ADM Erith (UK)

Odour Management Plan 2021

March 2022

Project No.: 0584457

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Document details	The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.
Document title	ADM Erith (UK)
Document subtitle	Odour Management Plan 2021
Project No.	0584457
Date	18 June 2021. Amended March 2022
Version	Final Version
Author	Yves Verlinden, Chris Hazell-Marshall, Mike Swainson
Client Name	ADM Erith Ltd

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Acronyms and Abbreviations

Name	Description
DAF	Dissolved Air Flotation
DTDC	Desolventizer/Toaster/Dryer/Cooler
EA	Environment Agency
EMS	Environmental Management System
EOL	Edible Oils Limited
FIDOR	Frequency of detection, Intensity as perceived, Duration of exposure, Offensiveness and Receptor sensitivity.
MOS	Mineral Oil System
OAS	Odour Abatement System
OMP	Odour Management Plan
RBD	Refined, Bleached and Deodorised
TO	Thermal Oxidiser
TO&S	Thermal Oxidiser with Scrubber

1. INTRODUCTION

This Odour Management Plan (OMP) has been prepared by Environmental Resources Management Limited (ERM) as part of a permit variation application on behalf of ADM Erith Limited relating to its Erith site ("the Site") and forms part of the overall Site Environmental Management Plan.

This OMP has been written in accordance with the Environment Agency H4 Odour Management guidance[1] (H4) and is intended to address the key potential odour sources within the boundary of the Site.

The site principally comprises a rapeseed edible oil production and processing facility. The facility also produces rape meal as a by-product of the edible oil process, which is sold for use in animal feed, and stores a relatively small quantity of sunflower oil.

The process has a characteristic vegetable odour which is detectable at certain points within and at the site boundary and sometimes beyond. Thermal and solvent treatment of the feedstock also liberates reduced sulphur compounds from naturally-occurring glucosinolates found in rapeseed.

Within ADM's most recent Environmental Permit, issued on 21st December 2005, the following condition on odour is stated:

> *"2.2.6.1 The Operator shall use BAT so as to prevent or where that is not practicable to reduce odorous emissions from the Permitted Installation, in particular by:*
>
> - *limiting the use of odorous materials*
> - *restricting odorous activities*
> - *controlling the storage conditions of odorous materials*
> - *controlling processing parameters to minimise the generation of odour*
> - *optimising the performance of abatement systems*
> - *timely monitoring, inspection and maintenance*
> - *employing, where appropriate, an approved odour management plan*
>
> *…provided always that the techniques used by the Operator shall be no less effective than those described in the Application, where relevant."*

The 2005 permit also included an Improvement Condition ("IP5") as follows:

> *"The Operator shall develop and maintain an odour management plan, summarising the actions to be taken to minimise odour under both normal and abnormal operating conditions with regard to the requirements set out in the Agency Guidance Note IPPC S6.10 Section 2.2.6, Dec. 2002. This plan shall assess the measures that are in place to prevent or reduce odour. Upon completion of the odour management plan a summary of the document shall be submitted to the Agency in writing and shall include time scales for any remedial action required."*

The Agency Guidance Note IPPC S6.10 (2002) is no longer in use in England. A new version was published in 2011, but it includes very little guidance on odour management. The Environment Agency consolidated cross-sector guidance on odour management and control into Horizontal Guidance Note H4 in March 2011 [1]. H4 is the Environment Agency's preferred contemporary guidance on the development and review of odour management plans for English installations.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/296737/geho0411btqm-e-e.pdf

In 2015 and 2018 there were a number of odour events at the Erith facility. These events were partially due to issues with the biofilters and in summer of 2018 coincided with an extended and uncharacteristic weather pattern of high pressure and very low wind speed towards the South West of the site. This resulted in the poor dispersion of odour emitted from the site. These events have been viewed by the Environment Agency (EA) as evidence of the need to review the existing Odour Management Plan[2].

This document has been written to replace the previous ADM Erith Odour Management Plan and is intended to comply with the latest relevant guidance.

[2] ADM Erith, 2006. Odour Management Planning at the ADM Erith Installation. Prepared by Golder Associates, August 2006.

2. OBJECTIVES

The EA summarises its expectations for an OMP in Appendix 4 of the H4 guidance. The Appendix states that:

"OMPs should be designed to:

- *employ appropriate methods, including monitoring and contingencies, to control and minimise odour pollution;*
- *prevent unacceptable odour pollution at all times;*
- *reduce the risk of odour releasing incident or accidents by anticipating them and planning accordingly.*

All OMPs will need to consider sources, releases and impacts, and use these to identify cost-effective opportunities for odour management."

In order to satisfactorily identify primary odour control measures, the scope of ADM's revised OMP includes the following areas from H4:

- Risk of Odour Impacts from Site Activities
  - Inventory of odorous source materials, including descriptions and quantities of solid, liquid and gaseous material.
  - Review of odorous releases on-site, in terms of release characteristics.
  - Consideration of the potential impact of odorous releases – classify the sensitivity of the surrounding area in terms of land-use and receptors.
- Review of Odour Management Controls
  - Review existing documentation relating to the management and physical operating procedures for known odorous activities/locations on-site and review for adequacy. This also includes the review of existing plans outlining the procedures for actions to be taken when odour complaints are received.
- Odour Monitoring Measures
  - Review of existing monitoring measures on-site and recommendation for improvements or new measures to adequately monitor odour.
- Odour Incident Reporting
  - Review of existing ADM documentation relating to the procedures for odour incident reporting and propose new measures to improve the effectiveness.

The following sections of this OMP address these requirements in turn.

3. SITE DESCRIPTION

3.1 Location

To the north of the site is a Tesco distribution centre, with a pond to the north-west of the site boundary, which is understood to have been constructed at the same time as the distribution centre in 2012.

To the south and west of the site are industrial properties and residential properties. The River Thames lies directly adjacent to the east. The nearest residential area is approximately 400m to the south/southwest of the site boundaries, this is unchanged from the original permit application.

3.2 Site Overview

The Site is approximately 6.5 hectares in area, the majority of which comprises buildings and industrial infrastructure, including several buildings used for the manufacturing, processing and preparation of edible oil products.

The Site Layout is presented in **Figure 3.1**.

3.3 Site Activities

3.3.1 General

The site operates continuously throughout the year unless maintenance or process changes are required. Planned summer shutdowns lasting a few weeks are the norm.

The Erith Oil Works installation processes rapeseed to produce rapemeal for feedstuffs and edible rape oils. The site also unloads sunflower oil from ships into storage tanks for transfer (without processing) to the adjacent Edible Oils Limited (EOL) site.

3.3.2 Raw material intake, storage and preparation

All seed coming onto the site by road is received via a registered weighbridge, sampled and checked for quality before unloading to one of two pits and transferred to storage silos via conveyors. Some seed is received from ships via a river jetty. This is unloaded from the vessels by a manually controlled vacuum unloader which sucks seed from the ship and raises it to the conveyor system which transfers the seed to silos. ADM Erith also unload unrefined rape oil occasionally when the Extraction Plant is not running (e.g. during long summer shut). The plant has twelve concrete seed silos, twelve concrete meal silos and one talc silo located near the extraction plant and a Mitchell Silo near the Thames. These silos are aspirated through seven vents (emission points A16 and A22-27).

The seed is transferred from storage silos via enclosed conveyors and elevators to the seed preparation plant. Seeds are screened to remove stalks, chaff and non-vegetable matter. Air from this process is vented to air via air emission point A8 after passing through a fabric filter to control the emissions of particles. The seeds are then conditioned by warming to increase their plasticity. The warmed seed is then flaked to crush and shear the seeds converting them to thin flakes, in which the oil is more accessible. Air from this flaking process is vented from air emission point A9 after passing through fabric filters to control the emissions of particles. The flaked seed is fed continuously to a steam heated tubular rotary conditioner which reduces the moisture content in preparation for pressing.

The heated flakes pass into several screw-presses, which apply mechanical pressure to the flakes forcing out approximately 65% of the available oil. The residual seed cake is transferred to a solvent extractor.

3.3.3 Extraction (distillation and desolventising)

The solvent extractor enables counter-current washing of the remaining oil in the seed cake with the solvent (hexane), to extract more oil from the flakes into the solvent. Once the oil has been removed from the flakes with pressing and solvent extraction has taken place the remaining solids are called meal.

Separation of the oil and hexane is achieved using conventional distillation methods. The oil-solvent mixture (miscella) is separated by evaporation and steam stripping which is carried out in stages. The extracted crude oil is pumped to storage tanks waiting further processing in the refinery. Hexane is recovered and reused.

The plant has twelve meal silos with a total capacity of 12,000 tonnes. The meal is loaded onto trucks and/or ships. Trucks are loaded via two enclosed meal loading bays with the ships being loaded at the jetty.

The meal-containing solvent is desolventised by steam in a vessel called the DTDC (Desolventizer/Toaster/Dryer/Cooler) to remove the solvent from the meal. Hexane is recovered and reused. The meal is dried, cooled and stored, before sale as animal feed.

3.3.4 Refining of oil

The refining process is completed in four stages:

(1) Degumming is a process used to remove oily phosphorus, the crude oil is treated with phosphoric acid and water. The oil is then passed through a centrifuge to remove the unwanted compounds. These compounds known as gums are transferred to the solvent extraction plant where they are added to the rapeseed meal in the DTDC. The free fatty acids remain in the degummed oil.

(2) Neutralisation removes the phosphorous and free fatty acids which naturally occur in the oil. It is treated with phosphoric acid and then a caustic solution. The oil is then passed through a centrifuge to remove the unwanted compounds. These compounds known as soap stock are transferred to the solvent extraction plant where they are added to the rapeseed meal in the DTDC (Desolventizer/Toaster/Dryer/Cooler).

(3) Bleaching removes unwanted contaminants and colour from the oil. Bleaching Earth is added to the degummed or neutralized oil which absorbs the unwanted contaminants. The oil earth mixture is then filtered via bleach filters. The filtered oil is transferred to the deodorization process and the used bleaching earth is pumped to the extraction process.

(4) Deodorising is the final step in the refining process and removes odour, taste and other unwanted compounds. If degummed oil is the feedstock, the deodoriser would also remove the free fatty acids. Steam is used to strip the unwanted compounds from the feed oil. This steam distillation is carried out at high temperature and low vacuum to protect the oil from oxidization. The finished product (Refined, Bleached and Deodorised – i.e. RBD oil) is transferred to holding tanks where the quality is checked before being transferred to storage tanks for dispatch. The stripped compounds are cooled to form distillate which is transferred to a storage tank and shipped as a by-product.

The refinery has ten large storage tanks with a total capacity of around 13,350 tonnes and ten process tanks with a total capacity of around 1,800 tonnes.

3.4 Sensitive Receptors

Potential odour receptors around the facility comprise a mix of predominantly low sensitivity industrial units immediately surrounding the site, and residential properties located approximately 400 metres away to the south, south-west, which are considered to be high sensitivity.

Table 3.1 outlines identified sensitive receptors. These have been split into receptors where members of the public are likely to be present, and those that are commercial or industrial properties, as the latter are generally less sensitive to odours. These receptors are also represented on **Figure 3.2**. The focus of this management plan is primarily on residential areas, particularly the residential properties located on Lower Road, Willis Road, Glendale Road and Battle Road.

Table 3.1: Sensitive Receptors

Sensitive Receptor Number	Receptor	Approximate distance from Site (m)	Direction from Site
Residential Area (public)			
1	Residences - Lower Rd (east)	415	South
2	Residences - Willis Road	420	Southwest
3	Residences - Glendale Road	410	Southwest
4	Residences - Battle Road (north)	500	South
Other sensitive (public) receptors, schools, leisure and retail			
5	Carousel Cafe Belvedere	470	North
6	Bulbanks Medical Centre	360	Southwest
7	St John Church, Erith	520	South
Commercial/Industrial (employment)			
8	Erith Tesco	0	North
9	Ocado CFC4	130	Northwest
10	Edible Oils	0	South
11	Ocado GMDC	270	South
12	Sharvatt Woolwich Ltd - Timber Merchants	350	West

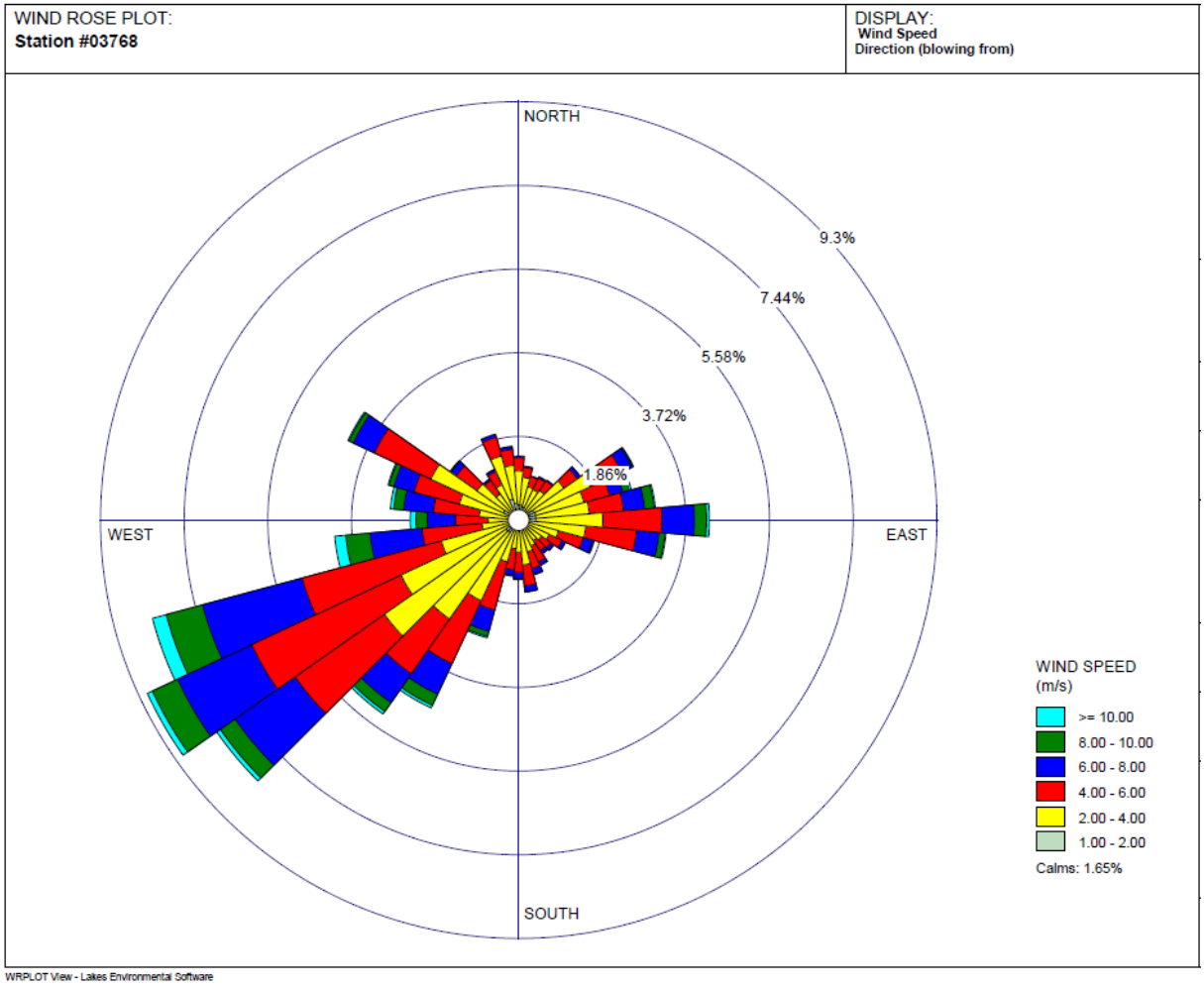
Figure 3.1: Site Layout Plan

Figure 3.2: Site Context - Sensitive Receptors

3.5 Wind Direction

A wind rose from London City Airport for the years 2016-2020 inclusive is illustrated in **Figure 3.3**. London City Airport is considered to be the closest, most applicable meteorological site to the Erith facility. This clearly shows the prevailing wind direction at the site from the five years of data to be from the south-west, which would direct any odour emissions over the River Thames towards the Rainham Landfill site to the east. A smaller proportion of the annual wind direction however does feature from the east/north-east, which may affect the residential properties to the west and south-west.

Figure 3.3: Wind Rose from London City Airport (2016-2020)



4. ODOUR RISK ASSESSMENT

4.1 Odorous Releases On-Site

Emissions testing has identified numerous compounds within the exhaust streams, including a number of potentially odorous sulphur compounds including hydrogen sulphide and dimethyl sulphide amongst others. These are or will be emitted mainly through the following primary, controlled odour emission point sources (see **Figure 4.1**):

- Emission point A10 - Odour abatement system exhaust
- Emission point A28 – New thermal oxidiser with scrubber (replacing old thermal oxidiser, emission point A13 in Q4 of 2021)
- Emission point A14 - DTDC (rapemeal dryer, toaster, deodoriser and cooler) which exhaust through a biofilter.

In addition to the point sources listed above, in the event the exhaust from the MOS bypasses the thermal oxidiser/scrubber system (A28, more details provided in **Section 4.4**), and is instead routed to emission point A14, increased amounts of H_2S are released.

4.2 Sources of Odour On-Site

Due to the nature of the operations at the site, fugitive sources of odour are naturally present to varying degrees at different stages of the process. An inventory of potentially odorous substances brought to or produced on-site is summarised in **Table 4.1** below.

The strongest continual source of odour on-site is the MOS. Continuous odours are also associated with the rapemeal extraction process (Desolventizer/Toaster/Dryer/Cooler (DTDC)).

Some intermittent odours are associated with on-site wastewater, generally when the treatment works periodically extracts the solids from the split box, or if the sludge dewatering system is over-loaded and not functioning properly. These emissions are limited to about one hour and occur <10 times per year.

Slight odours also arise on-site due to the storage of refined and crude rapeseed oil, with intermittent odours particularly occurring when the covering nitrogen blanket in the silos is displaced during loading and unloading.

Figure 4.1: Emission Points

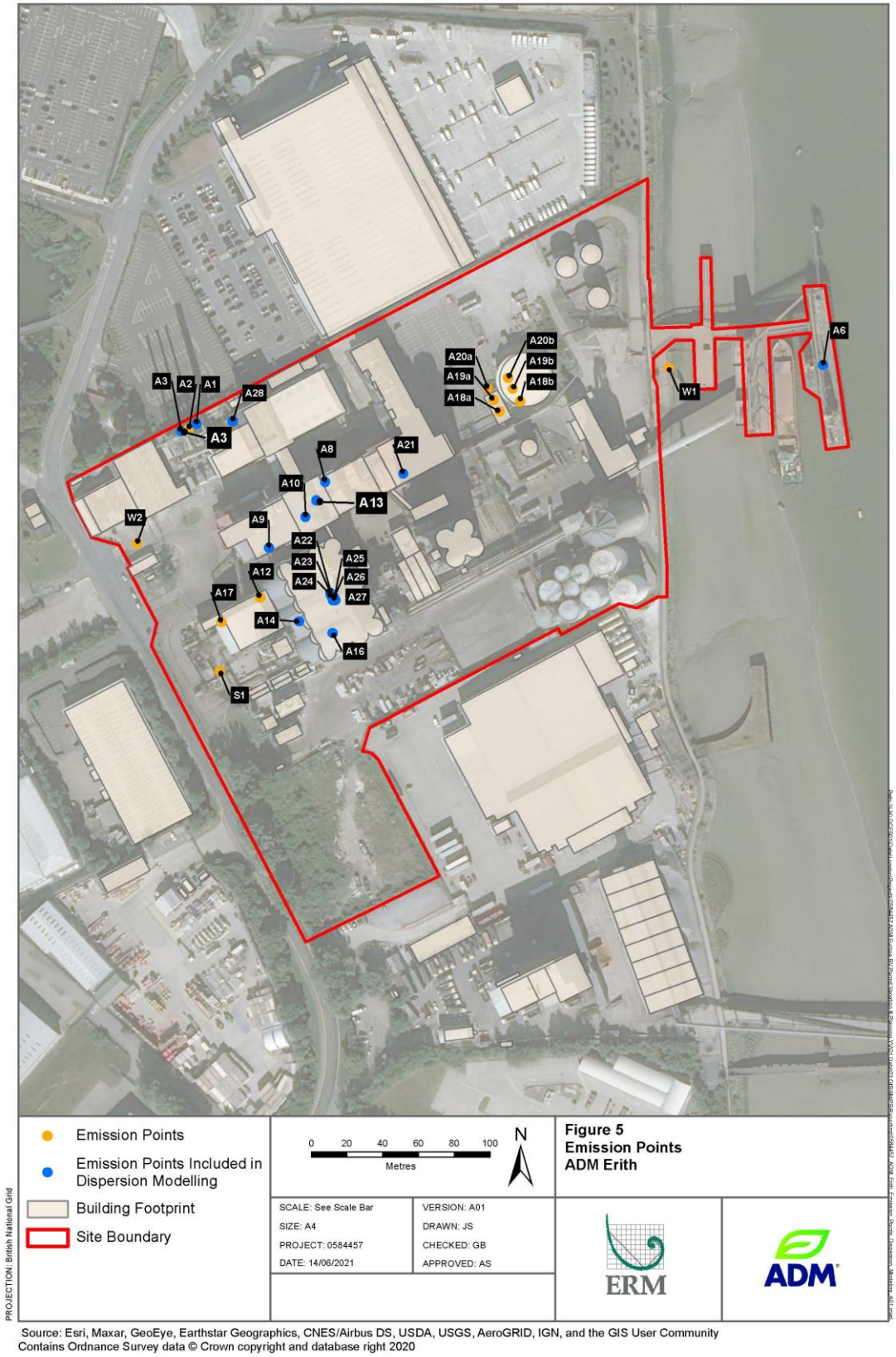


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Table 4.1: Inventory of Odour Sources On-site

Potential Odour Source	Odour Description	Odour Intensity*	Odour Release Pattern	Additional Comments
External Sources				
Ship loading	n/a	Unknown, but expected to be low	24 hours	To be confirmed during walkover survey during loading. May impact users of Thames riverside and marine amenities.
Grain Silos	n/a	0	n/a	Not aspirated – no odour observed.
Distillate tanks	Vegetable-type odour	2	Monthly	Filled slowly until a tanker is required to remove the contents
Wastewater Treatment Works	Putrescible waste	1-3	1-2 hour peak when clearing out solids	Generally no odour, but when emptied periodic short-term odour.
Refined (rapeseed) oil tank	Vegetable-type odour characteristic of rapeseed	2	Intermittent	Periodic release of odour when covering nitrogen blanket is temporarily displaced during unloading
Crude (rapeseed) oil tank	Vegetable-type odour characteristic of rapeseed	2	Continuous	As above
Rapemeal bay loading	n/a	0	Intermittent	Not considered to be odorous.
Spent bleaching clay storage	Faint decomposing matter	Spent bleaching clay storage	Faint decomposing matter	Faint odour due to uncovered waster material in skips. Plans to cover all skips
Waste vegetable oil & solvent hoppers		0	Continuous	No detectable odour – only very faint when hoppers filled/emptied
Storm-water sump	Sulphur	1	Continuous	Very faint odour by gatehouse. Expected to peak during dry, warm weather
Sludge dewatering	Putrescible waste	4	Intermittent	Audit observed excessive water during malfunctioning process resulting in strong odour. Located close to the Church Manorway public footpath
Dissolved Air Flotation (DAF) Unit	Decomposing suspended solids/oils	2	Continuous	Faint odour detected from this open-air source next to Church Manorway boundary. Regular maintenance is essential to prevent offsite impacts
Rapemeal extraction (DTDC)	Solvent / cooking cereal	3	Continuous through fugitive process releases	Cyclones and knockout pots, with exhaust vented to A14 bypass if biofilter down. Large quantities of hexane used but removed to ppm levels through condensation and mineral oil absorption. Some hexane slippage will occur in exhaust however

Potential Odour Source	Odour Description	Odour Intensity*	Odour Release Pattern	Additional Comments
Biofilters (x6)	Faint decomposing organic matter	2	There should not be odour unless containment fails	Normally no odour, unless a biofilter roof fails, releasing odorous water vapour
		Internal Sources		
Seed hoppers	Vegetable-type odour characteristic of the rapeseed oil production process.	2	Continuous	
Shaker floor	Vegetable-type odour, however more pronounced than seed hoppers	3	Continuous	
Mineral Oil System	Vegetable-type odour	5	Continuous	Very strong, although not offensive odour emanated from the whole process
Extraction vessels	Putrescible waste	3	Continuous	The open meal vessels are vented to the odour abatement system (wet scrubber), but some odour can still be present in the building.
Deodoriser	Putrescible waste	3	Continuous	Flashes off residue under vacuum with distillate residue after neutralisation & bleaching
Neutralisation & Bleaching	Very strong putrescible waste	5	Continuous	Unwanted fatty acids in oil reacted with phosphoric acid and then a caustic solution to form “soap stock” after passing through a centrifuge. Bleaching Earth added to absorb the unwanted contaminants. Very strong odour through open adjacent external shutters

* Odour Intensity Scale: 0 – No odour; 1 – Very faint odour; 2 – Faint odour; 3 – Distinct odour; 4 – Strong odour; 5 – Very strong odour; 6 – Extremely strong odour (Ref: German Standard VDI 3882, Part 14)

4.3 Odour Characterisation

Since a lower intensity of a less pleasant odour may cause similar nuisance to a higher intensity of a more pleasant one, the EA, in its H4 guidance, has set out three criteria for different hedonic tones as a threshold for potential nuisance. The hedonic tone indicates how pleasant or otherwise the odour may be.

Based on **Sections 4.1** and **4.2**, emissions of H_2S will be the primary focus of this OMP, and the most stringent hedonic tone will be used, which relates to the least pleasant odours.

4.4 Dispersion Modelling

Within the framework of the Permit Variation Application, dispersion modelling[1] of H_2S emissions from the Site has been performed to predict potential impacts to human health but also to predict potential risk of odour nuisance. Three scenarios were modelled:

Scenario 1) Current normal operations, with following H_2S point emission sources:

- scrubber of odour abatement system (OAS) emitting through A10;
- MOS exhaust treated by existing thermal oxidiser, emitting through A13;
- biofilter of DTDC emitting through A14;

Scenario 2) Future normal operations, with following H_2S point emission sources:

- scrubber of odour abatement system (OAS) emitting through A10;
- MOS exhaust treated by new thermal oxidiser/scrubber emitting through A28;
- biofilter of DTDC emitting through A14;

Scenario 3) Bypass events. The difference between future and current bypass lies with duration and frequency of the events which are expected to decrease considerably. The nature of emissions (immediate mass flow, flow parameters and emission points), and consequently the dispersion modelling input, are however identical with regards to H_2S. Future frequency and duration of events has been estimated by ADM based on knowledge of current MOS operational performance and the design of the new TO&S. This scenario involves following H_2S point emission sources:

- scrubber of odour abatement system (OAS) emitting through A10;
- MOS exhaust bypassed to A14 without treatment;
- biofilter of DTDC emitting through A14.

These scenarios assume the least favourable dispersion conditions based on five years of weather data (2016-2020) and is therefore conservative. The model is used to estimate potential maximum concentrations in Odour Units per cubic metre (OU/m^3) and the number of hours per year during which the odour assessment criterion may potentially be exceeded. The Odour Unit concentration represents the intensity of a perceived odour and is not related to how pleasant or otherwise the odour may be.

[1] Appendix A in 'ADM Erith Environmental Permit, Substantial Variation Application: Supporting Information Document

As per H4 Guidance, the assessment criterion for odour is based on the 98th percentile of hourly average concentrations of odour modelled over a year at the site/installation boundary (i.e. a maximum of 175 exceedance hours allowed per year). The criteria are:

- 1.5 odour units (OU) for most offensive odours;
- 3 odour units for moderately offensive odours;
- 6 odour units for less offensive odours.

In this case, the most stringent criterion was used, which relates to the least pleasant odours. This most stringent value was chosen to represent potential emissions of H_2S which are generally accepted as having an offensive odour. A concentration of one 'odour unit' per cubic metre (OU/m^3) is defined as the odour detection threshold which for H_2S according to WHO[1], falls between 0.2 and 2µg/m^3. For information, the identification threshold falls between 0.6 and 6µg/m^3. For the purposes of this AQIA, one OU/m^3 has been defined as 1.1µg/m^3 for H_2S, i.e. the mean of the WHO range for the odour detection threshold.

The modelling results (see **Figure 4.2** to **Figure 4.5** and **Table 4.2**) indicate the following for:

- current normal operations (scenario 1):
  - the odour criterion is predicted to be exceeded >175 hours (>2%) per year (i.e. greater than the maximum allowed under H4 Guidance) in the current situation with a maximum of 2,495 (28%) predicted exceedances per year at the point of maximum impact. The area where >175 yearly exceedances are predicted includes the largely industrial immediate area, and the adjacent Thames River to the east, but also extends to residential receptors to the west (Lower Road, Culing Road, Beltwood Road, Bullbanks Road, Mayfield Road). The maximum predicted number of exceedances at the specifically modelled human receptors for this situation is 251 (2.9%) per year. Based on this the current risk of odour nuisance is considered high;
- future normal situation (scenario 2):
  - the number of exceedance hours is predicted to decrease to a maximum of 263 exceedances (3.0%) per year at the point of maximum impact, which is situated over a small area over the northeast corner off the site and the River Thames, where the number of sensitive receptors should in practice be few. The maximum predicted number of exceedances at the specifically modelled residential receptors is reduced significantly to 38 (0.43%) per year. Based on this the future risk for odour nuisance is considered low;
- bypass event (scenario 3):
  - the number of bypass events following installation of the new TO&S are expected to decrease to a maximum of five events annually with an average duration of one hour as compared to a maximum recorded annual total of 48 hours (2016) and average recorded of 110 minutes per event for the current situation. As this is below the 175 hours allowable, the H4 guidance odour benchmark cannot be exceeded. Taking into account the maximum recorded and expected future bypass hours, the model predicts that the maximum percentage of time during a year in which the odour criterion (1.65µg/m^3) will potentially be exceeded due to bypass emissions is only 0.26% in the current situation and will further decrease to 0.027% in the future situation. Nevertheless, there is a small risk of causing occasional odour nuisance at nearby residential receptors during a bypass event. This risk will be further assessed using the FIDOR method (see **Section 4.5**).

In terms of transient receptors, members of the public may be present along the Thames Path / Thames Cycle Route which is located between the eastern boundary of the facility and the River

[1] https://www.euro.who.int/__data/assets/pdf_file/0019/123076/AQG2ndEd_6_6Hydrogensulfide.PDF

Thames, together with a public footpath being situated on the boundary of Church Manorway to the west of facility.

Whilst it is acknowledged that these boundary locations also have the potential to be affected by odour from the site, given the short length of time members of the public are expected to be in these areas, potential odour impacts in these locations are not considered to be significant or of material consideration.

From the above, the risk of causing odour nuisance at nearby residential receptors is predicted to be negligible during normal future operations. In case of a bypass event this risk will increase, however due to the very limited number of bypass hours, the risk for odour nuisance remains low.

Table 4.2: Predicted H_2S Odour Contribution

Parameter	Unit	AQS	Current – Normal Operations	Future – Normal Operations	Current – Bypass Events	Future – Bypass Events
Maximum Operational hours	h/yr	-	8760	8760	Maximum observed: 48	Maximum expected: 5
Maximum Anywhere offsite						
Odour criterion exceedance	h/yr (%)	175 (2%)	2495 (28%)	263 (3.0%)	Maximum observed: 22.7 (0.26%)	Maximum expected: 2.37 (0.027%)
Maximum affected residential receptor						
Odour criterion exceedance	h/yr (%)	175 (2%)	251 (2.9%)	38 (0.43%)	Maximum observed: 8.10 (0.092%)	Maximum expected: 0.84 (0.0096%)

Figure 4.2: Predicted H_2S Odour Criterion Exceedance Hours – Scenario 1 (Current Normal)

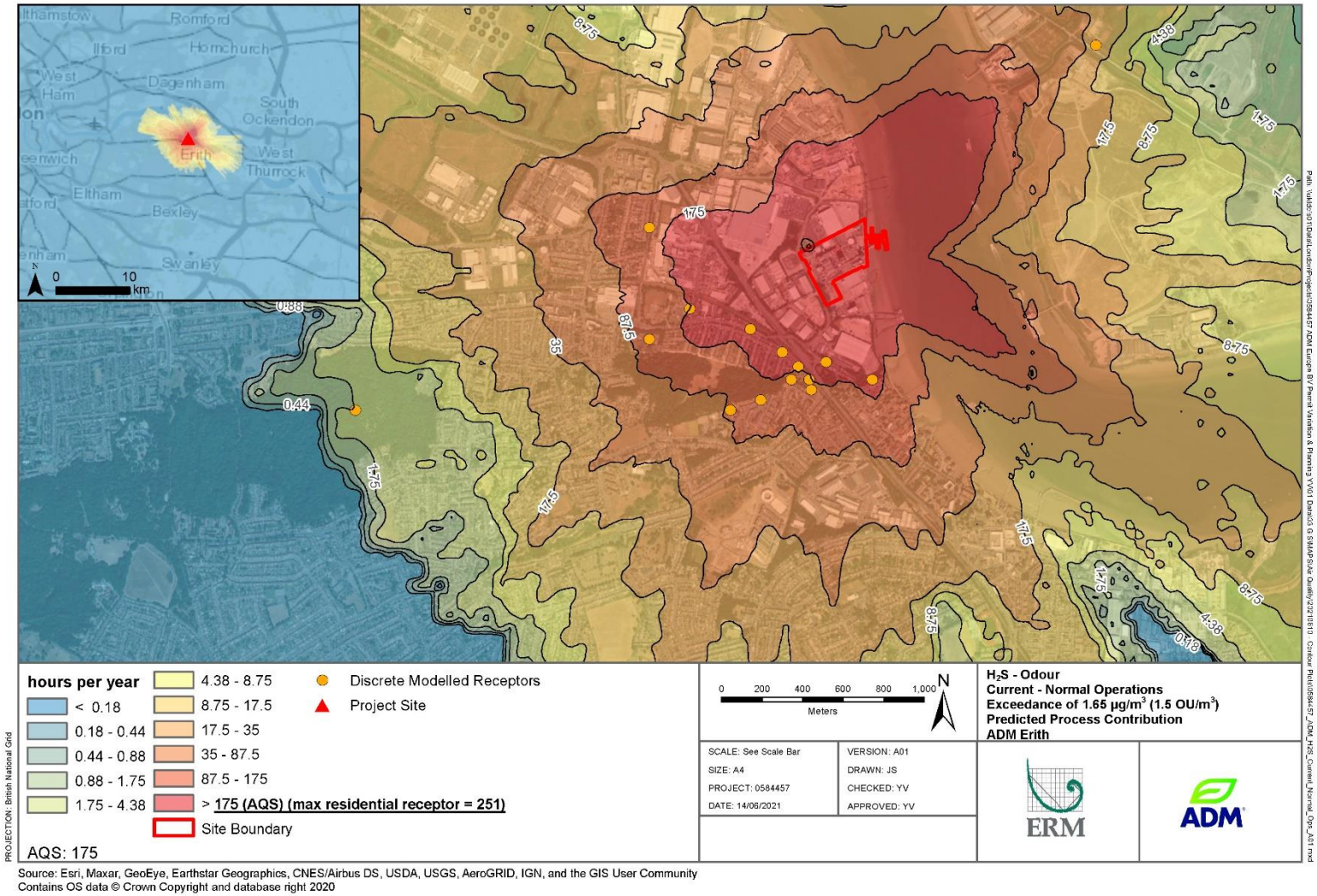

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Figure 4.3: Predicted H_2S Odour Criterion Exceedance Hours – Scenario 2 (Future Normal)

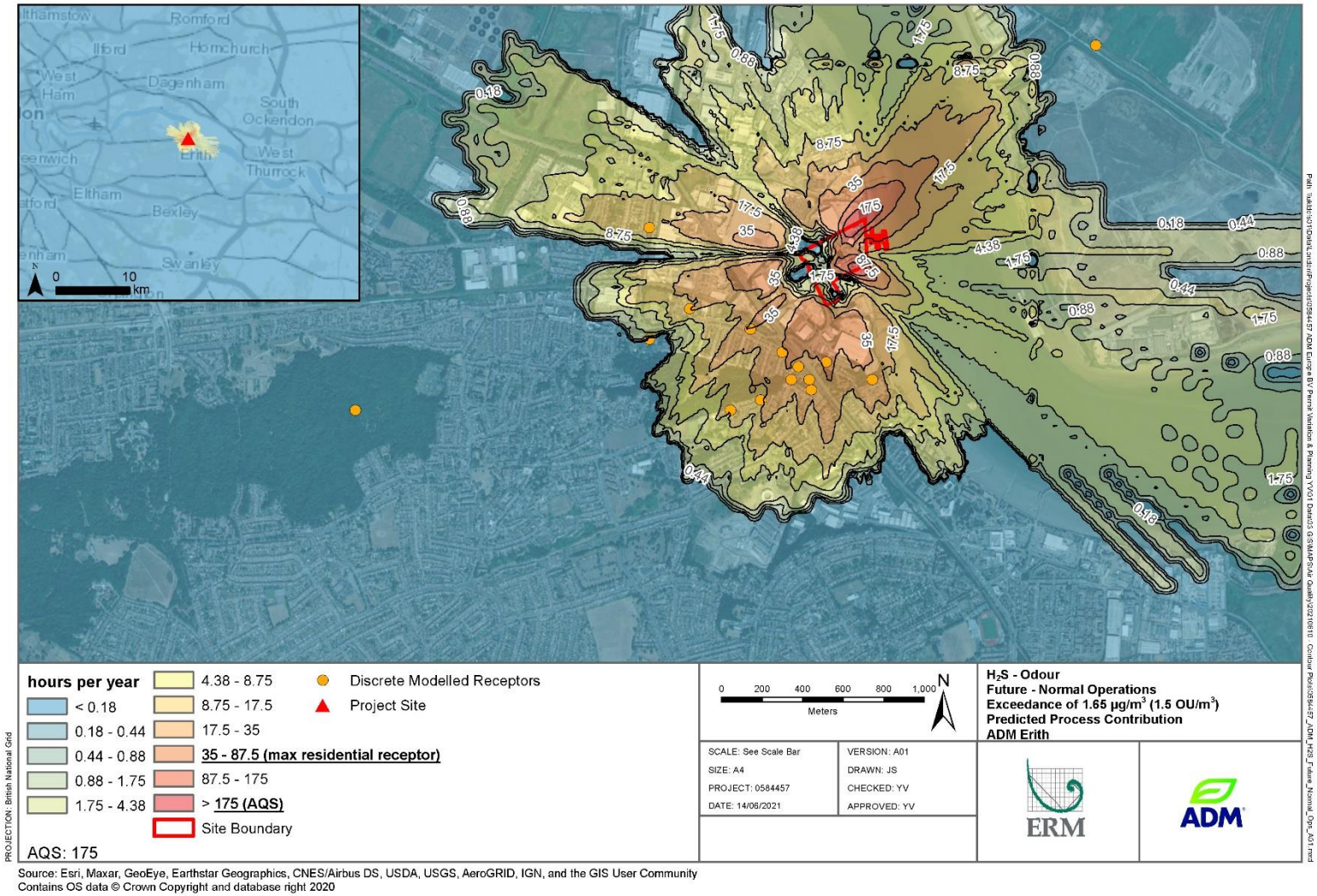

Figure 4.4: Predicted H_2S Odour Criterion Exceedance Hours – Scenario 3 (Current Bypass)

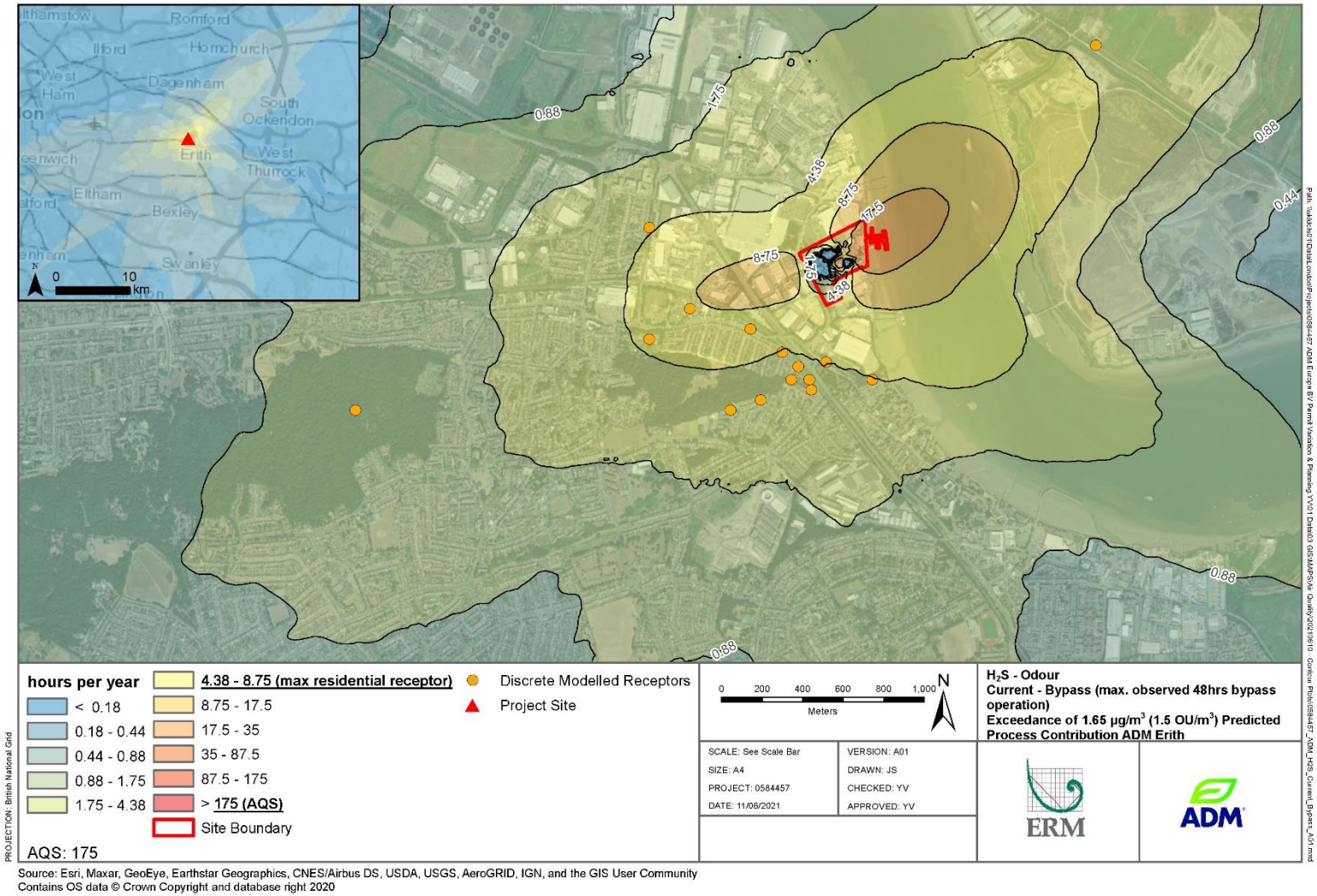

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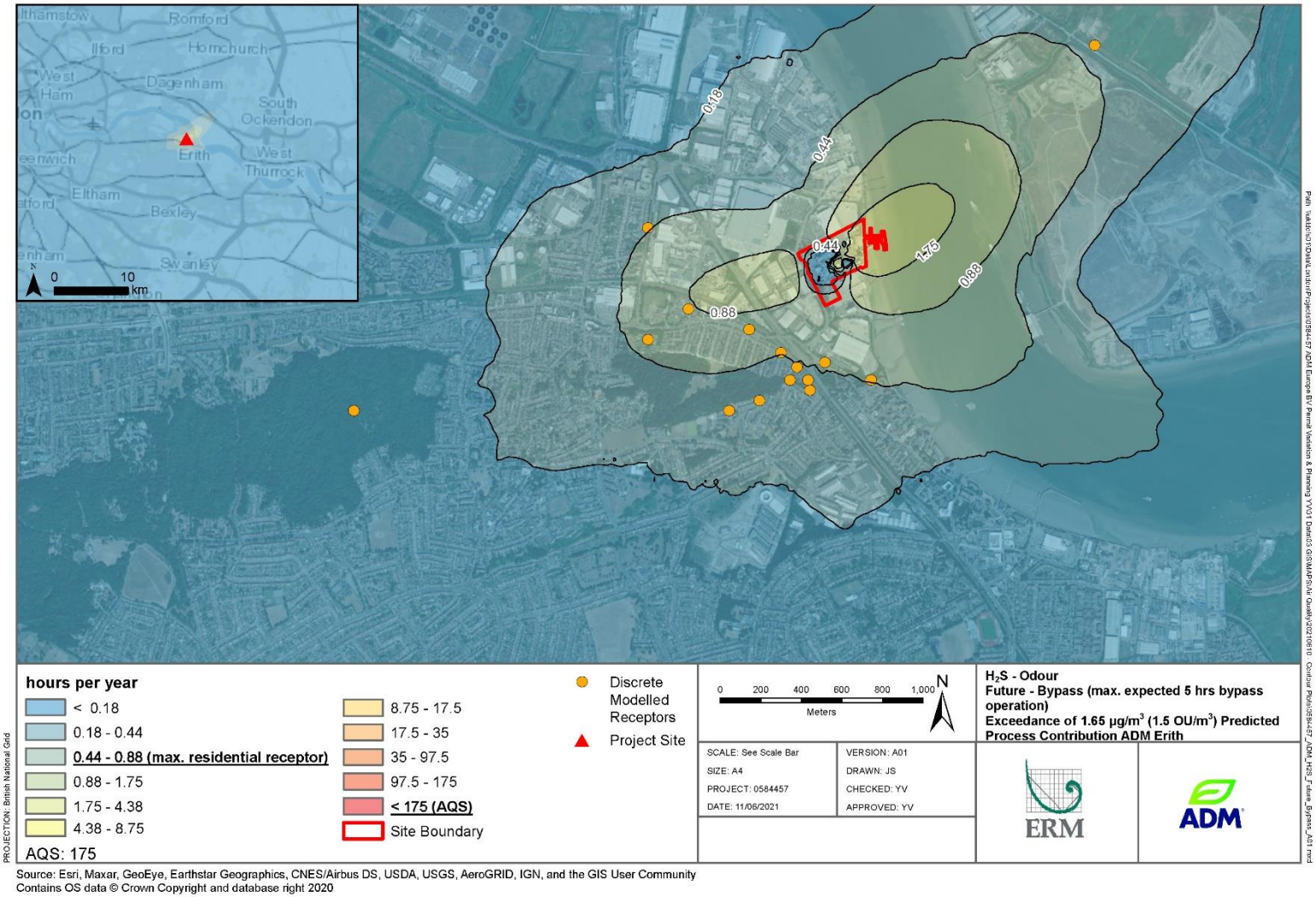
Figure 4.5: Predicted H_2S Odour Criterion Exceedance Hours – Scenario 3 (Future Bypass)



4.5 FIDOR Assessment

As the expected future H_2S process contributions during a bypass event are predicted to exceed the adopted odour criterion (1.65µg/m^3), a FIDOR assessment has been performed specifically for this situation.

Whether or not odour emissions reasonably constitute a nuisance depends on a number of factors. There is no single method of reliably measuring or assessing odour pollution, and any conclusion is best based on a number of lines of evidence.

In order to allow the potential significance of odour impact (source or emission) from a site to be determined, the EA sets out in their H4 guidance the following aspects of odour, commonly referred to under the FIDOR acronym, to be of key consideration:

- **F**requency of detection: can be assessed from emissions and process control data, wind direction data, complaints and odour diaries;
- **I**ntensity as perceived: For new proposals the expected exposure arising from different options can be estimated through, for example modelling as per **Section 4.4**;
- **D**uration of exposure: can be assessed from emissions and process control data, wind direction data, complaints and odour diaries;
- **O**ffensiveness some odours are generally regarded as more unpleasant than others (see **Section 4.4**); and
- **R**eceptor sensitivity: Some receptors are more sensitive than others. Domestic residences, or a pub with a beer garden are more likely to be sensitive than an industrial complex or passers-by. Some individuals will be extremely tolerant of odours at high intensities while others will be unable to tolerate an odour as soon as they identify it. Evidence that, for example, only one person finds the odour unacceptable whereas most others, similarly exposed, find it acceptable in that context (e.g. in a rural village) would be relevant to the assessment of the degree of pollution.

The FIDOR method is qualitative and involves a degree of subjectivity. There is also some overlap between criteria, e.g. intensity relates to concentration, however offensiveness may also increase with concentration. The overall conclusion of low risk is driven by the low expected frequency and duration of future bypass events; just five hours per year.

On the basis of the site context, the sensitive receptors with the greatest risk of odour nuisance are to the west/southwest of the site. This represents the receptors which are upwind for the greatest proportion of the year, but also closest to the site boundary. Residential areas are the most sensitive to odour.

The FIDOR Assessment is presented in **Table 4.3**.

Table 4.3: FIDOR Risk Assessment (Future Bypass)

Sensitive Receptor	Frequency of detection	Intensity	Duration	Offensiveness	Receptor sensitivity	Risk
Residential areas (#1 - 4)	Very infrequent due to large separation distance, low occurrence of events, prevailing wind direction away from receptors	Medium	Short, on average events last for ~ one hour.	Medium	High	Low (due to low expected frequency)
Other non-residential public receptors (# 5 - 7)	Very infrequent due to large separation distance, low occurrence of events, prevailing wind direction away from receptors	Medium	Short, on average events last for ~ one hour.	Medium	Medium	Low (due to low expected frequency)
Commercial and industrial, non-public receptors (#8 - 11)	Infrequent due to low occurrence of events	High (closer to source)	Short, on average events last for ~ one hour.	High (closer to source)	Low	Low (due to low expected frequency)

5. ODOUR RISK CONCLUSION

The plant will generate some odour emissions during normal operations. There are occasional activities that lead to higher odour emissions, most noteworthy the bypass of the mineral-oil exhaust to A14. Following the installation of the new abatement system (new TO&S) on the MOS exhaust, the overall risk of future odour nuisance at nearby sensitive receptors is considered to be low, due to the expected low frequency and duration of bypass events, coupled with the location of the most proximal residential receptors up prevailing wind direction from the site.

The following sections set out how emissions of odour will be managed at ADM Erith.

6. PROCESS CONTROL MEASURES

6.1 Overview

ADM uses a number of processes to abate odour from the Erith Site. These relate to operations within the process buildings and effluent and waste activities located out of doors but within the site boundary. These processes are performed in accordance with prevailing versions of ADM procedures.

All procedures mentioned in this OMP are live documents subject to change in accordance with operational, regulatory or other internal or external factors. The reference numbers mentioned in this OMP are in accordance with the procedure at the current time.

Listed below are key currently prevailing operating procedures relevant to odour control:

1. ADM Erith Odour Management (ref 181084);
2. Odour complaints investigation (ref 28974, current version summarised in **Appendix A**);
3. Biofilter Odour Abatement (ref 28924);
4. Odour Abatement System (ref 14592);
5. Thermal Oxidiser odour and Emissions to Air Control (ref 181848);
6. DAF Operating Procedure (ref 14737);
7. Wastewater Evaporator System (ref 41271);
8. Final Effluent Control and Associated Sampling Requirements (ref 14409);
9. Immediate reporting of environmental incidents (ref 43565).

6.2 Odour Control Technology

ADM's principal odour abatement technology is listed below:

- Odorous gaseous streams:
  - Wet scrubber / odour abatement system (OAS) for the exhaust gases following the preparation of the seed, before release to atmosphere at emission point A10 (stack located on top of the prep building);
  - Biofilters (replaced 2019) to treat the extraction exhaust stream from the rapemeal DTDC process, before release to atmosphere at emission point A14;
  - Mineral-oil system exhaust gas (H_2S and hexane-rich) passed through thermal oxidiser/scrubber system to emission point A28. The exhaust may be vented to atmosphere via A14, bypassing the biofilter when TO/scrubber is off- line.
- Odorous liquid streams:
  - Wastewater Evaporator System (current ref 41271).
  - Dissolved Air Flotation (DAF) Unit (current ref 14737).

All of these odour abatement measures are or will be documented and incorporated into the ADM Erith site Environmental Management System (EMS). This section of the OMP can be considered as a framework document which signposts the relevant published procedures (current prevailing versions) for odour control. The specific techniques used to control odour are presented in more detail in the following sections.

6.3 Thermal Oxidiser

The site currently uses a thermal oxidiser (TO) to abate the waste gases from the mineral oil extraction system. The current TO is fuelled using a 630kW natural gas-fired burner (manufactured by Weishaupt) and combusted gases are emitted through air emission point A13 (see **Figure 4.1**).

The TO (air emission point A13) will continue to be in operation, with a target end date to be decommissioned during Q4 2021.

A new TO is planned to be installed in Q4 2021 and will incorporate a natural gas fired burner and integrated wet caustic scrubber. Combusted gases will be emitted through air emission point A28.

The new TO and scrubber system will abate emissions from the mineral oil system after the extraction process. During a combustion process the contaminants within the exhaust gas (H_2S, VOCs and SO_2) react with the oxygen, fully oxidising the species present. The exhaust gases will then be channelled through a caustic scrubber to remove acid gases. The scrubbing system consists of an evaporative quencher using re-circulated water to cool down hot gas from the TO.

Water that has not evaporated flows from the quencher into the packed bed absorber. The gas passes through the first stage packed bed to remove the majority of SO_2 in the gas stream. The scrubbing water is collected in the sump and is re-circulated back to the top of the first stage packed bed and to the quencher. A sodium hydroxide solution with a concentration of 15% is metered into the scrubber recirculation line to neutralize acid gases in the gas stream. The addition rate of sodium hydroxide is controlled by the pH of the liquid in the absorber sump.

After the first stage, the gas passes through a second stage packed bed. The second stage acts as a polishing step to achieve a low outlet SO_2 concentration. A dilute solution of plant-supplied sodium hydroxide is metered into the second stage re-circulation line and is controlled based on the pH in the 2nd stage sump.

A blowdown stream is taken from the re-circulation line to purge the system of absorption products. A blowdown waste-water will be discharged into the site's water treatment plant, where it is mixed with all other waste streams on site. Form the water treatment plant the water is discharged into the Thames Water sewer. Clean softened water is added to the system to make up for blowdown and evaporative losses.

After passing through the packed bed the exhaust gases passes through a mist eliminator at the top of the scrubber vessel. The entrainment separator collects any water droplets that were entrained in the gas stream during scrubbing. The gas then passes through an interconnect duct and stack before being discharged into the atmosphere.

6.4 Biofilter

New biobeds were installed in 2019 to replace the former biobeds (discharging to A14), and were operational by November 2019. Air from the four lower stages of the DTDC passes through one of four cyclones to remove particulates. The warm vapours from the first lower stage (which contains over 99% of the odour and hydrogen sulphide emitted from the DTDC) is processed through the biobeds and then vented through A14. The remaining decks (containing less than 0.7 the odour and hydrogen sulphide) are vented directly from A14.

6.5 Odour Abatement System / Wet Scrubber

The odour abatement system (OAS) is installed to treat the odorous air streams generated following initial preparation. The system comprises of a cooler, scrubber and catalyst tank, and uses an alkaline sodium hypochlorite to oxidise the odorous components.

Continuous process monitoring is installed within the OAS equipment to notify of any process upsets. Relevant ADM personnel are also trained in the maintenance of the unit and a range of spare parts are always kept on-site.

The Odour Abatement System (current ref 14592) document sets out the protocol to ensure correct operation of this control.

The document, together with the ADM Odour Complaints Investigation Procedure (current ref 28974, current version summarised in **Appendix A**) outlines the parameters continuously monitored at ADM Erith, such as temperature, pH, levels of oxidisation solution and freshwater, and the exhaust gas flow-rate, together with the manual periodic checks required by relevant trained personnel and a trouble shooting guide in the event of unit problems.

6.6 Wastewater Evaporator System & Effluent Control

The wastewater evaporator system separates the used industrial water from the clean water, allowing the recycled water to be reused in the process, minimising wastewater and waste management costs. The system is also used to produce low-pressure steam used in the DTDC.

Putrescible solids collect at the bottom of the split-box, which when tankered out periodically can be odorous for a limited time and close to the source.

The method to correctly shut-down and start up the system satisfactorily is set out in the procedure Wastewater Evaporator System (current ref 41271). Key considerations for correct operation, relating to the control of odour, include:

- ensuring there is sufficient flow of water to the surge tank and the pump valves are open to the evaporator; and
- checking the surge tank is correctly overflowing through the swan neck, which demonstrates that the pump feed lines are clear of fines. If the lines are blocked, this has to be cleared immediately.

The document Wastewater Evaporator System (current ref 41271) also sets out the ADM Erith personnel responsible for maintenance; as per prevailing version of this procedure, these are the Extraction Operator and Shift Superintendent. Furthermore, Final Effluent Control and Associated Sampling Requirements (current ref 14409) sets out the procedures for monitoring of the final effluent to sewer, highlighting daily visual inspections of surface water conditions, the monthly flow meter calibrations and the composition sampling and analysis, together with the critical trade effluent discharge parameters and limits.

6.7 Dissolved Air Flotation (DAF) Unit

The DAF removes suspended solids, oils and other contaminants in wastewater stream via the use of air flotation. Air is dissolved in the water, mixed with the waste stream and released from solution whilst in contact with the contaminants. The air bubbles formed attach to the solids or oil, increase their buoyancy and float the material to the surface.

The unit is located close to the ADM site boundary with Church Manorway, adjacent to the public footpath.

The DAF Operating Procedure (current ref 14737) sets out the duties of the extraction operator and shift supervisor, including monitoring the following parameters:

- Flow and recycle stream;
- DAF Inlet pH;
- DAF Outlet pH;
- Coagulant dosing;

- Polymer dosing;
- Final effluent pH.

In addition to the DAF Operating Procedure, there is a specific monitoring and control protocol which includes a trouble shooting matrix for correcting potential problems such as high/low supply pH, no float, no flocs (solids) etc.; together with the chain of command in terms of responsibility for corrective action.

7. ODOUR MINIMISATION MEASURES

7.1 Overview

ADM Erith acknowledges that a fundamental aspect of odour minimisation is to ensure that all personnel responsible for, or having roles relevant to, odorous activities at the facility are trained in how best to minimise odour for that particular task. To this end all site personnel are made aware of the potential impact of odorous emissions being perceived at nearby sensitive receptors.

Typical odour minimisation measures which are the responsibility of all personnel include:

- ensuring that all odorous material or odorous stages are undertaken in enclosed areas or are prevented from escaping to outdoor air by being covered;
- regular cleaning of hard surfaces, drains etc.;
- avoiding build-up of dirt;
- covering the skips;
- routine maintenance of equipment (e.g. cleaning of filters).

Schedule A (see **Appendix E**) to this report sets out a Development Plan for the Erith site, highlighting the key items, activities or processes which are currently considered to be critical to the overall management of odour on-site.

Schedule B (see **Appendix F**) to this report also sets out the routine weekly checks (as per current procedures) which will be carried out to help minimise the potential for odorous releases off-site. These routine checks are based upon the potential odours which are considered to be continuous, as a result of the processes at ADM.

The odorous process areas at the site, together with the current controls are set out in the following sections.

7.2 Odour Minimisation Controls during Preparation and Refining

The preparation, refining and processing stages, particularly the soap-stock separation (aqueous mixture of soap and phosphatides) stage can be very odorous. Unwanted fatty acids in oil are reacted with sodium hydroxide (NaOH) to form “soaps”, which are then fed back into meal due to their calorific value. Due to the continuous nature of the process, ensuring the adjacent roller shutters are closed at all times is therefore the principal control to prevent odours escaping to the environment and potentially off-site.

Other potentially odorous include minor fugitive emissions from the refinery vessels, together with the deodoriser / neutraliser. Again, due to the continuous nature of the process, closing all external doors is the principal control.

The open vessels in the prep area are controlled via ventilation to the OAS (odour abatement system - wet scrubber). This has been installed to keep workplace air at an acceptable standard of odour concentration for worker welfare, but there is a corresponding benefit in controlling emissions which may leave the built environment as fugitive odour emissions.

7.3 Controls during Dewatering

There is a new sludge dewatering press installed since 2019. The system is a screw and bowl system and uses a coagulant polymer dosed pro rate to the throughput. Since the new system has been installed the dryness of the sludge has improved considerably, thereby eliminating the risk of odour emissions almost completely.

7.4 Controls during Waste Collection

There are no solid wastes that should generate a strong odour when managed as per ADM Erith's site procedures. All waste products are placed in skips/containers, with no dumping of any form of waste on the hard-standing.

DAF sludge does have the potential to be odorous and is generated close to the site boundary, however, the waste is removed from this location multiple times per week (therefore only small quantities of this waste are stored in this area). Furthermore, given recent improvements to the process, the DAF Sludge is far dryer than was historically the case, with much less odour generating potential. The DAF sludge is removed to the Waste Yard and is stored in a larger skip and is taken away for waste disposal multiple times per month.

The procedure Waste management (current ref 52400) documents the controls for the transfer of waste, waste management, segregation and recycling and outlines how all of the wastes generated on-site are correctly identified and recovered or disposed of in accordance with the Environmental Protection (Duty of Care) Regulations 1991, ADM IPPC Permit Condition 2.6 and the Waste Regulations (England & Wales) 2011. These procedures serve to minimise fugitive odour emissions from stored wastes.

7.5 Controls during Wastewater Treatment

The periodic clearing out of the waste water treatment facility has the potential to result in short-term odour episodes. Tankering away the sludge is a transient but essential process. Enclosed tanks/ gulpers designed specifically for the purpose are used to remove sludge from the wastewater treatment plant and leave the Site as promptly as possible.

8. ODOUR MONITORING MEASURES

8.1 Overview

The principal ADM procedure to address potential odour impacts is the ADM Erith Odour Management Procedure (current ref 181084). The measures set out in this OMP summarise the contents of the current version of this procedure and include certain additional measures.

8.2 Weekly Monitoring Procedure

Monitoring for odour ('sniff-test') will be carried out around the site at various fixed locations and at differing times of day and shift (i.e. morning, afternoon, evening, night-time). Odour observation records will be completed for each visit and held for quality assurance purposes.

The 'sniff-test' is the most appropriate for regular surveys, however the extent of the test and the chosen test locations are likely to vary based on the specific purpose of the test. Seasonal variation also occurs in the monitoring programme, with increased monitoring near receptors during the warmer months, to reflect when occupiers/residents are likely to have windows open. Examples of different monitoring purposes include:

- assessing off-site or boundary impacts under unfavourable meteorological conditions / north-westerly winds;
- assessing the validity of a complaint;
- assessing a particular odorous source or activity; or
- simply conducting a general site-walk over to confirm odour is acceptable.

An odour monitoring form is provided in **Appendix B** (taken from H4 guidance), which sets out the items and parameters that should be noted and observations to make. As well as the FIDOR parameters discussed in **Section 4.5**, the form also requires meteorological conditions to be recorded to assist with remedial action, odour source identification and responses to any complaints even if received well after the fact.

When performing the site odour surveys, the following suggestions are also made in H4 to ensure robust data collection:

- on occasion, two people simultaneously but independently carrying out the sniff-tests will improve data collection, particularly if responding to a reported odour complaint or checking off-site impacts;
- the odour surveys should be undertaken by staff who have had minimal exposure to potential odour on-site and are not de-sensitised to the site odour i.e. use of office-based staff or ensure surveys are undertaken at the start of an individual's shift to minimise the chance of odour habituation;
- it is advised to have a certain redundancy of staff that can undertake the surveys;
- the staff should be free from cold-like symptoms (including sinusitis/ sore throat) as these may restrict the ability to observe odours;
- it is advised that staff avoid strong scented food or drinks (including coffee) for a minimum of 30 minutes, and avoid wearing strong scented toiletries as well as the use of car air-fresheners, if driving to survey locations off-site;
- up-wind and down-wind 'sniff' tests should always be undertaken to help identify the source of odours (and those from off-site); and

- note any external activities that could be odour sources, or could contribute towards odours from on-site or be a confounding factor.

The above recommendations are followed by the ADM testers as far as is reasonably practicable. The frequency of testing is reviewed should concerns or complaints be received.

8.3 Source Monitoring

Third-party stack emissions testing at emission points A10 (scrubber OAS), A14 (biofilter) and A13 Extraction via thermal oxidiser periodically takes place. Once the new thermal oxidiser/scrubber system is operational, emission testing will continue at emission point A28 instead of A13.

Periodically the inlets to the OAS scrubber and thermal oxidiser, and the inlet and outlet of the biofilters are also monitored.

9. ODOUR INCIDENT PROCEDURES

The ADM Odour Complaints Investigation Procedure (ref 28974, current version summarised in **Appendix A**) sets out the current procedure for actions and investigation in the event of odour and fugitive odour impacts.

If an odour complaint is received by ADM directly, through the Environment Agency or the London Borough of Bexley Council (LBB), the immediate course of action is to understand whether the alleged odour has come from the ADM site and attempt to identify the source to see how it could be stopped in future. A checklist is included in the current version of the ADM Erith Odour Assessment & Complaints Investigation Procedure and covers items such as a review of the weather conditions and operational status of emission sources (Odour Abatement System and Thermal Oxidiser in particular) in the hours before and after the alleged episode.

When ADM is notified of an alleged odour complaint, the complaint may have occurred several weeks or months prior to receiving notice, making an investigation into the incident very difficult.

ADM therefore encourages the local residents to contact the Environment Manager at ADM Erith directly at the time of any observed odour impacts, so that an investigation can be undertaken as quickly as possible (typically within an hour of the complaint) to identify the potential reason for the odour at the receptor and provide a solution. An odour complaint form is set out in the ADM Erith Odour Management procedure (current ref 181084) and the current version of this has been reproduced in **Appendix C** of this OMP for (subject to change as this is a live document).

Furthermore, an example of the current odour diary form (subject to change as this is a live document) is also set out in **Appendix D** and ADM invites neighbours located closest to the Erith facility to complete these regularly, to assist ADM in understanding and managing off- site odour impacts. These will be provided in the event of repeated complaints at any given receptor location.

Completed odour diaries will be submitted to and reviewed by the Environment Manager, with notification given to the Site Manager.

APPENDIX A - ADM ODOUR COMPLAINTS INVESTIGATION PROCEDURE (SUMMARY OF CURRENT VERSION)

Odour Complaint Investigation Summary for Procedure 28974

- Precautions
- Required Complaint Information
- Complaint Investigation Procedure
- Environmental Considerations
- Required Training
- Document Control

Odour Complaint Report Form		
Date	Location	Grid Reference
Name and address of complainant:		
Tel No of complainant:		
Date and Time of complaint:		
Date time and duration of offending odour:		
Location of odour if not at above address:		
Weather conditions: (i.e. dry, rain, fog, snow)		
Cloud cover :(%)		
Cloud height:(low, med, high)		
Wind strength:(Light, moderate, strong, gusting)		
Wind direction:		
Complainant's description of odour:		
Has complainant any other comments relating to the odour:		
Have there been any other complaints relating to this location:		
Any other relevant information:		
On site activities at the time the odour occurred:		
Operating conditions at the time the odour occurred:		

APPENDIX B ODOUR MONITORING FORM (TAKEN FROM H4 GUIDANCE)

Odour report form			**Date**	
Time of test				
Location of test				
Weather conditions (dry, rain etc)				
Temperature (very warm mild etc or degrees if known)				
Wind strength (none, light etc) Use Beaufort scale if known				
Wind direction (eg from NE)				
Intensity (see below)				
Duration (of test)				
Constant or intermittent?				
What does it smell like?				
Receptor sensitivity				
Is the source evident?				
Any other comments or observations				

Sketch a plan of where the tests were taken and the potential source(s):

Intensity		**Receptor Sensitivity**
0 – No odour	4 – Strong odour	Low (eg footpath, road)
1 – Very faint odour	5 – Very strong odour	Medium (eg industrial or commercial building)
2 – Faint odour	6 – Extremely strong odour	High (eg housing, pub/hotel etc)
3 – Distinct odour	Ref: German Standard VDI 3882, Part 14	

APPENDIX C ODOUR COMPLAINT FORM (CURRENT VERSION)

ODOUR COMPLAINT FORM		
Time and date of complaint:	Name and address of complainant:	
Telephone number of		
Date of odour:		
Time of odour:		
Location of odour (if not at address above)		
Weather conditions (dry, rain etc)		
Temperature (very warm mild etc or degrees if known)		
Wind strength (none, light etc) Use Beaufort scale if known		
Wind direction (eg from NE)		
Description of the odour:		
What does it smell like?		
Intensity (see below):		
Duration:		
Constant or intermittent?		
Any other comments about odour?		
Have there been other similar complaints?		
Any other relevant information		
Does ADM accept that odour complaint is potentially attributed to site activities?		
Activities on-site at the time of the complaint?		
Operating conditions at the time of the complaint?		
Actions taken:		
Form completed by:	Date:	Signed:

Intensity
0 – No odour; 1 – Very faint odour; 2 – Faint odour; 3 – Distinct odour; 4 – Strong odour; 5 – Very strong odour; 6 – Extremely strong odour (Ref: German Standard VDI 3882, Part 14)

APPENDIX D EXAMPLE ODOUR DIARY FORM (CURRENT VERSION)

ODOUR DIARY						**Sheet No:**
Name & Telephone number:		Address				
Date of odour:						
Time of odour:						
Location of odour (if not at address above)						
Weather conditions (dry, rain etc)						
Temperature (very warm mild etc or degrees if known)						
Wind strength (none, light etc)						
Wind direction (eg from NE)						
What does it smell like? How unpleasant is it? Do you consider this smell offensive?						
Intensity – How strong was it?: (see below):						
How long did it go on for (time)?						
Was it constant or intermittent?						
What do you believe the source/cause to be?						
Any actions taken or other comments?						

Intensity

0 – No odour; 1 – Very faint odour; 2 – Faint odour; 3 – Distinct odour; 4 – Strong odour;

5 – Very strong odour; 6 – Extremely strong odour (Ref: German Standard VDI 3882, Part 14)

APPENDIX E SCHEDULE A - ODOUR MANAGEMENT – CURRENT DEVELOPMENT PLAN

The ADM Erith Odour Management Plan and associated and referenced procedures are live documents which from time to time will be updated. The development items outlined below surrounding activities or processes which are considered to be critical to the overall management of odour on-site and require further control measures.

These measures consist of actions designed to minimise both ‘routine’ and ‘non-routine’ odour sources at ADM. ‘Routine’ odour sources are considered to be those inherently associated with the processes at ADM and are likely to occur continuously. ‘Non-routine’ odour sources are those which are considered to be preventable and occur due to equipment failure / process upsets.

These actions demonstrate ADM’s commitment towards minimising odour at the Erith facility and potential off-site odour impacts.

DEVELOPMENT ITEMS

By addressing the following priority action, the unnecessary release of ‘non-routine’ odour emissions will be greatly reduced and/or eliminated, largely by focussing on improvements in performance.

- Thermal oxidiser

  The on-going performance of the thermal oxidiser has been reviewed as a priority; due to the number of times it has been off-line in 2015. Its function is key for processing the hydrogen sulphide and hexane-rich mineral oil system exhaust which minimises odour. A new replacement thermal oxidiser with integrated wet caustic scrubber is due to be installed in Q4 2021. This will improve not only reduce H_2S emissions during normal operations but is also expected to reduce the duration and frequency of bypass events.

APPENDIX F SCHEDULE B - ODOUR MANAGEMENT - DAILY CHECKS (AS PER CURRENT VERSION OF ADM PROCEDURES)

This Schedule lists the checks which are carried out to help minimise the potential for odorous releases off-site, as far as is reasonably practicable. These routine checks are based upon the manufacturers recommendations and continuous potential odours emitted from ADM Erith processes.

Many of the checks are simply visual however others require a more detailed review.

The checks listed below are comprehensively referenced from the current version of the ADM Erith Odour Management Procedure (ref 181084). This is a live document subject to change in accordance with operational, regulatory, and other internal or external factors.

Good standard practice:

- Ensure any spilled rapeseed is swept up and collected immediately.
- Ensure all roller doors and shutters are closed during loading and unloading.
- Ensure all external doors are closed to prevent odour egress from continuous process.
- Ensure the general waste skips, husks waste skip, meal waste skips are not overfilled.
- Maintain frequent and regular removal of waste from site.

Equipment Checks:

- Confirm Odour Abatement System (OAS) is operational as per internal procures:
  - TZ2_EXP_WI_Odour Abatement System
  - TZ2_EXP_WI_Biofilter Odour Abatement
  - Thermal Oxidiser odour and emissions to air control
  - TZ2_ENV_SOP_ADM Erith Odour Management,
  - TZ2_ENV_SOP_Odour Assessment Complaints investigation procedure

- Confirm OAS is operational:
  - Check circulation flowrate from the scrubber is within range
  -Check the pH to the OAS
  Check Redox control OAS scrubber (Sodium Hypochlorite)

  - Confirm biofilter(s) are all operational:
  - Yearly Check integrity of each structure- conduct by external vendor
  - Check steam flowrate to DTDC
  -Check main water flowrate to Biobeds
  -Check temp. in/out heat exchanger
  -Check Pressure in/out heat exchanger
  - Refer to Biofilter Operating Procedure

  - Confirm thermal oxidiser is operational:
  - Check mineral exhaust flowrate

  - Confirm storm-water sump isn't blocked and is functional:
  - Check the level of settled debris in sump is less than 50% of the outgoing pipe diameter
  - Remove excess debris if necessary. Do not allow settled sump waste to go into outgoing pipe
  - Check the cover is in-tact and the surrounding above-ground area is free from material that may leach into the system
  - Confirm wastewater treatment facility isn't blocked and is functional: Refer to Wastewater Evaporator System Operating Procedures
  - Check the temperature
  - Check the pH
  - Confirm DAF unit is operating effectively:
  - Refer to DAF Operating Procedures
  - Check the effluent flow rates
  - Check the coagulation dosing
  - Check the inlet and outlet pH

END