Odour Management Plan
Low Marnham Installation

JG Pears (Newark) Ltd & JG Pears Power (O & M) Ltd

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1.0 Introduction

The process undertaken at J G Pears, Newark is the rendering of animal by products, which involves the removal of water and sterilisation of the by-products to produce protein meal and fat along with steam and power generation from burning Cat 1 MBM is the sites CHP plant.

The by-product's processing plant is an approved mammalian and poultry process under the Animal By-Products (Enforcement) (England) Regulations 2011 with a licence issued by the Animal and Plant Health Agency for such activities. The by-product's processing facility is regulated by the Environment Agency which is prescribed for Environmental Permitting under Section 6.8A(2)(a), of Schedule 1, of the Environmental Permitting (England & Wales) Regulations 2010 (as amended)

> "*Disposing of or recycling animal carcases or animal waste by rendering at a plant with a treatment capacity exceeding 10 tonnes per day of animal carcases or animal waste, or, in aggregate, of both".*
>
> and 6.8 A(1)(c) covering the thermal treatment of feather and blood.
>
> *"Disposing of or recycling animal carcasses or animal waste, other than by rendering or by incineration falling within Section 5.1, at a plant with a treatment capacity exceeding 10 tonnes per day of animal carcasses or animal waste or both in aggregate".*

The CHP Plant is prescribed under Schedule 1, Part 2, Chapter 1, Section 5.1 Part A (1) Incineration and co-incineration of waste. Category 1 MBM

It is recognised that animal by-products processing can give rise to objectionable odours. Odours from the process are associated with the reception, handling and storage, transfer, and preparation of raw material; the cooking process; handling and storage of processed product and the handling, storage, treatment and disposal of solids, liquid effluents, and process gases. With proper control and use of Best Available Techniques odour can be managed to an acceptable level.

2.0 Purpose and Scope

This Odour Management Plan (OMP) provides information on the measures implemented to control odour emissions from the animal by-products processing operations and CHP facility for the storage and combustion of CAT 1 MBM. The OMP addresses the Environment Agency's general requirements for OMPs as part of the permitting process (Permit AP3435DG Application Variation V003 - Notice Issued (PDF) – 24052023), as described in Environment Agency H4 Odour Management guidance. The new consultation guidance has also been reviewed.

The H4 requirements recommend a simple document along the following lines: -

- A process description, particularly describing odorous, or potentially odorous, activities or materials used.
- Identification of all the release points for each of the activities and their locations.
- Identification of the sensitive receptors within the area of influence that could be impacted.
- A description of the baseline mitigation/control measures that would be used day-to-day under normal operating conditions in the absence of any unusual risk factors.
- Descriptions of odour abatement systems utilised.
- Identification of possible risk factors (e.g., equipment/control failures, abnormal/unintentional situations, adverse weather conditions, spillages, etc.); and a listing of the consequences for odours of these risk factors.
- A description of the additional measures that will be applied during these periods to deal with these risks.
- Public communication and investigation
- A description of what would trigger this further action/additional measures.
- A description of the roles and responsibilities of personnel on site (e.g., organisational chart), and the training and competence of staff in odour-critical roles.
- Details of how the measures in the OMP will be carried out, and who has been assigned managerial and operational responsibilities for them.

3.0 Description of Site

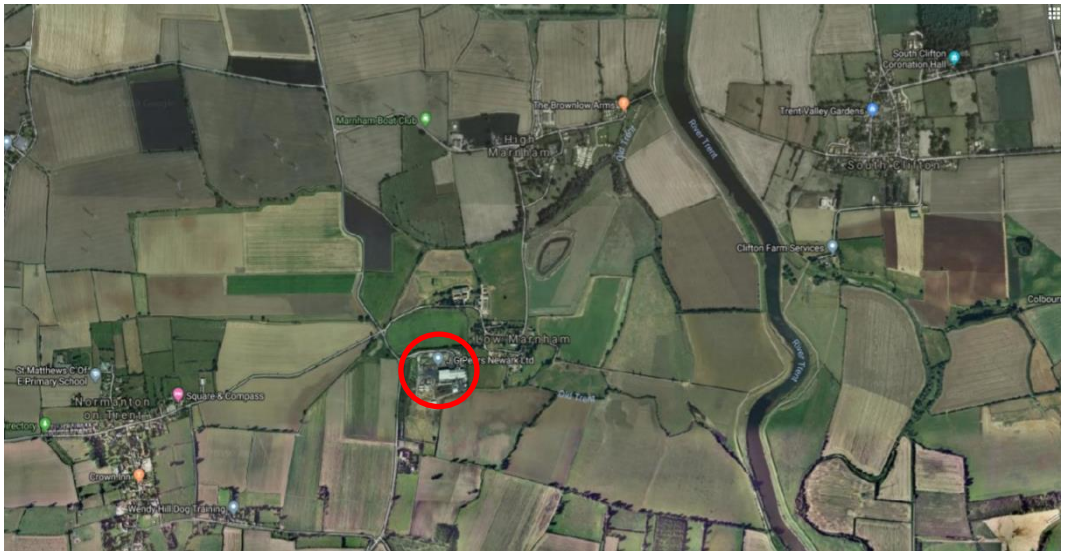
The factory site is located immediately to the southwest of the village of Low Marnham and approximately 1km to the east of the larger village of Normanton-on-Trent. The River Trent is 1.5km to the east of the site beyond two rows of flood defences, in addition to the earth bund on that side of the factory site. The site of former High Marnham power station is 1km to the north. The power station structures have been demolished with only the switch yard remaining.

The River Trent and Trent Valley Way, a long-distance footpath, run north south approximately 1km to the east of the site.

The location of the site is illustrated in Figure 1 below.

Figure 2 below shows the exact location in more detail. The overall landscape is rural with the plant surrounded by agricultural activities. Access into the site is off the B6047, Grassthorpe Road, at the northwest corner of the site. The main circulation within the site is provided by a service road along the north/south boundary leading to the car park, offices and dispatch yard adjoining the process building at the eastern end. The CHP plant is located in the middle of the site.

Figure 2



The site, which can be described as an inverted L shape, is level and is bounded on the west, east and southern boundaries by intermittent mature tree planting and almost continuous 3-4m high bunding; the earth bund on the eastern boundary is effectively a private flood defense augmenting the two further Environment Agency maintained defenses between the site and the river Trent, which is tidal at this location. A row of mature trees (poplars) lies on the northern boundary, with some hedgerow planting, while in the northeastern corner, closest to the village of Low Marnham, is an earth bund and there are some Leylandii trees which extend up to 12m in height which helps make a visual screen. Apart from the village, beyond the site on all boundaries are open fields, field hedges, trees, and a scattering of farm buildings. The topography of the surrounding area is flat.

The site comprises of several industrial buildings, the largest footprint being the process building in the northeast corner of the site with external plant and equipment primarily located on its south side. A water treatment plant, comprising concentric tanks, is located towards the southern end of the site, with plant room building and bio-filter beds adjoining the eastern boundary to the south. There is a warehouse/maintenance garage on the southern boundary. The CHP facility is largely located in the middle of the site.

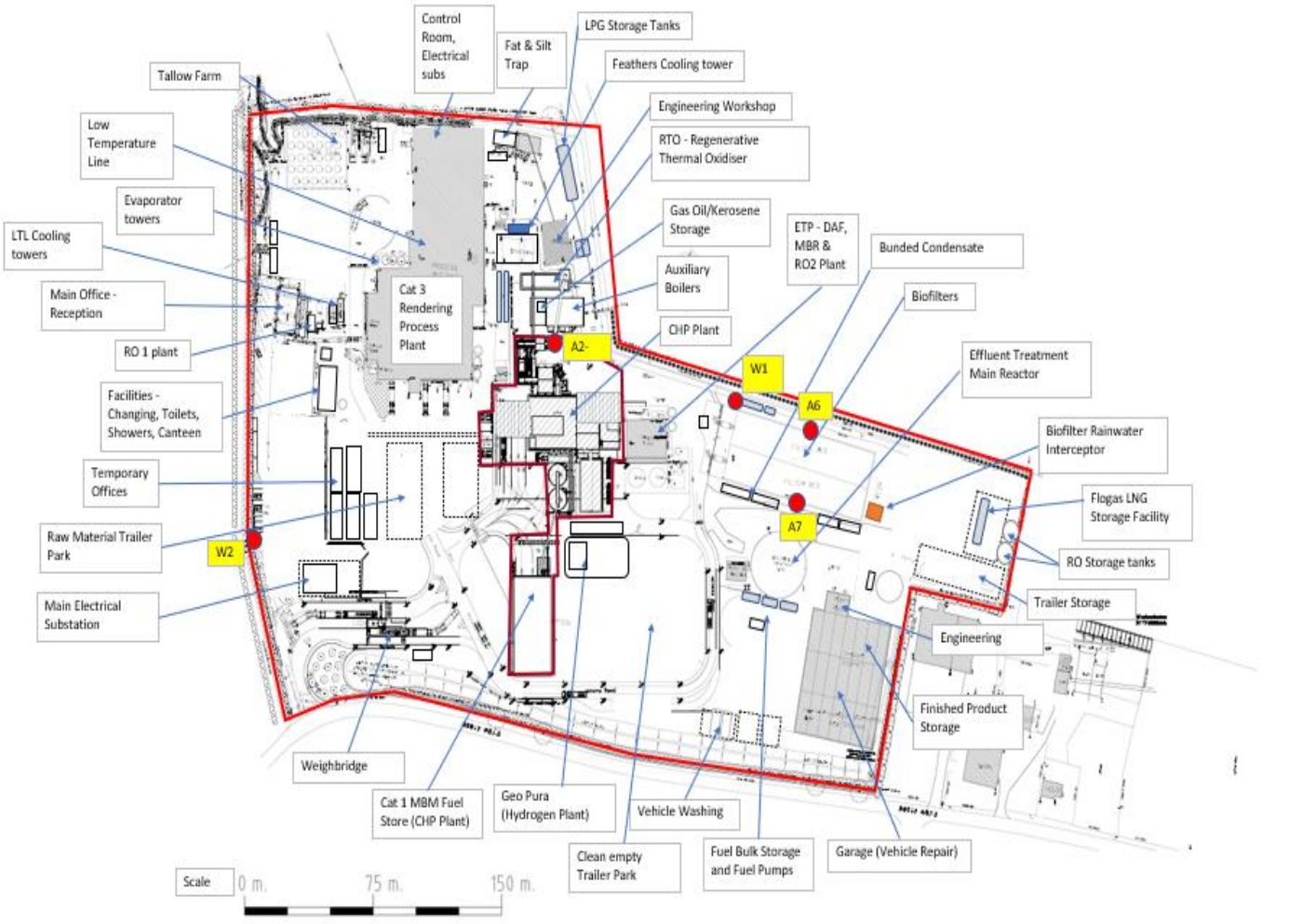
A site schematic is shown below with table 1 below depicting the buildings and main items of plant and equipment.

Table 1 – Site plan

Plan of JG Pears Newark Site

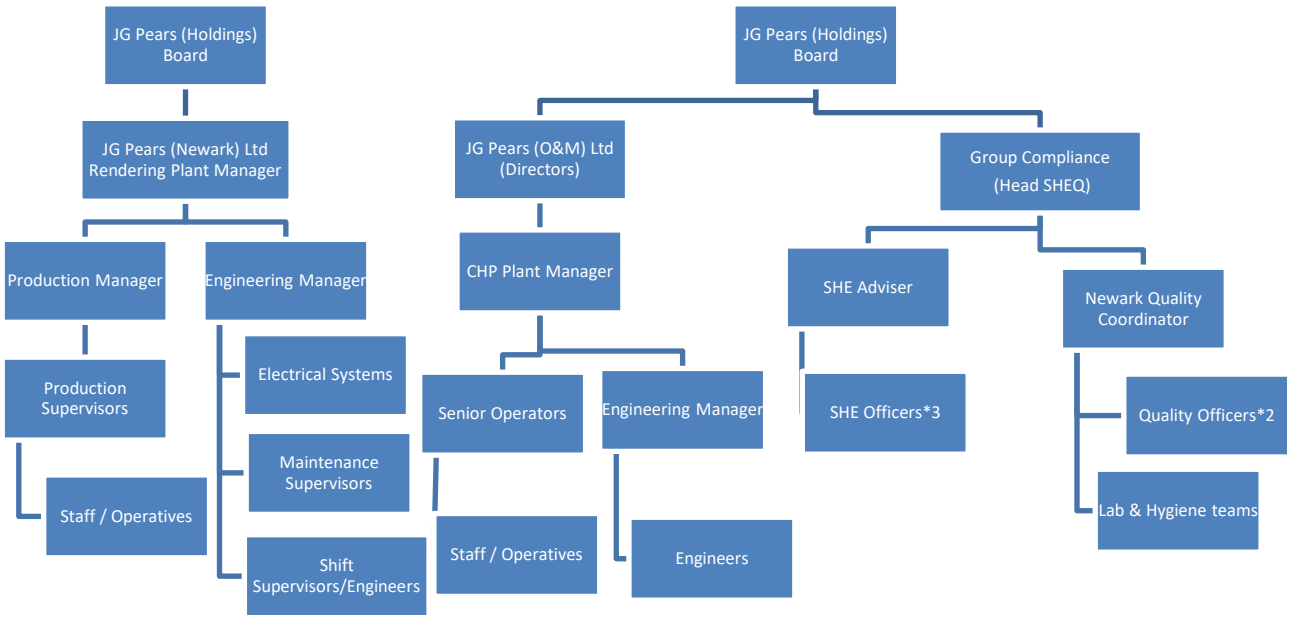
The plan highlights where JG Pears (Newark) do the activities covered by the permits (and any exemptions registered).
Red outline - Permit No. AP3436DG (Rendering) ; **Dark red outline** - Permit No. MP3235CC (Power)
Plan shows:
buildings, and other main constructions, like treatment plants, incinerators, storage silos and security fences

Emission Point	Description	Location
A2-A5	CHP, RTO & Auxiliary Boiler stacks	50m Stack west CHP plant
A6, A7	Biofilter exhaust stacks	Either side of Biofilters 1 & 2
W1	Final effluent discharge to River Trent	Exit of Final Discharge Tank
W2	Flow of surface water to stream	Exit of Car Park



4.0 Management Structure

The environmental management structure for the animal by-product processing facility and CHP at Newark is shown below.



The Operations Director takes overall responsibility for both the Newark by-products processing facility and JG Pears Power CHP plant. The Head of SHEQ reports directly to the Finance Director with inputs from other technical, engineering and operations management onsite. Members of the SHEQ Team undertake the “day to day” site environmental work, EMS system maintenance, odour investigation and improvement, effluent and waste management, ash, and fertiliser quality.

4.1 Training and Competency

Training and competency of staff is controlled by the site management and employee recruitment processes which covers training, awareness, and competence. Specific training on environmental impacts and awareness is being developed further across the business. The training will include toolbox talks and formal training both onsite and offsite.

4.2 Review

The odour management plan is to be reviewed on an annual basis, or in the event of changes to working practices, installation of new equipment or circumstances relating to a major incident resulting in significant odour complaints. All complaints are investigated and where corrective action is required this will be incorporated into the OMP, if not already covered. A major incident would prompt the OMP to be reviewed immediately.

Complaints, incidents, and corrective actions are reviewed as part of the documented Management Review Procedure. Meetings are held with the senior management team on a regular basis to discuss the details and review actions for continuous improvement. The Head of SHEQ has responsibility for the odour management plan implementation and review.

5.0 Process Description

The facility undertakes the processing of the following animal by-products:

- Slaughterhouse / abattoir and food production by-products.
- Feathers.
- Blood.
- Cutting plant and butchers shop by-products.
- End of shelf life for avian food processing supply chain.

Normal operation involves production 7 days each week (poultry slaughter plants typically process 7 days per week). Raw material requires removal from the slaughter plants daily. Daily cleaning takes place of plant equipment, surfaces, and trailers as part of a cleaning schedule.
Maintenance and major cleaning operations take place during non-operating periods on the production lines, these periods occur on most production lines generally for at least 12 hours in the period between late Saturday through to Monday morning.

The cleaning schedule is carried out by a dedicated hygiene team. The Quality Department undertake daily auditing for cleaning standards inside the production facility.

The main processing activities carried out involve:

- Raw material preparation (size reduction)
- Cooking, pressing equipment, separation and evaporation.
- Meal cooling,
- Grinding,
- Storage and loading systems and
- Fat clarification, storage, and loading

A number of supplementary activities are carried out:

- Raw material deliveries and off-loading,
- Process steam generation from the CHP plant or auxiliary site boilers,
- Treatment of process effluent and wash water within the effluent treatment plant,
- Treatment of concentrated odours and odorous air through the biological filter bed and thermal oxidation in an RTO or CHP plant boiler.
- Storage of finished products (meal and fat (tallow)) prior to despatch off-site,
- Production, disposal, and recycling of general waste.
- Storage of MBM fuel for the biomass CHP plant

The plant can process approximately 12,000 tonnes of animal by-products per week. The plant capacity is circa 100 tonnes per hour across the five animal by-product processing lines.

The installation receives animal by-products as defined in the Animal By-Products (Enforcement) (England) Regulations 2011. The animal by-products received are slaughterhouse by-products including feathers and blood; and animal by-products from abattoirs, cutting plants and butchers shops.

5.1 Raw Material Reception

Raw material is received on site as soon as is practical from its source of production. It is delivered to site by road in totally covered vehicles or containers which are designed to minimise odour and the spillage of any liquid or solid matter. The rear doors of the HGV trailers are tightly sealed around a rubber insert sealing strip between the door and the body of the vehicle to prevent any material leaking out. The trailers used can be either

single compartment or split trailers where a collection consists of both offal and feathers and in some instances also a tank for blood.
The frequency of arrival can vary slightly depending upon the time of day and day of the week. The distribution of the arrival of raw material trailers to site averages at 4-5 trailers an hour. Some periods may receive more than this, although liaison with suppliers plans for these rare occasions to be kept to a minimum. All vehicles enter the facility and proceed to the weighbridge where they report to the weighbridge office. A system of checks and controls are carried out for each delivery vehicle such that all animal by-product documentation is present and correct for each load. The checks ensure that documentation and vehicle loads are inspected to ensure non-conforming materials are not being brought to the facility.

In general, ABP raw material is tipped in order of arrival at the site together with the assessment of any odour issues noted by the driver, leaks or defects of the trailer, the distance that the trailer has travelled and the daily ambient temperature. A computerised priority spreadsheet is used, which instructs the weighbridge operatives and raw material loading operatives where a trailer should be parked and when it is tipped using a shunter. The revised procedure reduces trailer movements onsite by minimising weighing and draining of trailers.

There is no queuing of vehicles when they arrive at site. Trailers are directed from the weighbridge to the Raws Yard or Lane 1 (where they are parked inside the main production facility building). In most cases, trailers will not be parked outside for more than is necessary for shunting and handling purposes.
Storage and Handling ABP (Raw Material) as part of the site's EMS details the raw material trailer delivery, movement, and storage procedure.

Lane 1 trailer storage is used as far as is practicable during normal daily operations to minimise the number of trailers that are parked on the yard area prior to tipping. There are always three shunters available with two shunters being capable of adequate operating capacity to cover any potential breakdown of a single shunter at any one time.

When entering the factory trailers reverse into the appropriate narrow "air lock" reception building. The external airlock reception doors are fully automated via an induction loop system operated by the vehicles wheels. The door opens automatically and then closes quickly after the vehicle has fully reversed into the airlock. There is now only a key operated manual override available for the opening of the doors which removes unwarranted opening of any of the raw material bay external airlock doors by personnel. The airlock is always held under negative pressure via the building extraction system which is connected to the Biofilter odour abatement system.

Once inside the airlock the sheeting of the vehicle trailer is removed, and a visual inspection of the load is undertaken to check that only the correct category of animal by-product material is present and that there is no extraneous matter.
Only when the front shutter door is closed can the rear air lock door be opened allowing the lorry to tip the contents of the trailer into the stainless-steel raw material storage bin.

The storage bin has an automated closing lid with the bin head space extracted to the high intensity odour abatement system. Only in exceptional circumstances would a trailer sheet need to be opened externally (outside of the building) for the removal of a foreign body such as a Dolav. If possible, this is completed inside Lane 1, within the extracted air system, but it depends upon how many trailers are already stored in the building to be able to safely access the trailer with an excavator arm. The total time for such an operation is minimal, at under 10 minutes.

Photograph 1.
Raw material reception area with automatic (induction loop) rapid closing roller doors to the un-loading bays.

Vehicle washing and disinfecting of the inside of the trailer takes place inside the air lock reception area. This area is drained to the surface water drainage system and processed at the installations effluent treatment plant. A gantry is used for the operator to wash and disinfect inside the main trailer.

If there are potential delays in trailers being processed because of a temporary plant breakdown, odours will be minimised by using as much internal storage as practicable, following our ABP (Storage & Handling) Procedures.

Lane 1 can store 6 full trailers, giving a normal storage capacity of over 1.5 hours. The other Lanes can hold a further 5 trailers, giving 3 hours of holding capacity inside the factory building.

The Storage and Handling of ABP (Raw material) procedure details actions to be taken in the instance of a plant breakdown which would affect trailer tipping.
Should it be clear that the delays will cause excessive stock to build up and potentially cause odour issues, a decision will be made by the Production Manager to send an appropriate quantity of raw material to other sites, and/or divert incoming raw material directly to other sites. Options will include other JG Pears sites, competitor sites that can handle the material, or as a last resort disposal via an appropriate destruction facility such as a Cat 1 ABP site or incineration, or in extreme circumstances and under EA authority, to landfill.

5.2 Material Processing

The rendering production facility comprises of the following process lines: -

Line 1: High or low temperature rendering or blood meal production. Comprising of cooker, press and milling systems.

Line 2: High or low temperature rendering comprising of cookers, presses, and milling system.

Line 3: Feather processing. Comprising of 2 hydrolysers, dryers, and milling system.

Line 4: Low temperature rendering line. Comprising of cooker / preheater, presses, tri-canters, waste heat evaporator, three dryers and a milling and screening system

Line 5: Processing of blood. Comprising of raw blood tanks, batch cookers and a finished product holding tank (processed animal protein – PCP).

The animal by-products once tipped are transferred via enclosed screw feeders from the raw material storage hoppers through the crushers and to the appropriate cookers. All the transfer screws for raw materials are fully enclosed systems with air extraction to the high intensity odour abatement system. For blood products received at site, a road tanker will park within Lane 7 airlock. The blood is offloaded by pumping the contents of the road

tank to one of three vertical bulk storage tanks. The vertical blood storage tanks are fully sealed and can each hold 80 tonne of blood products. Each tank is back vented to the extraction system with odours abated by thermal destruction through either the CHP or RTO. The blood is pumped from the storage tanks to the blood cooker for processing. The blood storage tanks are manually cleaned weekly at the end of a continuous production run, whereby the solid residues are removed from the bottom of the tank via a drain and inspection hatch.

In general, the rendering process involves animal by-products being heated under controlled conditions. Evaporated water from the animal by-products is condensed. The greaves (dehydrated mixture of proteins and fats) are extracted from the cooking process continuously and separated into proteins and fat by subsequent processing stages.

The fat is cleaned before being pumped to storage tanks at the dedicated Tallow storage tank farm silos There is no fat separation from feathers or blood products. The tank farm is fully bunded and back vented to the sites odour abatement systems. All tanks have high level alarms to prevent overfilling. The tank farm has a discharge gantry for the filling of road tankers. The filling system hose is back vented to the sites odour abatement system.

For the high temperature lines, after the fat has been extracted by the presses the cake discharges to a cooler after which it is fed to a grinder to be milled where its particle size is reduced. Following screening and metal detection it is transferred to bulk containers prior to dispatch off-site.

The vapour evaporated by the heat from the cooking process is passed to indirect forced air-cooled or water-cooled condensers. The resultant process condensate is passed to storage tanks before being transferred to the effluent treatment plant. Non-condensable gases (intensive odours) are treated in the regenerative thermal oxidiser (RTO), where an operating temperature of between 850°C and 950°C is maintained, with a resonance time in the main chamber sufficient to ensure the odour is fully oxidised. Under normal operating conditions the intensive odour gas stream from the factory will be directed by sealed ductwork to the CHP Plant boiler as combustion air. The high operating temperatures of the CHP boiler will oxidise the odours before being discharged from the 50m high stack.

The cookers are process vessels operating under a slight vacuum to the condensers at minimum temperatures between 113°C and 145°C as required by the Animal By-product Regulations. The driers (dependant on material being dried) normally operate between

100°C and 125°C. Should the vacuum on the cooker experience failure, alarms would sound and the feed to the cookers would automatically stop.

6.0 Nature of the Odour Emissions from an Animal By-Product Rendering Process.

The nature of the rendering process and the type of odour that can be generated by the process has a significant effect on the offensiveness of the odour that can be emitted from an installation. The most important aspect of the rendering process is the decomposition of the raw material that takes place immediately after slaughtering. The natural degradation of the raw material continues until processing at the rendering plant and the rate of degradation is dependent on factors such as the animal species and the ambient temperature. The enzymatic decomposition and the oxidation of proteins in the animal carcasses produce a range of odorous organic compounds.

The odorous compounds that have been identified in gaseous emissions from rendering plants include the following:

- Sulphur-containing compounds, such as hydrogen sulphide, organic sulphides and mercaptans.
- Nitrogen-containing compounds, such as ammonia, amine and amide.
- Oxygen-containing compounds, such as acids, alcohols, aldehydes, esters, and ketones.
- Aliphatic and aromatic hydrocarbons, including oils and fats.

(Warren Spring Laboratory, 1980; Shareefdeen, et al, 2005; Kastner, 2002; USEPA, 1995; Defoer, 2000; and Meat and Livestock Australia, 1999):

Several of the individual compounds arising from the rendering process have very low odour thresholds. Consequently, when these chemicals are released to the atmosphere, a small quantity or low rate of release may be sufficient for odours to be detected. Descriptions assigned to odours from animal rendering facilities vary from person to person depending on their experience and sensitivity to odours. The descriptions typically assigned to the process odour from rendering plants include: ‘burnt meat/chicken’, ‘dog food’, ‘burnt fat’, ‘pork scratchings’, ‘OXO cubes’, and ‘rotten vegetables. The sources and description of odours associated with the JG Pears animal by-products facility will be detailed in following sections and tables contained in this odour management plan.

6.1 Outline of Odour Control and Abatement Techniques

JG Pears implements odour control techniques on its animal by-products processing facility to meet BAT requirements. Principally these techniques include: -

- Containment
- Minimising odour emissions through reception and processing techniques
- Thermal destruction
- Biological treatment

The above techniques will be described in further detail in the following sections as each part of the animal by-products and abatement plant is described and explained in further detail.

The site deploys two odour abatement techniques. Thermal destruction of high intensity odours such as those associated with cooking, raw materials and drying is conducted by passing these high intensity odours gas streams (up to 45,000 m3/hr, but normally around 30,000 m3/hr) through the CHP plant boiler. Back up facilities exist via an RTO (regenerative thermal oxidiser) of similar flow capacity for the thermal destruction of high intensity odours.
Should both CHP and RTO fail, the high intensity odours will be diverted to the auxiliary boilers if possible. Should the intervening time to full thermal treatment be judged to potentially cause an issue, all Rendering processes generating high intensity odours (such as cookers, evaporators, and dryers) will be shut down.
It has been estimated that this may be after around 4 hours, as some odour leakage into the general building air will naturally be extracted to the low intensity treatment system. This will be reviewed should an incident arise.
The general building air is extracted via two large fans, each rated at 110,000 m3/hr with the air being directed through two large 70*20 metre Biofilters (via caustic spray humidifier and filtration systems) which have a 40 second residence time for the abatement of low intensity odours.

6.2 CHP Odours

The CHP plant is not a significant source of offensive odours by the very nature of its operation as a combustion power generation facility. The fuel used is category one meat and bone meal (MBM) which arrives from other rendering facilities in the UK.

MBM has an odour described as a pet food, cereal type smell. MBM deliveries are received in the contained fuel reception building where the contents of an HGV trailer are

tipped and taken by conveyor to one of the two 500 cubic metre sealed concrete storage silos or held in bulk in the fuel reception building. The fuel reception building is kept under a slight negative pressure via an extraction system which extracts approximately 2 air changes per hour. The external doors are always kept in the closed position and are only opened to allow a vehicle inside the building to tip. The door is closed immediately the vehicle is inside before it can be un-sheeted and tipped. Operating procedures for fuel delivery and quality checking is part of the CHP plants SOP. The two fuel storage silos are held under extraction to minimise odour whilst the silo is steadily filled with MBM to keep a sufficient head of fuel to meet the demand of the boiler.

The extracted air from the Cat 1 fuel storage building and air displaced from the MBM silos is passed through a fabric filter unit before being directed to the CHP plant boiler combustion air duct where it joins the high intensity odorous air from the animal by-products rendering operations for thermal destruction.
If the CHP boiler is not operating due to an emergency breakdown or planned maintenance, the air from the MBM silos and CHP fuel store is temporarily directed to the biofilter via an automated damper system and ductwork. As the odour from MBM is of low intensity, the Biofilters are adequately capable of treating these odours.

The CHP boiler is the principal source of thermal destruction of high intensity odours arising from the animal by-product processing production facility. The existing RTO unit is kept running ready on standby in case the odorous air needs to be transferred quickly back for treatment in the RTO. Details of how the CHP boiler and failsafe systems operate for thermal odour destruction is explained in the forthcoming sections.

6.3 Odour Sources

There are several potential sources of odour from an animal by-products processing facility. Some of these sources can be points of significant odour generation. The CHP facility has only a minor impact when assessing odour sources in relation to its fuel storage (MBM) building which was detailed earlier. An odour assessment and extraction rate survey has been completed on the building by AEA Ricardo. The storage building is always kept airtight with all doors remaining closed and operating procedures for the delivery and offloading of MBM fuel.

To categorise the process and the potential odour sources at the facility the following tables detail the nature/description of the odour and the potential sources within the production process.

Table 2 below details the types of materials and finished products that the animal by-products facility processes and the CHP facility uses, along with the quantities processed and storage conditions/capacities. A description of the odour type associated with the materials is given in column 1, material specifics in column 1 and the control measures in columns 3,4 and 5.

Table 2

Operation/odour type	Material	Storage Conditions	Containment (for liquids)	Quantity
Raw materials – under normal conditions the material is fresh but can become odorous if aged or if not contained. The resultant odour would be that of rotting meat. Offal, meat, blood and feathers have a similar odour type and level.	Blood	Tank vented to CHP for thermal destruction of odours via ducting in building. Back up to RTO. Vehicle inside airlock when discharging contents from tanker. Tanks are constantly being emptied and filled as deliveries arrive to site, so the blood contents of the tanks are constantly fresh. Stale blood would coagulate affecting product yield and quality. Cleaning of the inside of tanks is undertaken at least once per week and drain off to effluent system in controlled manner.	Within site containment. Yard bunding to contain any spills or leaks from a tank. Any leaks would be contained by yard bunding with secondary containment at the main yard/site interceptor. This contains a spillage before it is pumped to the ETP. Tanks have bottom drains for draining of residues. Internal surfaces of tanks cleaned every 7 days, with large doors for ease of access.	Avian - Maximum holding capacity for site is 240 tonnes via three 80 tonne tanks. Level probes monitor space available with high level alarms.

Operation/odour type	Material	Storage Conditions	Containment (for liquids)	Quantity
	Offal/Meat/ Feathers	Animal By-product raw material arrives to site in covered, leak proof HGV trailers that are tipped as soon as possible through implementation of the trailer handling and tipping prioritisation procedure. Under Animal By-products legislation material must be processed within 24 hours of receipt. Tipping takes place in airlock.	Within site containment	Scheduled deliveries (to maintain the quality of the finished products – raw material must be tipped as fresh as possible). A procedure improves tipping prioritisation and reduces trailer movements on site. Raw material trailer storage building (Lane 1) integrated into the EMS procedure for trailer storage to minimise the number of trailers that would be stood on the yard waiting tipping.
MBM fuel for CHP has odour similar to description for finished product.	MBM Fuel	MBM fuel for CHP tipped directly inside air extracted fuel reception building with doors closed.		

Operation/odour type	Material	Storage Conditions	Containment (for liquids)	Quantity
Finished Product – Meal and oil/tallow are much less offensive than raw material. Meal is a pet food / cereal type odour and oil/tallow is similar to cooking oil.	Processed animal protein (sterilised processed blood) (OFSI)	Process tanks and dryers vented to CHP for thermal destruction of odours with failsafe to RTO.	Within site Yard containment bunding to contain any spills or leaks from any tank or dryer.	Dispatches made to customers daily Monday to Friday and Saturday am. Material processed over the weekend will be the despatched the next working day
	Poultry Oil/Tallow	Tanks are vertical, sealed and back vented to biofilters. The tanks have heating elements using hot water circulation to aid in the movement of tallow, and for cleaning. The majority are fitted with spray balls to assist with cleaning. The quality of tallow is dependent on free fatty acid availability, and the level and frequency of cleaning depends on the final product being stored. Tanks are vertical, sealed and back vented to CHP for thermal destruction of odours with failsafe to RTO.	Bunded poultry oil tanks (110%)	Current holding capacity 3500 tonnes via 35 tanks Dispatches made to customers Monday to Friday on a frequent basis so making space for new deliveries to be processed. Weekly stocks checked to ensure capacity. Sales aligned to production.
Finished Product (cont.)	Meal	Stored inside enclosed building or tote bags until despatched to customers. Transferred in one tonne bags or covered HGV trailers. Trailers removed from site to external location storage for additional storage capacity.	N/A	Up to 5000 tonnes kept in tote bags or bulk internal storage hoppers, buildings, and curtain sided trailers. Sales aligned to production or moved offsite for storage

Operation/odour type	Material	Storage Conditions	Containment (for liquids)	Quantity
Liquid effluent – Process condensate (condensed evaporated water from ABP) is moderately odorous and is kept in a sealed tank. Generally, the effluent has an odour like the raw materials in the process.	Wastewater – balance tank (All wastewater except condensate)	Tank sealed and back vented to RTO	Within site containment Yard bunded to contain any spills or leaks from a tank	Max holding capacity 2x 400m$^{3.}$ Tanks run on a fill/empty basis
	Factory condensate balance and storage tanks	Tank sealed and back vented to RTO. (Two smaller tanks vent to RTO with back-up to bio filter)	Within site containment bunded to contain any spills or leaks from a tank	Two 25 tonne balance tanks and two 200 tonne storage tanks. Tanks are level controlled and auto pumped. Storage capacity is maximum volume of the tanks. Feed to ETP to control volume
Solid Waste – the solid waste has a low odour	Solids from screens /	Filled dolavs stored in the screen area/interceptor shed	N/A	Dolav holds ~400kgs. Dispatched from site as required.
	Sludge from DAF treatment process	Holding tank back vented to RTO	N/A	Max holding capacity 40 tonnes. In 2 tanks. - removed twice/w
	Bio sludge	Decanted to a bulk trailer and removed from site	N/A	28 tonnes stored in trailer. Removed as each bulk

Table 3 details the potentially odorous areas of the JG Pears by-products rendering process and lists the potential sources of odour from each area. These sources of odour are controlled by operating procedures and physical containment, along with capture and treatment using the odour abatement measures described in later sections of this plan.

Table 3

Process Area	Odour Source
Category 3 Raw Material area – (Avian by-products)	Raws Yard. Airlock areas - Tipping & Cleaning of trailers Raw material storage bins Screening & Pumping of entrained liquids Raw material processing and transfer equipment Post Metal detection holding bin Raw material dolavs
Line 3 – Category 3 poultry material	Preheater Driers Holding Bins Tri-canters Presses Screw system Process hall room air Meal Cooling Milling/Sieving Meal handling
Line 2 – Category 3 poultry material	Cookers, pre-heaters, driers Presses Decanters, tri-canters Process hall room air Meal Cooling Milling Meal handling
Line 1 (Blood processing)	Drier Raw blood storage tanks Slow Mixing Bin Decanters Process hall room air Holding bins and screws Meal Cooling Milling Meal handling

Process Area	Odour Source
Line 4 (Feather processing)	Hydrolysers Driers Hydrolysed feather bin Raw feather screws Hydrolysed feather screws Drier discharge screw Process hall air Raw Materials air Meal cooling Milling Meal handling
Line 5 Mammalian blood process	Batch cookers Raw blood tank Processed blood tank
Peripherals	Fat trap Raw Effluent DAF sludge Condensate storage Inlet pump station Collection of processed blood (OFSI) Collection of sludge Finished Goods storage

6.4 Fugitive Emissions

The rendering process is operated within the main process building which is fully enclosed to prevent the egress of odorous air into the surrounding area. The building is extracted with the extracted air treated through the CHP/Thermal oxidiser and the biological filter bed prior to release to atmosphere. The building is held under a negative pressure by the extraction system which consists of two large induction fans each capable of extracting 140,000 m^3/hr of air from inside the building.

Rapid closing doors operate to the front of the building where the raw material reception bays are located as well as to the rear for removal of finished product. The rapid roller shutter doors to the rear of the factory building have been fitted with a two-stage opening system so that the door opens only to the required height to allow a fork truck access and not the full tall height of the building. An interlock system will also be fitted to the two rear

doors so that it prevents both doors opening at the same time and eliminates the possibility of external wind/air blowing through.

The raw material reception bays are “air locked” with a further internal roller door. The external air lock raw material doors have been fitted with an induction loop system so they only open when a vehicle is required to enter or leave the airlock. This removes any operator opening of the door for personnel access or other reasons. The doors close automatically soon after a vehicle has cleared the door area.

The external and internal airlock doors are interlocked so that the opening of the internal door for tipping can only be done when the external door is fully closed. This minimises any potential release of odour from the raw material delivery process. The airlock is also held under a negative pressure by the buildings main extraction system.
The extraction rate and volume for the processing building has been designed to achieve a satisfactory number of air changes per hour within specific compartments of the building. The building is subdivided into its processing parts (raw material reception, production, final product milling etc) and the extraction system is designed and balanced to have greater air changes at the more odorous points within the building. Annex 1 of this OMP details the plan of the building, the respective size and table of calculations for the extraction volumes. The building extraction system ductwork is checked and cleaned as detailed in the CMMS. Checks are performed at set points of the ductwork to ensure that adequate suction is being achieved. The system is balanced using a pitot flow/pressure meter and/or anemometer, which the company always has available.

The integrity of the whole of the building is tested every 12 months by smoke testing. The test is completed when there is no production taking place and the main building rooms filled with smoke. It is not practicable to be able to test the whole of the building in one go. The main process building is divided by internal walls which separate the raw material processing such as the air locks; feather shed raw material area, the cookers, driers and eventually the finished product mills and bagging. Each of these areas is tested separately during a building smoke test.

During a smoke test the exterior of the building is visually checked if there is any sign of smoke being emitted from the fabric of the building following the deployment internally of high-capacity smoke flares. This helps to identify any small gaps or pipe runs through the building fabric which could be a potential to release odours which need sealing up. Certain parts of the building have higher extract rates (by design) and the smoke clears quicker than other sections.

All vehicles arriving on site are fully sheeted with a tight polypropylene sheet in order to minimise the escape of odours and that the "liquid" contents of the vehicle safely remain in the trailer during transit.
All internal bodies of vehicle trailers are washed after a delivery has taken place. The washing and disinfection of all vehicle trailers is undertaken in the air lock bay once tipping has completed.

6.5 Effluent Treatment Plant (ETP)

All external yard and internal building drainage enter the ETP through a main collection sump situated at the rear of the installation. The main site fat trap and screen is located inside a contained small building with all doors kept closed. The building is kept under extraction with the air extracted to the biofilters. Large solids and fats are captured by a parabolic screen. The contents of the screen drop into a mini skip which is emptied on a regular basis.
The contents of the sump are treated through bio digestion, with fat digesting bacteria in the form of tablets or powder to reduce fat build up in this area. If necessary, crust is periodically removed from the sump into an enclosed container for disposal off-site.

From the balance tanks, effluent is sent to the Dissolved Air Flotation (DAF) process via the coagulator where the addition of Ferric (Ferric Sulphate), Caustic (Caustic Soda) and Polymer take place.

Powdered anionic polymer coagulant is mixed and dosed from the polymer mixer adjacent to the DAF plant in the ETP building. Ferric and Caustic are stored in bulk storage tanks outside the ETP in accordance with EMS procedure Storage and Handling Chemical Fuels Oils (Non-ABP).

Once chemically treated, the DAF tank clarifies the effluent by removing the suspended solids. Suspended solid matter floats to the surface and is removed by a skimming device and pumped to a dedicated storage tank. DAF sludge is removed from the site by tanker as "DAF Sludge" as described in the Waste Management procedure.

After screening the effluent stream is directed to the covered and vented balance tanks for intermediate storage from where it is batched processed using a chemo/physical treatment process. The effluent stream from the intermediate storage (balance) tanks is mixed with condensate from the cookers as it enters the biological treatment system. The ETP and its treatment systems are operated and monitored in accordance with the Effluent and Water Emissions procedures within the EMS.

The biological plant has 5 main processes:

- Contact tank: where raw effluent is mixed with activated sludge in aerobic conditions as determined by an online continuous Dissolved Oxygen (DO) meter in the Reactor. The contact tank has air extraction to the RTO abatement system.
- Anoxic tank: where de-nitrification takes place (conversation of nitrate to nitrogen gas). Ammonia levels (as ammoniacal nitrogen) are tested daily.
- Aerobic tank: where air is introduced via a diffuser system to oxidise organic pollutants and promote nitrification (conversion of Ammonia to Nitrate). Ammonia levels are monitored daily using an onsite laboratory. Aeration is monitored by DO (dissolved oxygen monitors) which adjust the amount of air blowing and dissolution in the Aerobic tank. A set point of 1ppm oxygen is maintained. This is fed by the inlet pump station.
- Membrane separation: multiple membrane units (each with a capacity of circa 10 tonnes per hour) are used to separate activated sludge from the treated effluent. The units are cleaned when the back pressure sensor indicates that cleaning is required.
- Sampling tank: where effluent is monitored for pH and turbidity prior to reprocessing (if out of spec) or being sent to the discharge tank (if in spec) from where the treated effluent is mixed with collected rainwater before being pumped to the river Trent.

The solids collected from the membrane separation process (RAS - recycled activated sludge or bio-sludge) is normally returned to the ETP, however when excess sludge is produced this is mixed with a polymer and passed through a decanter where the solids are separated (these are used as a fertiliser via land application). The solids are loaded into an open HGV trailer or farm trailer via an enclosed screw feed. The solids are not odorous unless stored for prolonged periods (greater than 7 days), smelling very similar to good humus laden earth. The trailer, once full, is removed from site. The liquids are returned to the main ETP tank via the inlet sump.

The treated outflow from the ETP is reused where possible with only the excess discharged to the river Trent. An RO plant is used to improve the quality of the final effluent so that more water is reused for site operations and cleaning activities.

The clauses from the Sector Guidance note which cover odour control with respect to liquid effluent are:

- Process effluent is kept separate from surface drainage unless agreed with the regulator.

- All liquid storage tanks should be located within bunds that are designed, constructed, and located away from watercourses and drains to appropriate standards and ensuring that the volume is more than 110% of the largest tank.
- The handling and treatment of liquid effluent should be carried out so as to minimise the emission of offensive odours. Where necessary to prevent odour emissions, tankers or transportable tanks should be vented to suitable arrestment plant or back vented.

The onsite ETP is predominantly a contained and sealed system. All key liquid storage and treatment tanks are enclosed tanks, back vented to abatement plant. The membrane separation units are housed within a building. The ETP has a DCS (distributed control system) with autonomous controllers distributed throughout the system for monitoring and operating the ETP. Alarms will activate to notify the operator if the system detects a flow failure, pump malfunction, valve problem or incorrect tank level.

A manual check form for the operating conditions of the ETP is completed daily. The check form is completed as part of Effluent and Water Emissions procedure for effluent treatment and for monitoring and measurements procedures of effluent.
The DCS systems and daily operator checks ensures that correct operating conditions are always achieved for the ETP which minimises odour potential along with the physical controls described such as tank back venting, enclosed tanks and bunding.

7.0 Identification of Sensitive Receptors and Monitoring

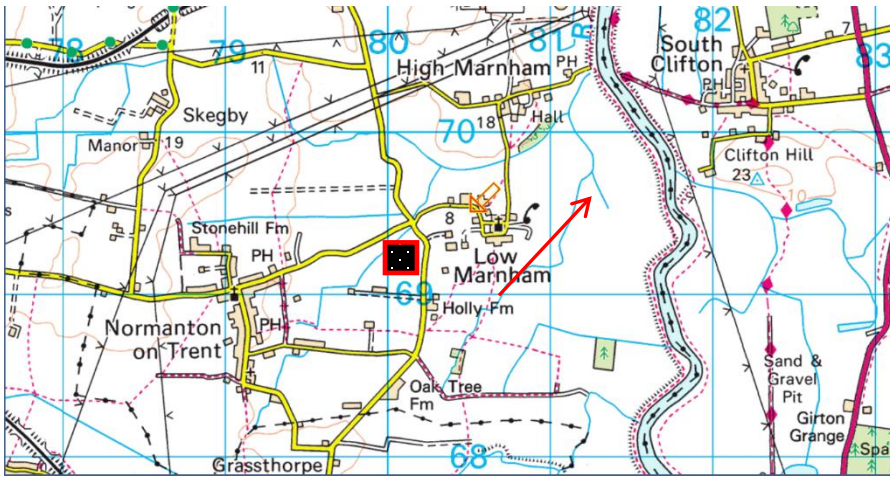
The predominant surrounding area to the facility is rural with a very low population density. The table overleaf (page 24) lists the nearby properties to the JG Pears facility. The maps indicate the location of these properties in relation to the facility. Each receptor is identified as a residential dwelling. The site operates 24/7 364 days of the year. The site is an essential facility within the food supply chain.

Table 4: Odour assessment receptor locations

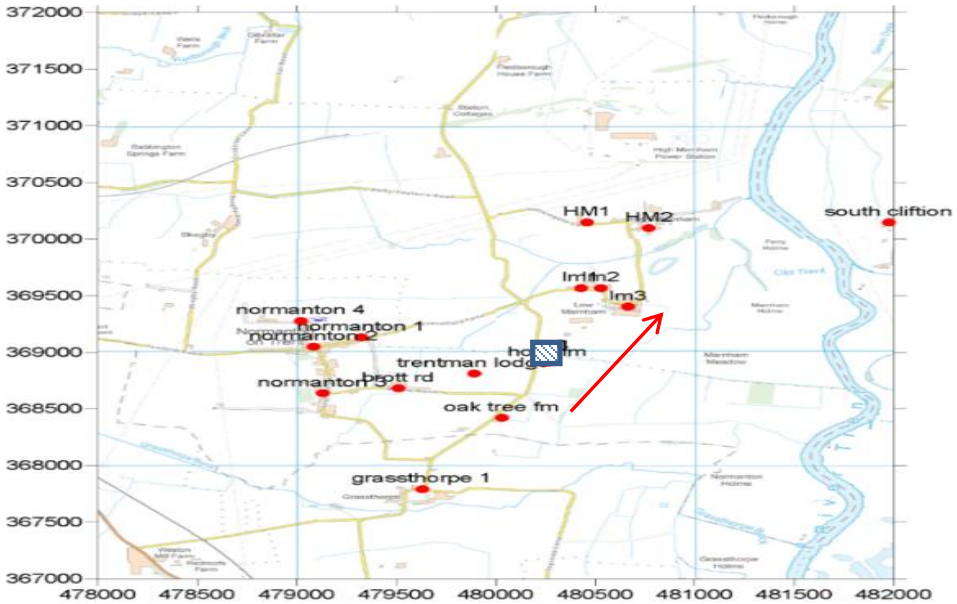
Receptor	Easting	Northing	
Low Marnham 1	480430	369567	
Low Marnham 2	480530	369567	
Low Marnham 3	480665	369402	
Brott Rd	479510	368682	
Trentman Lodge	479890	368812	
Normanton 1	479325	369132	
Normanton 2	479085	369047	
Normanton 3	479130	368637	

Normanton 4	479020	369277	
Holly Farm	480260	368907	
Oak Tree farm	480030	368422	
Grassthorpe 1	479630	367792	
High Marnham 1	480460	370147	
High Marnham 2	480770	370097	
South Clifton	481975	370147	

The prevailing wind is marked on the map below with a red indicator arrow.



Details of the positions of the specified discrete receptor points are shown, with the receptors marked by red circles accompanied by a reference number.



The prevailing wind is south westerly over a rural area which is sparsely populated. The red direction arrow shows the prevailing wind direction. The village of Low Marnham is closest to the processing facility and downwind of a prevailing south westerly wind.

There are several external sources of odour in the area local to the JG Pears site. Both Normanton-on-Trent and Low Marnham house several farms, which can produce a manure odour close to dwellings. Situated on Grassthorpe Road, immediately opposite the site boundary, is Holly Farm Eggs, a chicken farm. Further to this, approximately 9 miles south from the JG Pears site is British Sugar, Newark. Under specific high density weather conditions and with a southerly wind, a sweet but pungent odour from the sugar factory may be detected in the area.

7.1 Odour Monitoring

Off-site odour monitoring is undertaken on a regular, usually daily, basis as a matter of routine and in response to complaints received from the general public or formally from the Environment Agency. The EMS Odour Management procedure details both onsite and offsite odour monitoring. The odour assessment considers receptors close to the site and monitoring points are selected relevant to these receptors. The assessor records the odour intensity; the scale at which this is measured, along with the offensiveness. The description and scoring are in line with the EA guidance document for odour assessment and is detailed in table 5 below.

Table 5

Intensity		Offensiveness	
Score	Intensity	Score	Perceived Hedonic Tone
0	No odour	0	Neutral/No odour
1	Very Faint odour	1	Mildly Unpleasant
2	Faint odour	2	Moderately Unpleasant
3	Distinct odour	3	Unpleasant
4	Strong odour	4	Very unpleasant
5	Very strong odour	5	Extremely unpleasant
6	Extremely odorous		

Odour is assessed both on-site and off-site. Management and supervisory staff working on-site on a daily basis are prompted and trained to be aware of any odours or abnormal situations where an odour or excessive odours are detected beyond the routine daily

odour check. The odour monitoring undertaken assesses the level of odour generation and the potential for off-site impacts, so that pro-active mitigation measures can be undertaken early enough to mitigate any potential offsite impact.

Where on-site odours are greater than 3 in intensity, and the following audit detects off-site odours which could impact on receptors (either by means of a complaint being reported or an odour being detected through JG Pears own monitoring checks), the following steps are taken:

- Inform site management (24/7 email notification to factory management and supervisors)
- Complete the daily monitoring form, which also captures the investigation.
- With site management teams, the identified odour is mitigated, and a further audit conducted to verify that odour is not detected offsite.
- If the odour cannot be prevented from being detected offsite for an extended period, the regulator will be informed (Schedule 5 notification) of the issue and necessary corrective actions taken.

Further to this the odour recording form details the time and date of assessment, details of the individual undertaking the survey and weather conditions. Odour from other sources is identified where possible and reported to the relevant authority for information and/or action as appropriate.

When an odour complaint is received at the site an investigation will be carried out. The investigator will collect data including the complainant's location, a description of the nature of the odour causing a nuisance, site operations occurring at the time of assessment, weather conditions including cloud cover, wind direction and wind speed (using information from the on-site weather station) and visit to off-site location. The form will also provide details of the corrective action to be undertaken if required. Reporting to the Regulator is undertaken as per the Permit requirements.

A detailed odour monitoring procedure is incorporated into the site's EMS. The Odour Management procedure is the detailed procedure for on-site and off-site odour monitoring. The facility operates a comprehensive automated and web based meteorological station which data logs wind speed, direction, temperature and humidity, also accessible from mobile phones.

7.2 Odour Complaint Measures

Elevated levels of odour may be identified either by:

- Receipt of an odour complaint from a third party suggesting that there is an odour from the installation.
- Detection of odour at the site boundary because of the monitoring procedures.
- Malfunction within the animal by-products production facility.
- Malfunction of the odour abatement systems.
- Weather extremes causing excess stock building up on external Yard.

There is a site recording system to record complaints, which is completed by management (or designated responsible person) and recorded via the Environmental Management System (EMS). As part of the EMS, the complaints procedure is implemented. All complaints about off-site odour that are directly communicated to the site are responded to and action taken immediately. Staff are deployed as soon as possible to witness the alleged odour. Contact is usually made with the complainant via the offsite visit to assess the odour.

Site management (or designated responsible person) ensure that:

- The complaint is investigated to identify the cause, if necessary, this will usually involve direct communication with the complainant.
- Check weather conditions specifically wind direction in relation to the complainant's location (using on-site met station)
- In the event of elevated levels of odour being detected, the presence of 'abnormal' on-site activity is assessed and if necessary, preventative action is taken that will prevent a reoccurrence of the same problem. These actions must be documented.
- If the complaint can be verified, the regulator will be notified and given information on the investigations conducted and actions taken as appropriate.
- Complaints arising from the local regulator will be investigated and reported in line with the above procedures.
- All complaints are reported to the Operations Director, Rendering Manager, Production and Head of SHEQ and discussed at regular site meetings.
- If the investigation indicates that the complaint has not been justified this will be clearly recorded on the Complaints Log, which is also an incident form.
- All complaints will be logged and are available for inspection.

In the event of elevated levels of odour being identified, the event will be recorded as per the EMS procedure. The regulator may be notified if the there is a potential for elevated odour levels to continue. Should an emergency occur out of hours, a nominated representative will contact shift supervisors and managers, as appropriate, via radio or mobile phone. The nominated representative will identify whether management need to attend site to resolve the problem.

Abnormal meteorological conditions such as low wind strength, low pressure, high temperatures may promote elevated levels of odour either on the site or at nearby sensitive receptors. A wind direction towards sensitive receptors may increase odour levels. Conversely very low wind strength and temperature inversions may minimise dispersion and potentially create a build-up of odour. High temperatures may also increase emissions. The mitigation measures to be undertaken in the event of abnormal meteorological conditions are the same as the contingency mitigation measures detailed above (see section 8.5, table 10)

Process operating conditions will be immediately investigated to ascertain the source of any abnormal odour. Abatement systems would be investigated to ensure that they are operating affectively. More detail of abnormal and contingency measures for abatement systems is detailed in section 8.5.
The Odour Management Plan and Complaints procedure contained in the sites EMS details a comprehensive response system for odours.

8.0 Odour Control, Management and Abatement Systems

The company operates two “end of pipe” odour abatement systems utilising either thermal destruction or biological treatment. Thermal destruction of odours is conducted through the combustion boiler of the CHP plant with the existing regenerative thermal oxidiser (RTO) providing a failsafe back up. The intensive odorous air from the animal by-products processing facility is directed daily to the CHP boiler for thermal destruction. The two large Biofilters are used for treating “low” intensity odours which is mainly internal building air and some tank back venting.

Odorous air streams from the production facility are categorised into high, medium and low. Concentrated odours (high and medium); are those directly associated with the cooking, drying and condensing processes of by-products processing and lower intensity odours such as air from the inside of the production building, some tank back venting and the CHP fuel reception building. In line with BAT requirements the site has risk assessed processing operations so that specific odour sources are treated by particular abatement methods and systems. Intensive odours are treated by thermal destruction via the CHP

boiler or Regenerative Thermal Oxidiser (RTO). Lower intensity odours are treated by the large biofilter beds.

The various process areas, odour treatment route and odour minimisation techniques for the animal by-products processing operations are detailed in table 6. The odour risk is categorised depending upon the intensity of the odour. The operation and control of the abatement systems are detailed in section 6.

Table 6

Process Area	Odour Source	Odour risk/ Categorisation	Release & treatment route	Other Minimisation technique
Raw Material area	Airlock areas - Tipping & Cleaning of trailers Raw material storage bins Screening & Pumping of liquid Grinding Dolavs Post Metal detection holding bin. Crusher Back vents of main storage bins Drain Screen	Low Medium – treated as high	Biofilter CHP/RTO	Doors Airlocks Building fabric Lids on screen and bins Rapid rotation of trailers into Lanes
Line 3	Preheater Driers Holding Bins Tricanters Presses Screw system Press water tank. Stick water tank. Evaporator condensate tanks CIP Tanks Process hall room air	High Medium – treated as high. Low	Evaporator system with any spare gases passed to condensers with resultant NC gas to (high) CHP/RTO CHP/RTO Biofilter	Doors Building fabric Enclosed – lids on screens and bins.

	Meal Cooling Milling/Sieving Meal handling			
Process Area	**Odour Source**	**Odour risk/ Categorisation**	**Release & treatment route**	**Other Minimisation technique**
Line 2	Cookers Presses Press feed screw. Decanters 1st Stage meal cooling screw Process hall room air Meal Cooling Milling/meal handling	High Medium – treated as high. Low	Process gases to condensers with resultant NC gas to CHP/RTO. Cookers sealed kept under vacuum and continually monitored. Biofilter	Doors Building fabric Enclosed – lids on screens and bins
Avian Blood Process - Release of odour from the material (blood) when delivering or collecting	Drier Raw blood storage tanks Slow Mixing Bin Decanters Drier feed screw Stick water tank. Process hall room air Meal Cooling Milling Meal handling	High Medium – treated as high. Low	Process gases to condensers with resultant NC gas to CHP/RTO CHP/RTO Biofilter	Storage Tanks Building fabric Doors

Process Area	**Odour Source**	**Odour risk/ Categorisation**	**Release & treatment route**	**Other Minimisation technique**
Feather Process. Release of odour from the unloading of raw material, processing the material, despatch of finished product (meal), treatment of effluent from the process, loading of feather water	Hydrolysers Drier Hydrolysed feather bin Raw feather screws Hydrolysed feather screws Drier discharge screw Process hall air Raw Materials air Meal cooling, Milling Meal handling	High Medium – treated as high. Low	Process gases to condensers with resultant NC gas to CHP/RTO CHP/RTO CHP/RTO Biofilter	Doors Building fabric
Mammalian blood process	Batch cookers Raw blood tank Processed blood tank	High Medium – treated as high.	Process gases to condensers with resultant NC gas to CHP/RTO Cookers sealed kept under vacuum and continually monitored. CHP/RTO Tank gases to condensers with resultant NC gas to CHP/RTO	Doors Building fabric

Peripherals	Condensate Storage	Medium	RTO via ducting	Storage Tanks
Peripherals	Raw Effluent Storage Storage of DAF sludge Collection of processed blood (OFSI) Collection of sludge Inlet pump station	Low Medium	RTO via extraction fan Carbon filter or deodoriser tank filter for tanker space air RTO via ducting	Vacuum Tanks Biofilter
Process Area	**Odour Source**	**Odour risk/ Categorisation**	**Release & treatment route**	**Other Minimisation technique**
Peripherals	Cooked Blood	High	Back vented to CHP/RTO	Storage tanks
Peripherals	Tallow tank farm	Low	RTO via ducting	Storage tanks
Peripherals	Yard fat trap	Low	Biofilter via ducting	Doors Building fabric

Where the RTO is currently listed in the table as the thermal abatement technique for that specific part of the process, the CHP boiler is the principal method of thermal destruction for high and medium intensity odours.

Table 7 overleaf lists further operations associated with the animal by-products processing operations and gives additional details of the critical pathways, and control measures to minimise an odour release through process controls and techniques.

EMS procedure details the operation controls and checks for odour abatement systems at the site

Table 7

Operation	Release Points Identified	Critical Pathway	Control Measures in Place	Implementation of Measures
Blood Processing – Unloading raw material	Tanker - connections	Poor connections and / or damage to pipework	Procedures Tanker connects to tank to allow venting to area under abatement. The blood tanks are back vented to the thermal odour abatement system. All transfers and connections done inside building. High level alarms to warn of overfilling	Documented procedures trained out. Venting occurs into process building. which extracts to bio filter (Avian) or directly to bio filter ducting (Mammalian). Tankers connected to mobile carbon filters on Yard if high ambient temperatures.
Operation	**Release Points Identified**	**Critical Pathway**	**Control Measures in Place**	**Implementation of Measures**
Blood Storage	Tank vent Over filling of tank - spillage	Failure of abatement or damage to pipework.	Tanks vent directly to odour duct work to RTO (back-up to Bio filter) Tanks have high level alarm and is in a bunded area.	Venting occurs directly to CHP/RTO thermal abatement systems.
Loading Tanker for Despatch of processed liquid blood	Vent Pipe	Poor connections and / or damage to pipework	Discharge pipeline connected to vent pipeline	Displaced air from tanker back vented to CHP/RTO or use of mobile carbon filter
Rendering Process – Unloading raw material	Unloading the vehicle	Building integrity failure, abatement failure.	Takes place in air lock with doors closed. Outside of the shed the full vehicle is always sheeted. Removal of extraneous matter procedure in place to minimise time the vehicle is outside un-sheet	Documented procedures trained out. Venting occurs into animal by-product reception air lock which extracts to bio filter

Loading Tanker for Despatch of processed liquid blood or effluent	Vent Pipe	Poor connections and / or damage to pipework	Discharge pipeline connected to vent pipeline	Displaced air from tanker back vented to CHP/RTO or use of mobile carbon filter
Rendering Process – Unloading raw material	Unloading the vehicle	Building integrity failure, abatement failure.	Takes place in air lock with doors closed. Outside of the shed the full vehicle is always sheeted. Removal of extraneous matter procedure in place to minimise time the vehicle is outside un-sheet	Documented procedures trained out. Venting occurs into animal by-product reception air lock which extracts to bio filter

Operation	Release Points Identified	Critical Pathway	Control Measures in Place	Implementation of Measures
CHP Unloading MBM fuel to fuel reception building. MBM storage silos	Unloading the vehicle	Building integrity failure, extraction failure.	Building has permanent suction to facilitate air changes. Control via forced draft fan drawing air into the CHP boiler.	Documented procedures trained out. Air treated in CHP boiler
Rejection of out of spec material	Fugitive emissions in transport	Odours may escape if trailer is leaking or not sheeted correctly.	Out of spec material is rejected (not suitable, incorrect category) to prevent processing issues including increased odour.	Transported off site as soon as possible, trailers remain fully sheeted.
Washing Down	Fugitive emissions	Building integrity failure, abatement failure.	Takes place in tipping shed with doors closed. Also – to reduce odours in effluent, solids are removed by a screen before entering the discharge tanks.	The tipping shed is extracted to the bio filter.
Processing	Process equipment Cooker Press Milling	Building integrity failure, abatement failure. Fugitive emissions from building or from moving / loading meal.	Cooker, condenser, presses, and other process equipment extracted to RTO/CHP. Process building extracted to bio filter. Room air extracted to bio filter	Thermal odour abatement systems (CHP) running during processing. Biofilters running for room air extraction.

Operation	Release Points Identified	Critical Pathway	Control Measures in Place	Implementation of Measures
Loading of Meal in bags / containers	Fugitive emissions	Odour carried by dust	Carried out in building	Procedures trained out
Movement of Meal in bags	Fugitive emissions	Odour carried by dust	Bags sealed/ containers lidded	Procedures trained out
Storage of fat/tallow	Over filling of tank – spillage	Release of odours from spill in bund	Spillage contained in bund and cleaned up as soon as possible.	Tank fitted with high level alarm. Bund inspection and cleaning procedure in place. Tanks back vented to biofilter
Loading tanker with fat/tallow	Pipeline connection / spillage. Odour from transfer	Poor connections and / or damage to pipework	Area kept clean	Trained operatives. Road tanker loading gantry has extraction of displaced air from road tanker vented to biofilter
Movement of Meal in bags	Fugitive emissions	Odour carried by dust	Bags sealed/ containers lidded	Procedures trained out
Storage of fat/tallow	Over filling of tank – spillage	Release of odours from spill in bund	Spillage contained in bund and cleaned up as soon as possible.	Tank fitted with high level alarm. Bund inspection and cleaning procedure in place. Tanks back vented to biofilter
Loading tanker with fat/tallow	Pipeline connection / spillage. Odour from transfer	Poor connections and / or damage to pipework	Area kept clean	Trained operatives. Road tanker loading gantry has extraction of displaced air from road tanker vented to biofilter

Operation	Release Points Identified	Critical Pathway	Control Measures in Place	Implementation of Measures
Feather processes – Unloading raw Material	Unloading the vehicle	Building integrity failure, abatement failure.	Takes place in Feathers tipping shed with doors closed. Building space air is extracted to the condensers and thermal oxidiser. Outside of the shed the full vehicle is always sheeted.	The shed is extracted to the bio filter.
Processing	Hydrolyser Process building	Building integrity failure, abatement failure. Fugitive emissions from building or from moving / loading meal	Building extracted to bio filter	condenser and Thermal odour abatement system. Bio-filters running for room air extraction
Movement of Meal in bags	Fugitive emissions	Odour carried by dust	Bags tied to seal.	Bags outside for minimal time (for loading, but not storage), covered if required. Procedures trained out
Effluent Treatment Plant Main fat trap	Fugitive emissions from chamber	Airborne if doors left open.	Integrity of building, Vented to odour ductwork to biofilter	Doors only opened when access needed. Vented to biofilter
Interceptor screen	Solids	Airborne if left outside	Lined dolavs stored inside the building, covered, prior to emptying	Inside closed building
Inlet pump tank	Pipeline/ connections	Poor connections and / or damage to pipework	Vented to odour ductwork to RTO. High level alarms to warn of overfilling	Vented to RTO
Condensate Storage Tanks	Pipeline/ connection	Release to air from poor connection/pipe damage during intake or dispatch	Vented to odour ductwork to RTO. High level alarms to warn of overfilling	Vented to RTO Tanker pipe inserted into scrubber solution before starting operation.

Operation	Release Points Identified	Critical Pathway	Control Measures in Place	Implementation of Measures
Balance Tank	Pipeline/ connection	Release to air from poor connection/pipe damage during intake or dispatch	Vented to odour ductwork to RTO. High level alarms to warn of overfilling.	Vented to RTO, and carbon filter for tanker
DAF Sludge Tank	Pipeline/connection	Release to air from poor connection/pipe damage	Vented to odour ductwork to RTO	Vented to RTO
DAF Sludge Intake or dispatch	Tanker connections	Poor connections and / or damage to pipework during intake or dispatch	Tanker vents to a scrubber solution	Tanker pipe inserted into scrubber solution before starting operation. Odour observation during tanker loading.
ETP Process building	Fugitive emissions from building	Very little odour from OS membrane systems which are enclosed and sealed systems	N/A	N/A

Peripheral odour control and minimisation techniques associated with the building and storage tanks are detailed in table 8 below. Odour Management of the EMS incorporates the control measures described below.

Table 8

Point	Operational Control
Doors	All factory doors shall be checked on each operational shift. Any defects shall be recorded and reported. The doors shall be repaired as soon as possible following reporting of defects. All access doors to air locks and areas requiring regular access containing cooking equipment shall be of the fast-acting type and have restricted height operation. All doors shall remain closed whilst the process is in normal operation except for normal operational access and egress. All personnel doors shall be fitted with self-closure devices and kept closed when not in use. Airlocks for raw material areas shall be fitted with interlocked doors to prevent both doors being open at the same time. The doors shall only be operated by the induction loop with no manual operation.

Point	Operational Control
Building Fabric and proof of negative pressure	The building has been designed and is maintained in good order to minimise the possibility of odour escape from the building. Any damage to the building fabric shall be recorded and reported and repaired as soon as practicable. The building integrity and proof of negative pressure shall be checked using the smoke test method; this test shall be carried out annually (refer to procedure 8.1.0.012 Maintenance - Factory). All results shall be recorded, and any defects repaired without undue delay. Notification of abnormal testing results shall be made to the Environment Agency. Daily observation that the main doors to the building are being pulled inwards by the negative pressure (refer to photo on page 11) and air is being sucked into the building from the intake louvres located on the front of the building.
Vacuum tank operations (waste sludge removal, drain cleaning etc)	Vacuum tank operations shall take place within a building or directly back vented to the biofilter whenever possible. Where a fixed back vent system is not available a mobile odour abatement unit shall be connected to the tanker
Storage Tanks	All storage tanks for the storage of potentially high intensity odorous materials (raw blood etc) shall be back vented to the CHP/RTO thermal odour abatement system. Other low intensity tanks are back vented to the biofilters. The integrity of these tanks to contain odours emissions are visually checked as part of the sites CMMS. Signs of any leaks or detection of odorous emissions shall be recorded and reported. All tanks are in purpose-built bunds or contained yards/areas. Bunds can contain at least 110% of tank contents. All bunds are checked monthly for integrity and any excess rainwater pumped to the ETP. Any spill or leak will be actioned immediately, and tank contents held in the bund will pumped to a mobile tank. All containment yards/areas will be visually inspected along with drainage systems.

8.1 Thermal Odour Treatment - CHP Plant

Thermal oxidation is a proven technology for destroying or abating malodourous emissions. In typical operation, a thermal oxidiser will remove over 99% of odorous emissions.

The approximate odour concentration in the extracted high intensity odorous air stream is in excess of 800,000 ou_E/m^3 and following effective oxidation the residual odour concentration falls to less than 1,261 ou_E/m^3 which equates to an approximate 99.8% odour reduction. Testing of the CHP odour removal efficiency on 28/11/2108, in accordance with BSEN13725:2003 "Air quality Determination of odour concentration by dynamic Olfactometry" returned 98.5% efficiency, and then in 2021 99.8% efficiency and in June 2024 99.9% efficiency. The efficiency testing of the CHP is conducted at least every two years by a UKAS accredited testing and analysis consultancy.

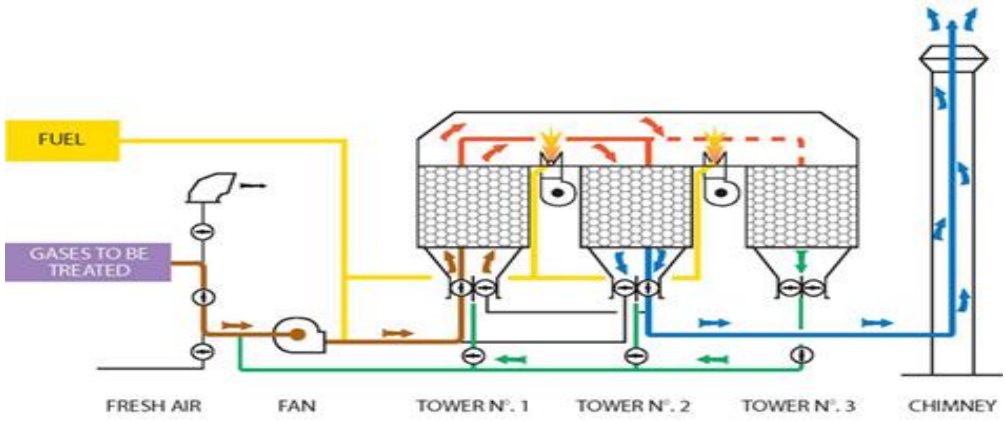
The volume of extracted air by the CHP combustion air fan is circa 35,000m3 (the same as for the RTO when it was used as the principal source of odour abatement before the CHP plant was built). The high combustion temperatures of the CHP boiler are in excess of 1000°C which are ideal for the effective thermal destruction of odorous compounds. The CHP boiler has to meet IED requirements of a minimum of 850°C for more than 2 seconds. Testing of the boiler has confirmed this. Automated control and monitoring systems via a SCADA system control the extraction rates of air from the Newark by-products processing facility. Alarms will sound and notify CHP plant control room operators if there is a malfunction with the extracted air system or the boiler. Standard operating procedures would be followed in the instance of abnormal operations. The odorous airstream would be directed to the RTO where it is held in standby mode, near operating temperature.

The CHP plant boiler is the principal means of odour abatement for the high intensity odorous air stream from the animal by-products processing facility.

8.2 Thermal Odour Treatment - Regenerative Thermal Oxidiser (RTO)

The RTO is designed to treat up to 45,000m3 per hour of high intensity process vapours and odours by heating the odour containing air to in excess of 850°C to oxidise (burn) the odours. The current air loading for the RTO from the animal by-product facility is approximately 30,000m3 per hour. The RTO consists of three canisters filled with a ceramic material which recovers the heat energy from the oxidation process. A combustion chamber interconnects the three vertical canisters. In each canister there are flow control valves to direct contaminated air and treated air from one canister to another. The three-canister system ensures that there is no release of untreated air when the combustion gas flow is diverted onto the next canister, which can happen in two canister systems. The change over time between canisters can be set between 90 and 150 seconds. The treated gas stream is then released via the 50m multi-flue stack.

The schematic diagram below illustrates how the RTO operates. More detailed specifics of the JG Pears RTO are shown in the SCADA screen shots in Odour Management Procedure.



The oxidiser effectively works in automatic mode within programme control parameters.

Table 9. Control parameters for the RTO

Parameter	Set point	Control
Canisters change over	90 to 150 seconds	Automatic
Minimum combustion temperature	850C	Automatic
Maximum Temperature	950C	Automatic
Burn out cycle operation	Set on run hours and pressure as procedure	Automatic

The RTO is operated by a SCADA control system within the RTO's control room. From here information on the operating parameters and status of the unit is monitored, controlled, stored, data logged and displayed. If there is an operating problem with the RTO such as a drop in the set temperature, then alarms will sound both in the oxidiser and rendering plant control rooms. Engineering staff would investigate the source of the malfunction immediately and implement the necessary corrective action to restore normal operating conditions.

The RTO has a preventative inspection and maintenance programme which is part of the sites CMMS. This involves daily, weekly, monthly, 6 monthly and annual schedules. The RTO unit is cleaned by performing a ceramic regeneration approximately every week or sooner if the pressure drop sensor across the RTO increases. When in cleaning mode the temperature of the unit automatically increases the ceramics at the bottom of the canisters to 400°C. This process acts very similarly to how a diesel engine motor vehicle cleans the diesel particulate filter.

A daily check is completed for the RTO, which is generated and the results kept on the CMMS Holistech planned maintenance system (HolisTech Web 28.15.0.1).

Essential spares for the RTO are kept on site to minimise any down time. However, an annual service of the RTO also identifies parts that may need replacing with the following 12 months.

The RTO would only then be used during periods of set downtime for the CHP boiler, such as routine maintenance of the boiler or an emergency where the CHP boiler would be offline for more than 4 hours.
If the CHP boiler is off-line for a short period of time due to emergency maintenance or there is a drop-in temperature below the IED requirement the back-up auxiliary boilers will immediately be fired up and the high intensity odour air stream directed to the boilers for thermal destruction.
It should be noted that the CHP and auxiliary boilers cannot be operated at the same time as this would generate excessive steam output that cannot be used.

Diagram 1 on page 58 details the contingency procedures and time settings in such circumstances in more detail. The auxiliary boilers take approximately 30 to 40 minutes to achieve the correct operating temperatures for steam generation from their banked state.
The reliability of the CHP plant will be such that the above scenario would only occur very infrequently.
If there is no steam availability due to combustion plant breakdown the factory cooking processes would not operate and there would be a temporary stop to animal by-products being unloaded.

8.3 Bio Filters

The Biofilters are used to treat the large volume, lower intensity odours from the processing plant (such as general building extraction) and any other odour streams that have not been designated to be directed for thermal destruction currently using the CHP/RTO.

There are two biofilters supplied by a single duct from the factory. The duct splits just before the actual biofilters such that there are two separate humidifiers and fans pushing the extracted air through each filter. The reason for two filters is that constructing a single large, covered filter and providing a roof would pose construction challenges for such a large structure. Also, the air entering the biofilter would decrease in velocity before it would potentially reach the end of the filter. This would in turn affect the function of the bed to abate the odours effectively and consistently. The design of the two filters and their

respective sizes enables air to evenly reach the whole of the filter bed at a suitable pressure to homogeneously percolate up through the filter bed. Having two filters enables a failsafe position such that a fault with a humidifier or fan, or filter bed or irrigation system means that factory air can still be extracted, though at a lower rate until the fault is corrected.

The biofilters use microorganisms to remove odorous air pollution. They operate continuously 24hours a day 7 days a week (except for a short period of weekend cleaning and maintenance).
The efficiency of the neutralisation process is governed by the speed the air is passing through the bed, the density of the filter medium, moisture content, temperature and slight alkalinity. Both bio filters are contained within a covered structure and extract to atmosphere through 2 x 20m chimneys. The installation of lids over the filter medium enables a more controlled and stable environment for the filter to operate in, such that the media is not prone to drying out is direct sunshine or over moist media during heavy rain. The building also enables a stable temperature for the filter all year round. The point discharges (chimneys) also aid dispersion under most climatic conditions. The air flows through a packed bed of media (clay pellets) and the pollutant transfers into a thin biofilm on the surface of the packing material, bacteria held in the biofilm degrades and breaks down the odorous compounds.

The total volumetric flow rate to each of the biofilters is currently around 30 m^3/s with approximately 110,000m^3 of air processed through each filter per hour. Each filter bed is 77 meters in length and 15 meters wide. The clay ball media is at a depth of 1350mm. The empty bed residence time has been designed to meet a minimum 40 seconds. When calculated at a 40 second residence time (77x15x1.35 = 1559m^3 x 3600 seconds divided by 40 = 140,000m^3) each biofilter has a capacity to treat 140,000m^3 of air. Currently the filters run at approximately 110,000m^3 volume of extracted air. The clay media is expected to be suitable for use for at least 10 years, if not longer. A programme of inspection takes place twice per year and turned and replenished as required.

The odorous air is drawn from the process building along a stainless-steel duct by two extraction fans powered by inverter driven motors, the start sequence and speed of these units are controlled via the DCS. Before the air enters the biofilters it passes through humidifiers where treated effluent water is pumped into the air stream via four sets of spray nozzles. The system level is maintained and controlled by a level switch located in the humidifier spray tank. The humidity is >95%. Before entering the biofilter header, the air passes through a series of baffle plates which remove large water droplets entrained in the air stream.

The humidifiers are drained and cleaned on a weekly basis and the spray nozzles are checked for operation and blockages following the PPM work instruction and the spray nozzle maintenance cycle. The water from the humidifiers is recirculated to the humidifier spray tank with a constant drain and make up of water, based on visual inspection by the ETP operators. The ammonia level of the water is monitored daily and the colour of the water is inspected each shift to ascertain the level of solids that has been trapped in the humidifier spray. The operator will change the water based on this colour assessment, an odour assessment and the measured levels outlined below in the Biofilter sprays recirculating water. The system level is maintained by treated water make-up, controlled by a level switch located in the humidifier spray tank.
All operations are controlled by the DCS. The recirculated water is monitored daily for pH, Ammonia (NH4-N), Nitrite (NO2), Nitrate (NO3) and weekly for Ortho Phosphate (P). The pH of the spray water is monitored and controlled by the DCS and is dosed with alkali to maintain a pH of between 7 & 8.

The spray water is bled to maintain the ammonia concentration to the desired level (at least below 300mg/l) and phosphate added to ensure that at least 1ppm can be detected at all times. The recirculation system is fitted with a blowdown valve which dumps used spray water to the effluent system. The blowdown is controlled by the DCS but does have a manual override which is tested weekly as part of the CMMS. The tank is fully drained and refilled daily.

The biofilter media is inspected for compactness every 6 months following a PPM and testing procedures. Any identified isolated compacted areas will be scheduled for turning or replacement.

The back pressure sensor is also an early indicator if any slight compaction is taking place of the bed. Equally the bed is checked for any fissures which may allow the odorous air to escape quickly through. The bed is uniformly irrigated by overhead sprinkler heads on an automated timer system. The system is checked daily by the Effluent Treatment Plant operators, and cleaning undertaken weekly or as necessary.

During cleaning of the humidifiers, which is usually weekly on a low production day, one bed will be shut down, effectively halving the extraction from the factory. The cleaning takes approximately 3-4 hours to complete and is completed usually at the weekend every week when production is minimal or has ceased during clean down.

The odour loading on the biofilters can deal with the odour units being received together with the bed size and residency time of the volume of air being extracted and processed through each filter.

8.3.1 Biofilter Odour Monitoring and Testing

Tests are carried out annually by an approved odour test laboratory of the odour removal efficiency of each biofilter and the characterization of the final discharge air emanating from each stack. The Odour samples collected are in accordance with the sampling requirement set out in BSEN13725:2003 "Air quality Determination of odour concentration by dynamic Olfactometry".

Odour analysis is currently carried in a UKAS accredited olfactometry, by trained and experienced specialist staff in accordance with quality management procedures certified to ISO 17025:2005. Sensory odour testing including olfactometry analysis was conducted in accordance with UKAS accredited procedures (UKAS Testing Laboratory No. 4729) which comply fully with the requirements of the international quality standard ISO 17025:2022 and the European standard for olfactometry BS EN 13725:2022.

Air flow measurements are made within the ductwork at each sample location, with the exception of the biofilter outlet (which is at the base of the stacks).
Separately the indicative levels of:
• Reduced sulphur is measured using a Jerome Gold Leaf probe.
• Volatile organic compounds (VOC) are measured using a photo ionisation detector.
• Organic material is determined using a Fourier transform infrared (FTIR) spectroscope.

Each odour sample is pumped through a Gasmet FTIR for ~20 seconds to flush the cell, after which the sample is scanned for 60 seconds to provide an indicative profile for each sample.

A daily check sheet is completed for each biofilter. The operation and monitoring of the biofilters are detailed in the site EMS procedure.
Should a parameter be found to be out of range or there is a physical breakdown of an irrigation pump for example, immediate repair/replacement of a part/equipment is undertaken, and processes parameters adjusted to within set operating requirements.

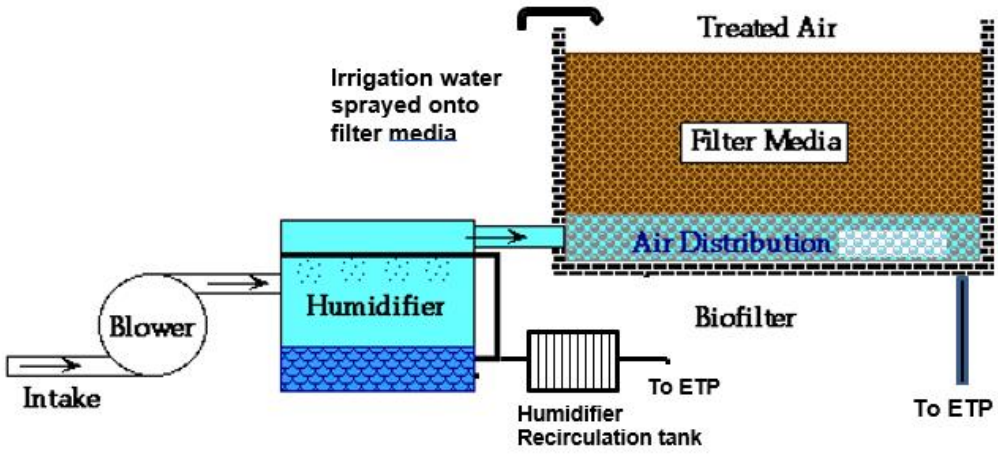
Operational Capacity

It is possible to operate on one biofilter bed with a reduced extraction rate (and reduced air volume) from the factory if there is a temporary malfunction or fault with one of the biofilters.
The risk of a major biofilter failure happening is detailed above, but realistically as the biofilter bed is very straight forward and has minimal complex equipment or moving parts associated with it, the risk is very low and spare parts are held on site. The biofilters and

associated water irrigation systems and extraction ductwork is maintained in accordance with the site's CMMS.

The photograph below shows the inside of one of the biofilters.

The basic principle of the function of a biofilter is shown in the schematic below.



8.4 Abatement Emission Points

There are five emission points associated with the odour abatement systems. Three of these points are combustion processes, one for steam production and electricity generation (CHP), second just for steam production (auxiliary boilers) and the third a

dedicated RTO. Table 10 below details the emission point reference and technical data associated with each emission point including recent test data for efficiency of the specific odour abatement systems of the RTO and biofilters. The RTO abatement system is tested for olfactory reduction efficiency at least once every two years, and the Biofilter annually as per the Permit. Thermal destruction of high intensity odours through the combustion systems of the CHP boiler or auxiliary boilers (when the CHP boiler is offline for a short period of time) will achieve the same thermal destruction efficiency as shown for the RTO (>99%).

Table 10 – Odour emissions data

Release point	Temperature °C	Volumetric flow rate m^3/s	Typical Inlet concentration OU_E/m^3*	Typical Outlet concentration OU_E/m^3*	Efficiency of odour removal %*
Bio Filter 1	21	30	7000 to 36000	Up to 4800 emitted at 16m	Av.75
Bio Filter 2	21	30	14000 to 36000	Up to 4800 emitted at 16m	Av. 75
RTO	156	13.9	Up to 1,550,000	1240-4900 emitted at 50m	Av. >99.0**
CHP (2018-2021)	131	15.1	Up to 1,550,000	1250-2300 emitted at 50m	Av. >99.0
Auxiliary boilers	127	13.8	Not tested yet due to lack of running	(Emitted at 50m)	Not tested yet due to lack of running

* Range of test results from August 2018, November 2018, July 2019, November 2020, June 2021 & June 2022 testing. Tests carried out by Ricardo-AEA.
** RTO efficiency when fully loaded with high intensity odour.

The final emissions from the abatement systems are through stacks. The design of the abatement systems, together with efflux velocities and exit temperatures from the corresponding stacks have been designed and operated to ensure effective final dispersion both for products of combustion and odour. The CHP plant, auxiliary boilers and RTO exit through the main 50m high multi-flue stack. The biofilters exit through two 20-meter-high stacks. The olfactory odour testing is reflective of the emissions from the point source emission points.
Dispersion modelling data (ED12482159 pears stack modelling draft 25062020) shows that odour unit concentrations from the CHP and RTO will not be detectable in the surrounding areas when outlet concentrations listed above are emitted at 50 metres (the

height of the stack). Biofilter odour at greater than 3,000 OUe/m^3 might be detected against background odours in an open environment adjacent to the site at Holly Farm and at the closest monitoring point and house in Low Marnham (ED12482159 pears stack modelling draft 25062020).

Should a Biofilter odour concentration above 3000 OUe/m^3 be recorded from the odour monitoring exercise a full investigation should be carried out to ascertain the potential causes. A report identifying actions to be taken to increase the efficiencies of the affected Biofilter and reduce the odour intensity below 3000 OUe/m^3 is to be produced, and if required communicated.

8.5 Abnormal Conditions, Planned Maintenance, Plant Failure and RA

To prepare an assessment of possible abnormal conditions and the options for mitigation of odours, the following assessment detailed in table 11 on the following pages considers the following critical points:

- The activity which produces the odour and the point of odour release.
- Possible process or control failures or abnormal situations.
- Potential outcome of a failure in respect of the likely odour impact on local sensitive receptors.
- What actions are to be taken to mitigate the effect of the odour release.
- Timescales for actions and process operations.

Table 11

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Areas which are associated with raw material input	Materials input: - seasonal variation in weather may affect odour of materials particularly if putrescible may influence level of odour being generated /released	Fugitive release of odours from delivery vehicles due to hot weather	All raw materials checked on receipt that they are dispatched and received from source within Animal By-products legislation. Trailer storage and tipping prioritization system from Storage and Handling ABP (Raw material) procedure implemented to minimize trailer movements and ensure tipping completed in shortest possible time including in building storage of trailers waiting tipping.	Immediate through trailer storage and prioritization procedure

Identify release points or areas	**Possible abnormal operation or failure that could lead to an odour release**	**What are the consequences of such an abnormal situation or failure**	**Control Measures in place to prevent or reduce the abnormal situation or failure**	**Time implementation**
Areas which are associated with raw material input	Failure of air lock door to animal by-product material reception area.	Fugitive release of odours from inside the loading area	Not to use that loading bay for deliveries. Spares kept on site for repair of door such as motor, pulleys and cables. Contractor on 24 hour call out. Extraction system would minimise odour release as air is being sucked into the building	Repair would be instigated immediately. Bay not used until repair complete. SHE Team notified immediately to assess if any potential offsite impact
Areas which are associated with raw material input	Rate of throughput or increased hours of operation may influence level of odour being generated/released	Fugitive release of odours from delivery vehicles unable to drop off their loads.	Raw materials are processed on a first in first out basis which minimises odour release. EMS procedure Storage and Handling ABP (Raw material) followed for trailer prioritisation. Site operates 24 hours a day so increased demand would not result in increased odour as raw materials continually processed.	

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Areas associated with production processing which could have a potential to affect the process and the generation of odours.	Failure of production equipment such as ABP cooker, screw feeds or pumps etc. may influence level of odour being generated/released.	Uncontrolled or elevated release of odours from point source/ area source	Animal by-products facility controlled by SCADA systems which have specific control parameters set. Alarms sound if parameters exceeded or equipment failure/breakdown. Source would be located inside the building so the extract system would still take the odorous air for treatment to the biofilter.	Any relevant changes to operating parameters of cookers, dryers or hydrolysers etc. are continuously monitored by automated computer-controlled systems. Attention to any out-of-range processing parameters would be immediately investigated and remedied. Prolonged plant problems more than a 4-hour period would result in reduced plant operation or specific production line being stopped. Major failure of production equipment would result in controlled shut down of production line - material diverted to other process lines where possible and off site if needed. SHE Team notified immediately to assess potential for offsite odour. Environment Agency notified for major breakdown and potential off-site impact. Web site message.

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Areas associated with production processing which could have a potential to affect the process and the generation of odours.	Breakdown of ETP so restriction to process waste effluent and consequently effecting the sites ability to process raw material	Uncontrolled or elevated release of odours from point source/ area source	Spares such as pumps and valves kept on site for repair. Breakdown of ETP would result in condensate being stored in the existing storage tanks. Prolonged failure would lead to effluent being tankered offsite for treatment	Repair would be instigated immediately. Tankering to commence before storage tanks are full to allow production to continue. If tanks become full the process would be shut down in a controlled manner and raw material diverted.
Those which affect the ability to arrest/minimise odour	Emergency breakdown of CHP plant or a drop in temperature of < 850°C to adequately thermally destroy high intensity odours.	Uncontrolled release of odours from point source for short period	Temporary diversion of all production and cooker odour to biofilter whilst back up thermal systems are activated. During this period steam supply to process is restricted while CHP is unavailable so release to biofilter is just to release pressure.	Implemented immediately by failsafe systems that are automatically programmed into SCADA systems. Emergency failure of CHP would result in High intensity odours temporarily fed to biofilter to release pressure from production process until automatic transition to RTO is completed. High intensity odours will only go to auxiliary boilers if CHP and RTO systems fail together and usually it can take 10 minutes to get auxillary boilers up to thermal destruction capacity. The SHEQ Team is notified immediately to assess potential offsite odour impact and formal notifications.

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Those which affect the ability to arrest/minimise odour	Planned maintenance of CHP plant or a prolonged breakdown or drop in temperature of < 850°C to adequately thermally destroy high intensity odours.	Uncontrolled release of odours from point source for short period	Step1: If CHP breaks down and cannot be fixed immediately the process will use the auxiliary steam raising boilers. With RTO in "standby mode" it will be used for thermal destruction of high intensity odours. STEP 2: If RTO fails due to breakdown it would result in odours being diverted to the auxiliary boilers for treatment.	See Timescales of transition of high intensity air Section 8.6.
Failure or abnormal or planned maintenance of the building ventilation odour control system [biofilter]	Mechanical breakdown of arrestment equipment such as pumps, fan or motor failure on one or both biofilters may influence level of odour being generated/released.	Unable to keep negative pressure in production building. Uncontrolled release of odours from point source/ area source	If problem with a biofilter; low intensity odours air can be treated temporarily (48-hour period) on one filter. Production temporarily reduced until problem resolved	Spares kept onsite for fan motor and fan blades and pumps for irrigation and dosing of biofilters. Repair immediately carried out. If repair cannot be resolved within 48hrs production would be reduced so one bed can treat. Major failure of both filters would result in production being stopped and raw material being diverted. SHEQ Team notified immediately to assess potential offsite odour impact and formal notification. Public message on web site.

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Failure or abnormal or planned maintenance of the building ventilation odour control system [biofilter]	Breakthrough of biofilter may influence level of odour being generated/released.	Uncontrolled or elevated release of odours from point source/ area source	Low intensity odours air can be treated temporarily (48-hour period) on one filter. Production temporarily reduced until problem resolved. Media bed on both biofilters inspected daily	Media bed immediately repaired.
	Biofilters unable to cope with increased odour intensity from factory	Uncontrolled release of odours from point source/ area source	Measures intended to reduce impact of odour on biofilters to be intensified. Dry spots appearing due to higher airflows in biofilter beds. Decrease airflow from higher intensity areas. Decrease input of high intensity odours from Effluent Treatment Plant	Humidifier water recycled less (changed at least twice per shift) to provide more cleansing of airstreams. Beds to be checked more frequently (e.g., every hour) for dry spots. Divert air from e.g., Feathers to RTO. Reduce condensate input to Inlet sump.
	External failure of other utilities, e.g., water supply, electricity to biofilter may influence level of odour being generated/released.	Uncontrolled release of odours from point source/ area source	Power failure on site would result in production being stopped due to not being able to operate plant. Major power failure to site would stop the process completely. Odorous emissions would be minimal as soon as cooking processes stopped. Backup water supply held onsite - water could be tankered in if required.	Immediate cease of operations. Raw materials deliveries would stop after 6-hour period if power failure still ongoing unless standby power (hired in generators are on route and material will be processed in 24hours. SHEQ Team notified immediately to assess potential offsite odour impact and formal notification. Public message on web site

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Those which affect the ability to contain odour	Building damage which affects integrity due to for example. - storms - Power failure - Failure of automatic doors, i.e., in open position - Failure in procedures to maintain containment (human error).	Uncontrolled release of fugitive odours	Building fabric inspected monthly. Integrity of building checked by smoke test which is undertaken every 12 months. Any building damage would be repaired along with any malfunctioning doors. If damage is severe the process line would stop operating to allow repairs to take place. Raw materials would be diverted to alternative processing plants if necessary	Damage would be immediately assessed and repair whether temporary or permanent would begin immediately and if safe to do so with the aim of being enclosed within 6 hours. If the damage is severe and the odour impact potential significant or likely to be beyond 6 hours, then the process line(s) affected would be brought to a controlled stop. SHE Team notified immediately to assess potential offsite odour impact and formal notification. Environment Agency notified within 2 hours. Public message on web site
	External Storage tank or pipework leakage	Uncontrolled or elevated release of odours from point source	Tank leak or pipework leak would be repaired as soon as is practicable. Most leaks are minor and can be contained until process is not operating at the weekend when repairs can be made. Tank contents can be pumped to alternative tank. Pipework isolated which contains leak and alternative pipework used as temporary measure. Bunds pumped out of any contents and cleaned.	If tank or pipework leak cannot be contained and the potential odour impact is significant, the relevant part of the process would be stopped, and the leak repaired prior to recommencement of operations.

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Those affecting dispersion between the source and sensitive. receptors	Short term weather patterns, fall outside of normal conditions for that area and are highly unusual (not just the normal meteorological pattern) - e.g., inversions Weather - wind direction, temperature, inversion conditions if these are normal variants of local weather. ▪ Loss of plume buoyancy/temperature	Temporary grounding of plumes leading to slightly elevated odour levels; spread of odours from Yard to site boundary.	In exceptional meteorological conditions monitoring for odours both on-site and off-site increased, especially if more trailers need to be stored on the external Raws Yard and regulator notified if there is potential for odours to impact offsite and potentially generate high volume of public complaint.	Severe weather situation process operations would be modified to mitigate offsite issues where possible. SHE Team to assess potential offsite odour impact and formal notification if necessary. Public message on web site
Inclement weather	High winds causing extraction rates to be disrupted when building doors are opened for off-loading or finished product removal.	Uncontrolled or elevated release of odours from point source	Raw material bay has an interlocked internal door which minimises air disruption when outer door is opened. Compartmentalisation of inside of factory to minimise air blowing through. Doors have two stage opening to minimise height of opening. Freshly milled products can be held for 6hrs inside the building so that the dispatch door is not opened until high winds have eased. Fan speeds on the biofilters can be increased to ensure negative pressure is adequately maintained. Biofilters have capacity to treat the potential extra volume (residence time calculation gives maximum of 140,000m^3)	Fan speed on the extraction system can be increased as required

Identify release points or areas	Possible abnormal operation or failure that could lead to an odour release	What are the consequences of such an abnormal situation or failure	Control Measures in place to prevent or reduce the abnormal situation or failure	Time implementation
Inclement weather	Abnormally low temperatures (circa -10) causing liquids in pipes to freeze.	Uncontrolled or elevated release of odours from point or area sources	Exposed pipes lagged. Contents of pipes are mainly from animal by-products processing which have been processed at high temperatures and contain residual heat.	Deal with as storage tank leak above.
Inclement weather	Abnormally high temperatures (e.g., above 26°C) causing raw material odour to be released from trailers stored or handled in the yard or over the Weighbridge	Uncontrolled or elevated release of odours from point or area sources. Spread of odours from Yard to site boundary from trailers.	Ensure scheduling of incoming trailers is synchronized as far as practicable with process capacity. Minimise waiting times on the Raw Materials Yard for incoming trailers to be processed or stored internally to less than one hour where ambient temperatures are more than 26°C. Eliminate need for reweighing trailers after excess water drainage by use of metering in raw material reception areas. Reduce time for cleaning of trailers using extra resource to enable more rapid processing and turnaround of trailers	The schedule of trailers is constantly reviewed. These can be altered with supplier consent for future collections. Monitoring of trailer storage is increased with higher temperatures and trailer movements supervised. Reweighing using flow meters will be kept ready for action. Resource will be diverted when temperatures increase to ensure trailer turnaround efficiency.

			internally in the factory	
Inclement weather	Effect of extreme high or low temperature on abatement plant such as biofilter Heavy rain – either storm or continuous persistent rainfall	Uncontrolled or elevated release of odours from point or area sources	Biofilters fitted with roof to protect against fluctuating weather conditions (temperature variation and rainfall) ensuring a consistent temperature and humidity for the media bed. Temperature or rainfall would not have an effect upon thermal abatement measures. Site is fully bunded to protect against flooding from River Trent located 1.5km away.	If site (or access to) is severally flooded, then the plant would be shut down in a controlled manner. SHE Team to assess potential offsite odour impact and formal notification if necessary. Public message on web site

A major utility failure such as an interruption of the electricity supply would mean that production would cease and the potential for generating odours would also diminish, the company would hire in temporary generators to keep the plant running as required. An interruption of the water supply would be countered by using stored water and tankering additional water to site as required. The CHP produces the electricity for the site and could continue to operate if there was a major grid outage.
The risk of a full abatement systems failure would be extremely low. However, in the case of a full abatement system failure, the rendering process would have to be stopped, such as a power outage situation. The risk of this happening is extremely low due to having 3 systems in place to treat high intensity air – CHP, RTO and auxiliary boilers.

The start-up of the process from such a situation would involve bringing the odour abatement systems back “on-line” prior to production of animal by-product processing beginning again.

8.6 High Intensity Odour Abatement Systems

There are three potential abatement systems for high intensity odour treatment available for the process. If there was a systematic failure of all three systems, the production process (cooking) would be stopped. Two of the systems utilise the CHP or auxiliary boilers which generate the steam needed for the animal by-products processing to operate.
A failure of both these would mean that there would be no steam production for the rendering process and the temperature requirements under the Animal By-Products legislation could not be met so production would be prevented to continue due to lack of steam.

Hierarchy of abatement equipment and high intensity odour destruction at Newark

CHP: Primary role.

- 1st choice for steam generation for site.
- 1st choice for high intensity cooking odour destruction in CHP boiler.

RTO: Primary role.

- 2nd choice for high intensity cooking odour destruction upon stoppage or failure of CHP plant boiler. RTO always held in “standby mode”.

Auxiliary Boilers: Primary role.

- Back up steam generation for site upon stoppage or failure of CHP SSG.
- 3rd choice for high intensity cooking odour destruction upon stoppage or failure of CHP boiler and/or RTO thermal oxidiser.

Provisions are in place if exceptional circumstances arise whereby the odours from the animal by-products production facility require to be treated for production to continue. The intensive odours from the rendering facility are first and foremost primarily directed to the CHP boiler (as boiler combustion air) for thermal destruction. The RTO will not be used but remains permanently in “standby mode” ready for Intensive odour thermal destruction for any planned or unplanned events or maintenance of the CHP plant.

The auxiliary boilers can be used as a source of odour treatment for high intensity odours, but if the RTO is available, this will always be used as priority until CHP is returned to full operational temperatures. The high intensity odours will then be re-directed back to CHP as the primary source of high intensity odour destruction.

If the CHP plant has an emergency breakdown or stop situation the installation's auxiliary boilers would always be automatically fired so the site has steam available to continue the full rendering operation.

In addition to the RTO taking full factory air for thermal destruction, Burner 2 (pre-burner) will be started to aid efficient operation of the RTO burn and maintain higher stack temperatures which is best practice for the elevation of treated air to atmosphere.

Timescales of transition of high intensity air:

- From CHP to RTO – Automatic instantaneous transition
- From CHP to auxiliary boilers – Automatic instantaneous transition to the Biofilters then 15 minutes for boilers to reach full thermal destruction capability.
- From RTO to CHP - Automatic instantaneous transition
- From RTO to auxiliary boilers – Automatic instantaneous transition to the Biofilters then 15 minutes for boilers to reach full thermal destruction capability.
- From Auxiliary boilers to RTO or CHP - Automatic instantaneous transition.

The biofilters have very few mechanical or moving parts and have a high reliability rate. The chances of a major failure are highly unlikely. If a situation arose that both biofilters were compromised, then a decision would be taken to decrease production and implement temporary treatment of odours through existing systems such as the RTO where possible.
Prior to carrying out any planned maintenance on the site, an assessment will be made of the potential for the works to cause an odour release from the site. If odour could be generated by the works, the Regulator should be notified as soon as is practicable, detailing mitigation procedures.
A further notification should be submitted if the programme of works alters substantially.

9.0 Cleaning and Spill Management

General house-keeping measures are in place such as keeping all doors to odorous buildings closed and the prompt cleaning of spillages. Procedures implemented on-site in relation to housekeeping practices are detailed below:

- Spillage Procedure: Spills and leaks of animal by-products, wastes, chemicals and other hazardous substances are all subject to the Spill Procedure. The Spill Procedure outlines the control, mitigation and clean-up methods. This ensures spills are cleaned promptly and disposed of correctly minimising the potential for odours emanating from site.
- Cleaning: a cleaning schedule is in place Work Areas and equipment.
- Bund Management Procedure: Tanks and bunds are on an annual inspection programme.

- Odorous air extractions systems are cleaned as instructed in the CMMS and reviewed annually.

10.0 Maintenance/New Equipment / Processes

All plant and equipment which is associated with environmental control, such as abatement equipment, extraction systems, effluent treatment systems will have a preventative maintenance plan implemented through the sites new CMMS. Procedures for maintenance are included in the site's EMS Maintenance and Garage procedures.

Any new equipment or processes to be introduced to the site will be assessed for its potential environmental impact before purchase takes place. The assessment will include odour impacts with respect to minimising or reducing odour potential, noise impact, energy efficiency and process quality improvements.

11.0 Public Communication

Management representatives from JG Pears attend all Parish Council meetings to discuss any issues raised by local residents about the operation of the site. Members of the public and local elected members are periodically taken on tours of the site to assist with the understanding of the processes that take place and the challenges faced to mitigate impacts that the busy 24-hour operation of the site has on the environment. The JG Pears web site has an information section dedicated to the Environment which details the animal by-products process and odour controls.

There is a specific page for community liaison and announcements which is used to inform the community of any potential works, maintenance or breakdowns that may occur which could have an impact offsite.

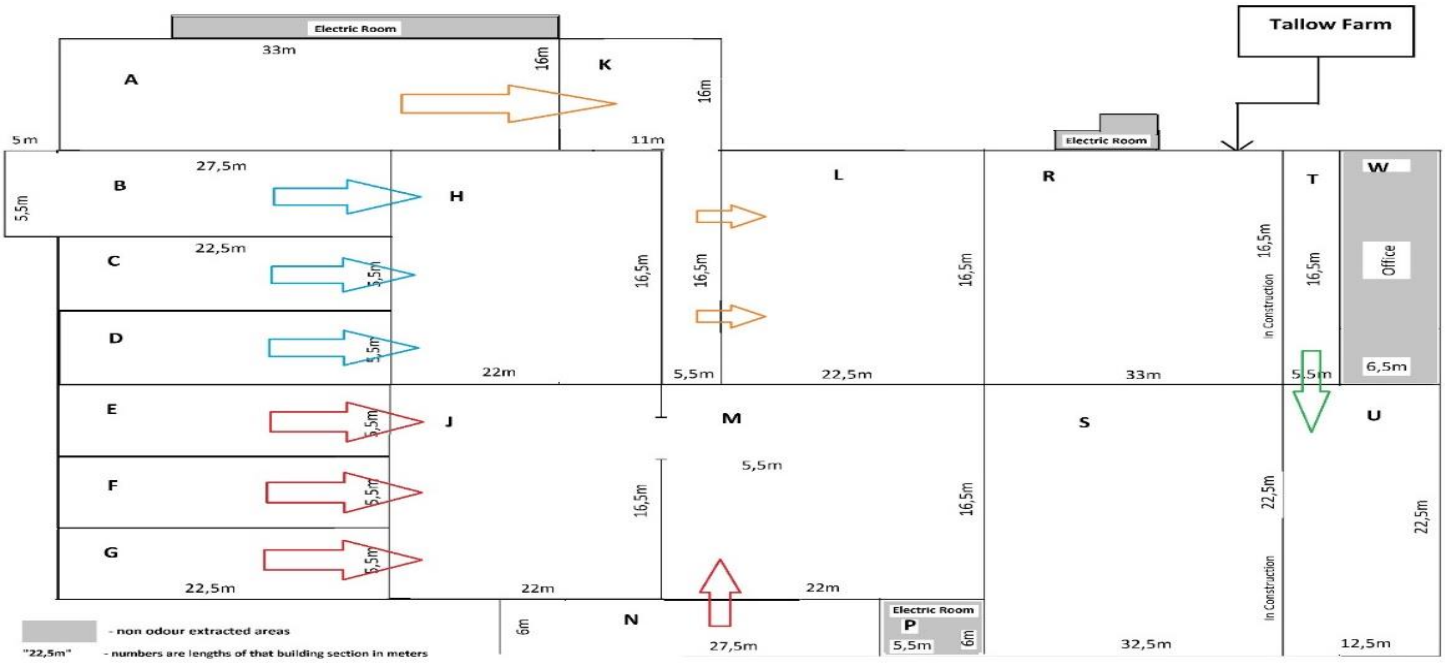
Website links for community liaison:

https://jgpears.com/j-g-pears-and-the-environment/
https://jgpears.com/community-liaison/

12.0 Related Documents

Document Number	Page No	Description
V003 - 24052023	4	Permit AP3435DG Application Variation V003 - Notice Issued (PDF) - 24052023
Environment Agency	4	H4 Odour Management Guidance geho0411btqm-e-e
8.1.0.005	11/12	Storage and Handling ABP (Raw material)
8.1.0.004	25	Storage and Handling Chemical Fuels Oils (Non-ABP)
8.1.0.006	27	Effluent and Water Emissions
CMMS Holistech	47	HolisTech Web 28.15.0.1
Ricardo AEA	52/53	ED12482159 pears stack modelling draft 25062020

Annex 1 - Animal by-product building extraction details.
Main building extraction design plan



Room Dimensions, volumes, air changes and extraction rates

Room / Area	Dimensions (Width (W) and Length (L) from attached plan) (H is the average are of that section of building)			Approx Equipment Volume	air volume in building section (L*W*H*(100 - equipment volume))	Flow through (no = 1 : yes =0)	Minimum number of air changes per hour	Minimum extraction to biofilter when area operational	Notes
	W (m)	L (m)	H (m)	%	m^3			M^3/H	
A	16	33	10	10	4752	0	2	0	Only used to store finished meals - flow to K
B	5.5	27.5	10	15	1286	0	6	0	
C	5.5	22.5	11	0	1361	0	6	0	Flow prioritised from used bays as internal door opens
D	5.5	22.5	12	0	1485	0	6	0	
E	5.5	22.5	12	0	1485	0	6	0	
F	5.5	22.5	11	0	1361	0	6	0	Flow prioritised from used bays as internal door opens
G	5.5	22.5	10	0	1238	0	6	0	
H	16.5	22	11	10	3594	1	6	21562	
J	16.5	22	11	10	3594	1	6	21562	
K*	16	11	11	10	2192	0	6	0	Flow through to L
L**	17	22	11	10	4152	1	7.5	31139	
M	16.5	22	11	15	3394	1	7.5	25455	
N	6	27.5	11	10	1634	0	6	0	Flow prioritised from used bays
P	6	5.5	10	100	0	1	0	0	electrical panel room
R	16.5	33	11	20	4792	1	6	28750	
S	22.5	32.5	11	15	6837	1	6	41023	
T	16.5	5.5	11	20	799	0	6	0	Flow to area U
U	22.5	12.5	11	15	2630	1	6	15778	
W	16	6.5	11	100	0	1	0	0	electrical panel room
				SUM	46583			**185269**	**Minimum design extraction from building**

* - room 5.5m x 16.5m x 5.5m is added
** - room 5.5m x 16.5m x 5.5m is added