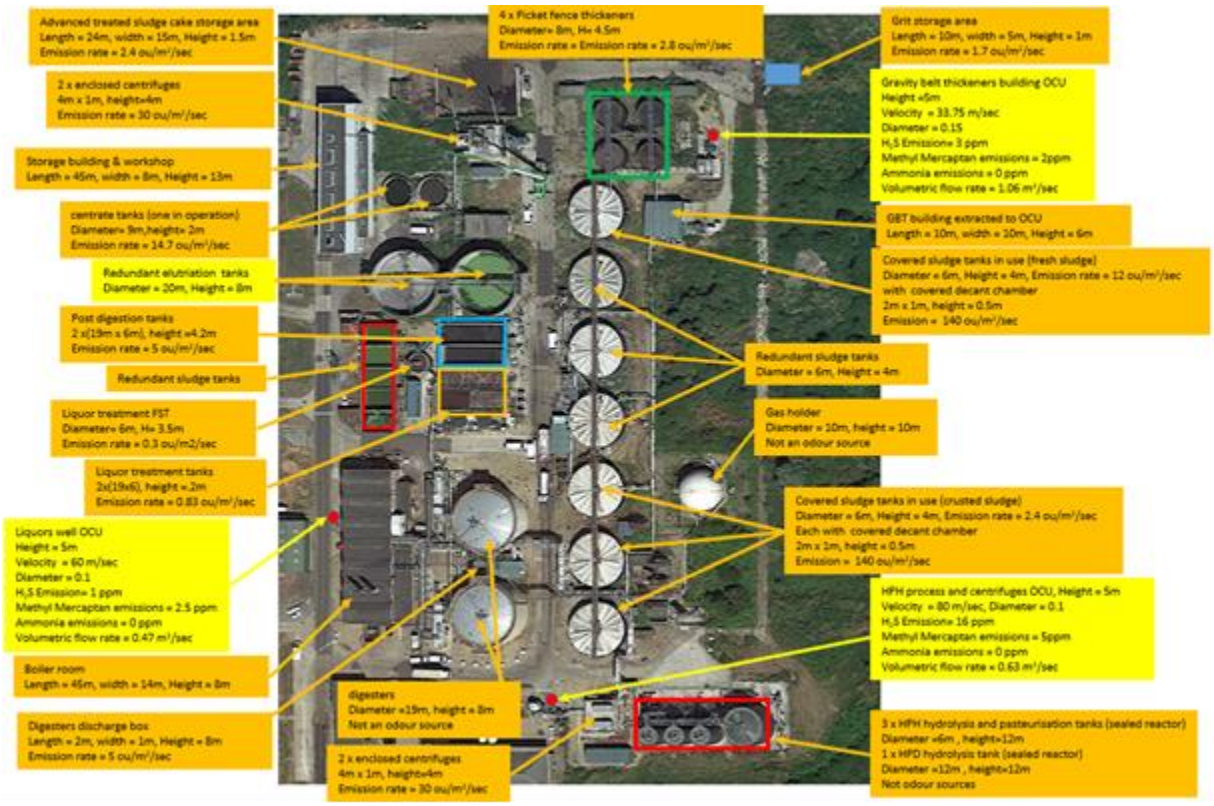
The magnitude of risk relates to:

- Frequency: How often an individual is exposed to odour
- Intensity: The individual's perception of the strength of the 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/Receptor sensitivity: 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.

There are a number of receptors in relative close proximity to the site. The sensitive receptors 500m of the site are identified in the Bioaerosol Risk Assessment (Basildon Bioaerosol Risk Assessment)

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source (a)	Direction of receptor from closest emission source
Sensitive receptors near the Site (places of work, amenity areas)	PSTs	Water Recycling Centre	154	east
	Biofilters	Water Recycling Centre	N/A	
	Aeration lanes	Water Recycling Centre	225	east
	FSTs	Water Recycling Centre	133	west
	Anaerobic digesters	Sludge Treatment Centre	168	West
	Pasteurisation Tank	Sludge Treatment Centre	130	West
	Centrifuge building	Sludge Treatment Centre	107	West
	Hydrolysis Tank	Sludge Treatment Centre	136	West
	HPH Heating Tank	Sludge Treatment Centre	127	West
	Cake storage	Sludge Treatment Centre	**85**	east
	Boilers	Biogas combustion	187	West
	CHPs	Biogas combustion	168	West
	Flare	Biogas combustion	165	West
Residential properties near the Site (residential)	PSTs	Water Recycling Centre	172	North
	Biofilters	Water Recycling Centre	N/A	
	Aeration lanes	Water Recycling Centre	**98**	North
	FSTs	Water Recycling Centre	212	North
	Anaerobic digesters	Sludge Treatment Centre	279	North
	Pasteurisation Tank	Sludge Treatment Centre	364	North
	Centrifuge building	Sludge Treatment Centre	265	North
	Hydrolysis Tank	Sludge Treatment Centre	381	North
	HPH Heating Tank	Sludge Treatment Centre	353	North
	Cake storage	Sludge Treatment Centre	263	North
	Boilers	Biogas combustion	251	North
	CHPs	Biogas combustion	267	North
	Flare	Biogas combustion	354	North
Amenity area near the Site	PSTs	Water Recycling Centre	294	east
	Biofilters	Water Recycling Centre	N/A	
	Aeration lanes	Water Recycling Centre	345	east
	FSTs	Water Recycling Centre	385	east
	Anaerobic digesters	Sludge Treatment Centre	408	east
	Pasteurisation Tank	Sludge Treatment Centre	496	east
	Centrifuge building	Sludge Treatment Centre	**334**	east
	Hydrolysis Tank	Sludge Treatment Centre	507	east

Receptor	Nearest potential emission source to receptor	Process	Distance (m) from nearest potential emission source (a)	Direction of receptor from closest emission source
	HPH Heating Tank	Sludge Treatment Centre	490	east
	Cake storage	Sludge Treatment Centre	326	east
	Boilers	Biogas combustion	400	east
	CHPs	Biogas combustion	395	east
	Flare	Biogas combustion	471	east



Monitoring odour on WRC & STC site

The site has a number of potential odour sources. We will undertake sampling every 2 weeks and as needed assessments, of the odour on site. This will be recorded on one of two documents:

- Potential Sources Sampling Log

- Complaints Investigation Sampling Log

The site has access to, and uses the following methods to assess the odours detected on site:

- SNIFF trained personnel
- Operational staff detecting differences

The site has had an odour model completed for its current operational activities. This, along with onsite knowledge, has been used to generate the potential odour sources list referenced in the maps earlier.

Causes of odour on site

As an operational site dealing with an inherently odorous material it is to be expected that fluctuating odour levels will be detected when changes to the operational activities, or other disturbances in the process occur. This section will detail, using operational, local and scientific knowledge, areas that we feel should be checked first; together with an explanation for the management control and considerations in each case. This is not an exhaustive list and in some cases further investigation will be required.

	Potential Odour Source	**Causes to consider**	**Control steps to take immediately**
1	High and low level Inlet	Dosing Failure from Networkl Trade Effluent Effluent Discharge	Contact and notify Maintenance Manager/MST of potential dosing failure Notify Catchment Quality Scientist of potential discharge
2	PSTs	Carrying too much sludge in PSTs	Check operation of Desludge and adjust as required
3	PST Outlet (above weir)	Carrying too much sludge in PSTs	Check auto desludge system is operating Desludge as soon as space is available
4	Import Septic Sludge	Septic Sludge	Check Covers Temporary Seal if required
5	(Behind) Gas Bag	Gas escaping	Isolate gas bag and flare and contact CHP team
6	Huber Thickening area	Failure of OCU	Clean up of belt room Maintenance of belt Maintenance of OCU

		Operation of belt causing build-up of thickened sludge Cleanliness of belt room	
7	SAS belt room and centrifuges	Failure of OCU Operation of belt causing build-up of thickened sludge Cleanliness of belt room	Clean up of belt room Maintenance of belt Maintenance of OCU
8	Amtreat plant	Failure of the amtreat process	Reseed using MLSS from another site Maintenance to repair equipment
9	Storm tanks	Material in storm tanks	Clean storm tanks
10	HPH	Escape of sludge Whesso's in operation	Cleaning up after breakdown/escape of sludge Investigate why Whesso is in operation and take appropriate action

WRC/STC Management decisions involved

The site is operated to maximise efficiency and to ensure compliance with various operational and regulatory thresholds.

Some of the operations on site may, inadvertently, cause an odour to escape, however, this is unavoidable in these circumstances. An example of this would the Whesso valves operating to relieve the pressure in the gas system to prevent health and safety problems. Our primary concern must be health and safety where our gas systems are concerned. Venting gas through Whesso valves also means we lose the value of that gas. If these valves operate it would be for as short duration as possible and the odour should be minimal although unavoidable.

When investigating odour on the site it may become clear that the odour arising is caused by an off-site asset, for instance if there is a septicity issue in the network. This can occasionally be caused by a change in the dosing operations within the network and if it was identified as a septicity issue this would be passed the relevant team within the business and would be removed from site operational control. The

solution to this would be to review the dosing. There are a number of factors involved in this assessment and it is outside the site management ownership.

This section will be continually reviewed to address any longer term management changes that may impact the odour profile of the site.

All monitoring procedures will still be carried out should the above become necessary.

All site operatives will be briefed on this plan & any amendments or revisions that may be made.

This plan is one route of on site management. Some issues will be raised as part of Gas management, Fire risk management and other operational controls. If they have no direct link to odours they will not be included as potential sources, but could be discovered as the root causes in any investigation.

WRC/STC Mitigation on site

To manage odour on site it is required that we understand the profile of the odours.

To that end a model has been carried out, extracts of which have been shared in this document. Any major operational shifts will be run through the model to ensure that the impact on odour is not unforeseen and appropriate mitigation can be included. However it is not practical to run the model for all operational changes.

It is acknowledged that at times it is difficult for operational staff to detect odour changes, however where this occurs, or where the routine investigation highlights an issue, or a complaint is received the site personnel will assess the odours off-site and at the boundary for the segment in which the odour occurs as detailed in the map earlier in this plan.

The intention of this segmented approach is to ensure that there is a recordable odour present in the area of concern and back track the source to our site. This will also involve the wind direction being considered. If the odour is close to the boundary of a segment and the wind direction indicates there is some chance of the odour crossing segments it is expected that the operative carrying out the assessment will include the second segment in their assessment.

All staff will be briefed on this new process and it will be routinely carried out and discussed.

Maintenance and monitoring requirements in relation to the odour control systemto be undertaken at the site including daily/weekly/monthly/annual checks and servicing (links to log books and check sheets to be included)

Emission Point Type	Parameter	Monitoring Frequency	Monitoring standard or method
Channelled emission to air (biofilter and scrubbing system	Ammonia	Once every 6 months or more frequent if stated in the permit.	Emissions of pollutants into the environment through any kind of duct pipe stack etc. As per design and manufacturer's specifications EN ISO 21877
	H_2S		CEN TS 13649 for sampling NIOSH 6013 for analysis
	Odour concentration		BS EN 13725
	Efficiency checks	Annual	Annual report detailing the removal efficiency of all abatement systems and planned maintenance including media health air flow distribution and emissions removal efficiency BS EN 13275
	Media moisture andgas flow temperature	Weekly	Recorded using a moisture meter and temp probe
	Gas stream flow	Continuous	As per design and manufacturer's specifications
	Surface condition	Weekly	Visual assessment
	Thatching and compaction	Weekly	Back pressure

Communications

On receiving a customer complaint we will follow our code of practice.

We will communicate planned activities with the potential to cause odours and any other identified issues on-site, to the following;

Environment Agency	General Enquires	environmental.health@essex.gov.uk
Anglian Water Customer Liaison Manager	Customer Issues	CustService@anglianwater.co.uk
Anglian Water Customer Liaison Team Leader	Emma Crush	eCrush@anglianwater.co.uk
	Victoria Skipp	vSkipp@anglianwater.co.uk

Version History

This plan will be reviewed annually with the WRC, STC and Compost teams.

Version	Updated by	Updated on	Changes made
Version 1	Roger Babington	December 2011	
Version 2	Roger Babington	June 2013	
Version 3	Philip Seamons	February 2016	
Version 4	Philip Seamons	November 2017	
Version 5	Philip Seamons	April 2019	
Version 6	Philip Seamons	November 2021	
Version 7	Philip Seamons	December 2023	