JG Pears Power (O&M) Ltd
Co-incineration Facility - Permit EPR/MP3235CC

Variation Application
Supporting Document

JGP/MP3235CC/VAR/25

Date: April 2026

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Document Control

Title	Supporting Document for Part A Permit Variation – JG Pears Power (O & M) Ltd under Section 20 of the Environmental Permitting (England & Wales) Regulations 2016. Submission to Environment Agency
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Submission Date	30th April 2026

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1.0 Introduction and background

This application is for Variation of Permit EPR/MP3235CC issued on 28th August 2017 by the Environment Agency to JG Pears Power (O & M) Ltd (Companies House Reg No.09998627) to operate a waste co-incineration plant under Section S5.1 A(1)(b) of The Environmental Permitting (England & Wales) Regulations 2016 (EPR). The Permit implements the requirements of the EU Directives on Industrial Emissions and Waste. This variation application is made under Section 20 of the EPR as an "application to the Regulator for variation of permit conditions".

JG Pears Power (O&M) Ltd operates a CHP co-incineration plant as part of its animal by-products processing facility at Low Marnham. The CHP plant supplies both steam and electricity to the rendering facility operated by JG Pears (Newark) Ltd.

The facility and its associated activities are permitted under the schedule shown in the table below:-

Table S1.1 activities		
Activity listed in Schedule 1 of the EP Regulations	**Description of specified activity**	**Limits of specified activity**
S5.1 A1 (b)	The incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity exceeding 3 tonnes per hour.	From receipt of waste to emission of exhaust gas and disposal of waste arising. Waste types and quantities as specified in Table S2.2 of this permit.
Directly Associated Activities		
Electricity & steam Generation	Generation of an average of approx. 7.9MWe electrical power and 32 tonnes/hour process steam using a steam turbine from energy recovered from the flue gases.	Steam and electricity used in the animal rendering facility with excess electricity export to grid
Back up electrical generator	For providing emergency electrical power to the plant in the event of supply interruption.	For use in the CHP plant and animal rendering facility

JG Pears is one of the four major companies in England and Wales which processes animal by-products. The Low Marnham operation is the largest capacity avian by-products processing plant in the country.

This application for a variation to the CHP facility at JG Pears is being made as the operation of the facility is part of the wider rendering, slaughterhouses and abattoirs industry, which is currently the subject of a BREF update. Changes to the Transmissible Spongiform Encephalopathy (TSE) regulatory framework, particularly concerning Bovine Spongiform Encephalopathy (BSE) and the use of processed animal protein (PAP), have significantly impacted the rendering industry. These changes, driven by scientific advancements and risk assessments, have led to shifts in processing requirements, material classifications, and the potential for reintroducing rendered products into animal feed.

The "feed ban" initially prohibited the use of certain PAPs (derived from ruminants and specified risk material) in animal feed due to BSE concerns. Category 1 meat-and-bone meal (MBM) must be disposed of by incineration or co-incineration or used as fuel for combustion in an approved plant, to prevent the re-entry of high-risk material into the feed chain and to control the spread of (TSEs). However, recent research and risk assessments have led to the possibility of safely reintroducing non-ruminant PAPs into aquafeeds and potentially other animal feeds.

These changes could significantly impact the current operation of the JG Pears CHP installation which uses rendered category 1 and 2 animal by-products MBM as fuel. Very quickly the by-products industry would be processing cat 1 and cat 2 material for other more commercially advantageous uses and as such the availability of material in the form of MBM fuel would substantially reduce very quickly.

In light of the above potential legislative changes that are on the horizon the future viability and sustainability of the JG Pears CHP Co-incineration facility must be secured. As part of the industry becoming more resilient and sustainable in the light of Brexit and other economic pressures, the ability to bring in other biomass fuels to supply the co-incineration facility will provide an outlet for those agricultural industries with waste biomass and also secure the sustainable future for the JG Pears CHP installation.

This supporting document for a variation application of the issued permit (EPR/MP3235CC) details the proposals for sourcing, handling, storing and combustion of alternative biomass materials in the JG Pears co-incineration facility. The document will also reference a bicarbonate milling operation installed at the CHP facility for the purpose of size reduction of bicarbonate materials for use in the air pollution control systems.

1.2 The applicant

JG Pears is a family-run company, founded in 1972, and uses rendering to turn agricultural and food industry waste into sustainable products like animal feed, biofuels, and fertilizer. The company provides nationwide biosecure collection services for animal by-products (from abattoirs and meat processors), fallen stock from farms, and food waste from the catering industry. The business collects, transport and processes over 10,000 tonnes of animal material a week.

JG Pears operates across three main by-products processing plants located at Low Marnham, Nottinghamshire, Market Harborough, Leicestershire and Waddingtons in Bradford.

The company has invested heavily in renewable energy with the operation of a combined heat and power (CHP) plant at Low Marnham that burns Meat and Bone Meal (MBM) to generate renewable energy for its operations and the National Grid. The 46MW plant was commissioned in 2018. Ash from the CHP plant and other by-products are processed into high-quality organic fertilizer.

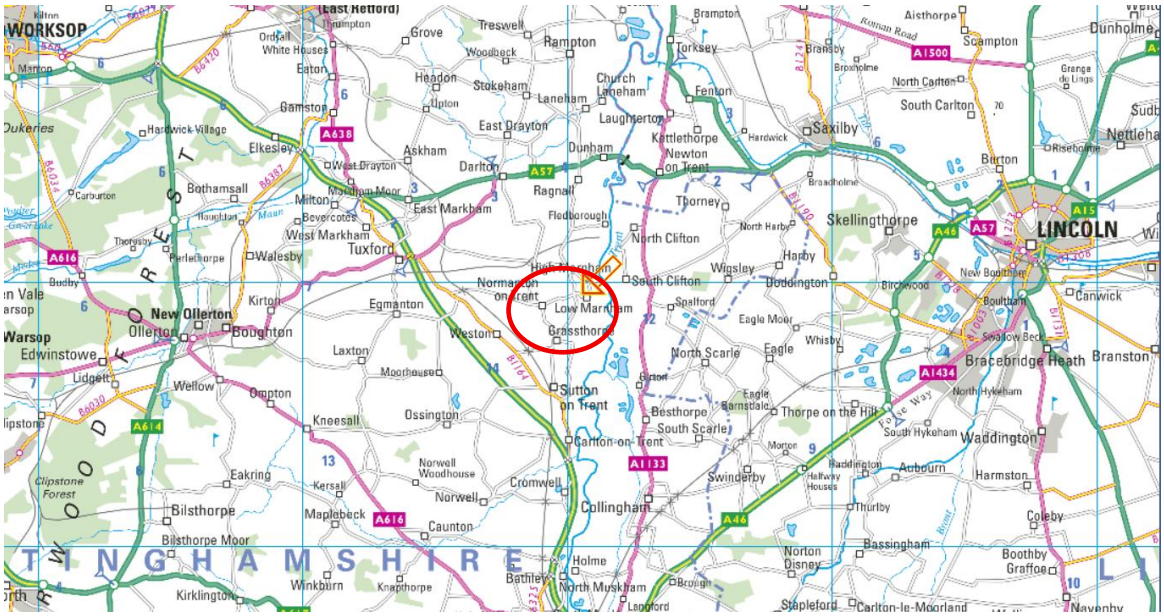
The Low Marnham rendering process produces premium-grade animal fats and protein meals used as core ingredients in pet food and aquaculture feed.

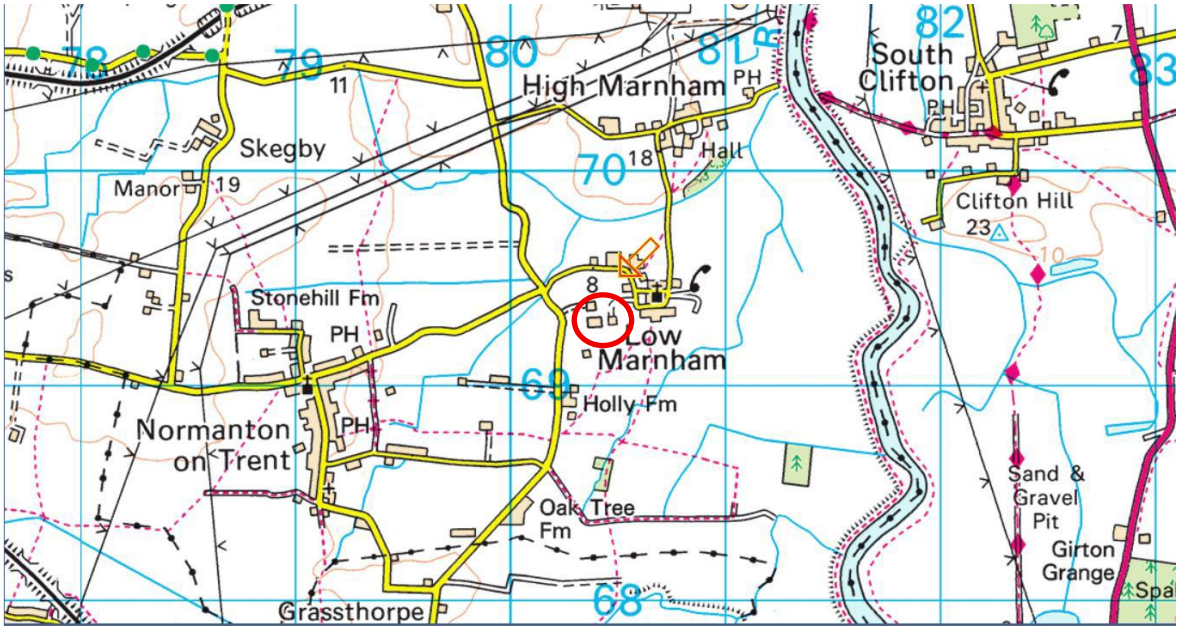
JG Pears also owns 8.1 MW of wind generation at Spicer Hill Windfarm located Penistone

A new green energy hub (HyMarnham Power) at the former High Marnham power station is being developed as a joint venture between GeoPura and JG Pears, transforming the former High Marnham coal-fired power station site into a cutting-edge clean energy hub. The plant will produce, store, and transport 1,800 tonnes per year of low carbon hydrogen using 15 MWe of electrolysers. Set to be fully operational in Autumn 2025, HyMarnham Power is poised to be one of the first projects from the Governments Hydrogen Allocation Round 1 (HAR1) to go live, marking a significant advancement in the production, storage, and transportation of low carbon hydrogen.

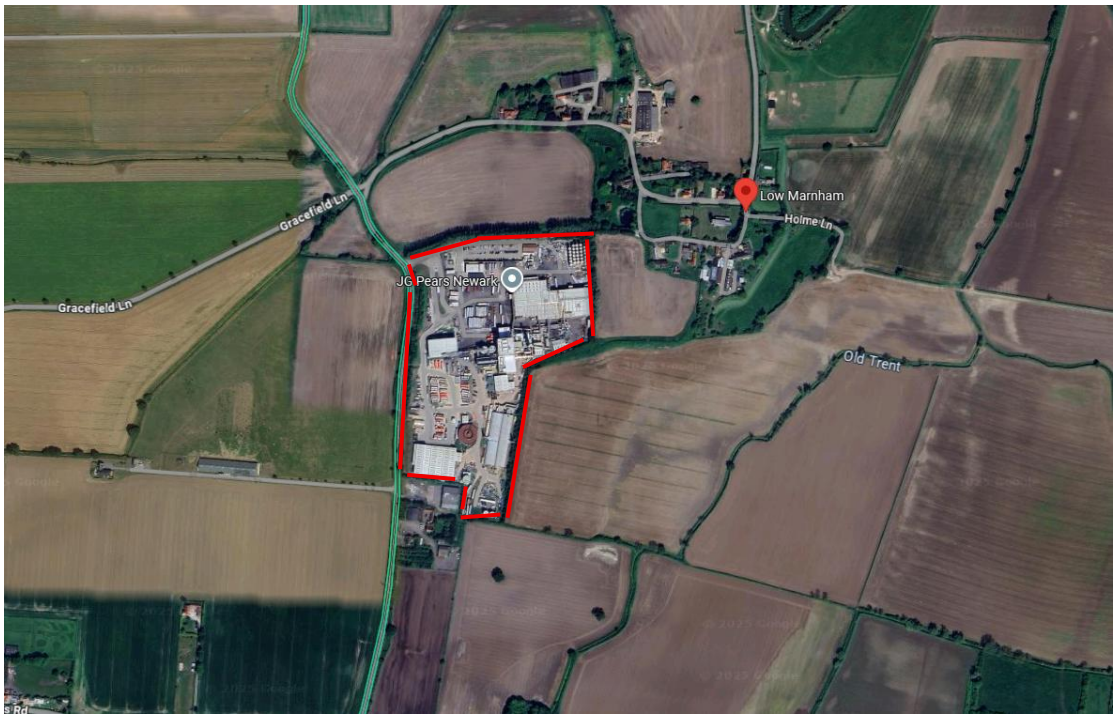
1.3 Location of Installation and Site details

The combined heat and power plant, offices and associated facilities are located within the existing site of JG Pears rendering plant at Low Marnham in North Nottinghamshire.





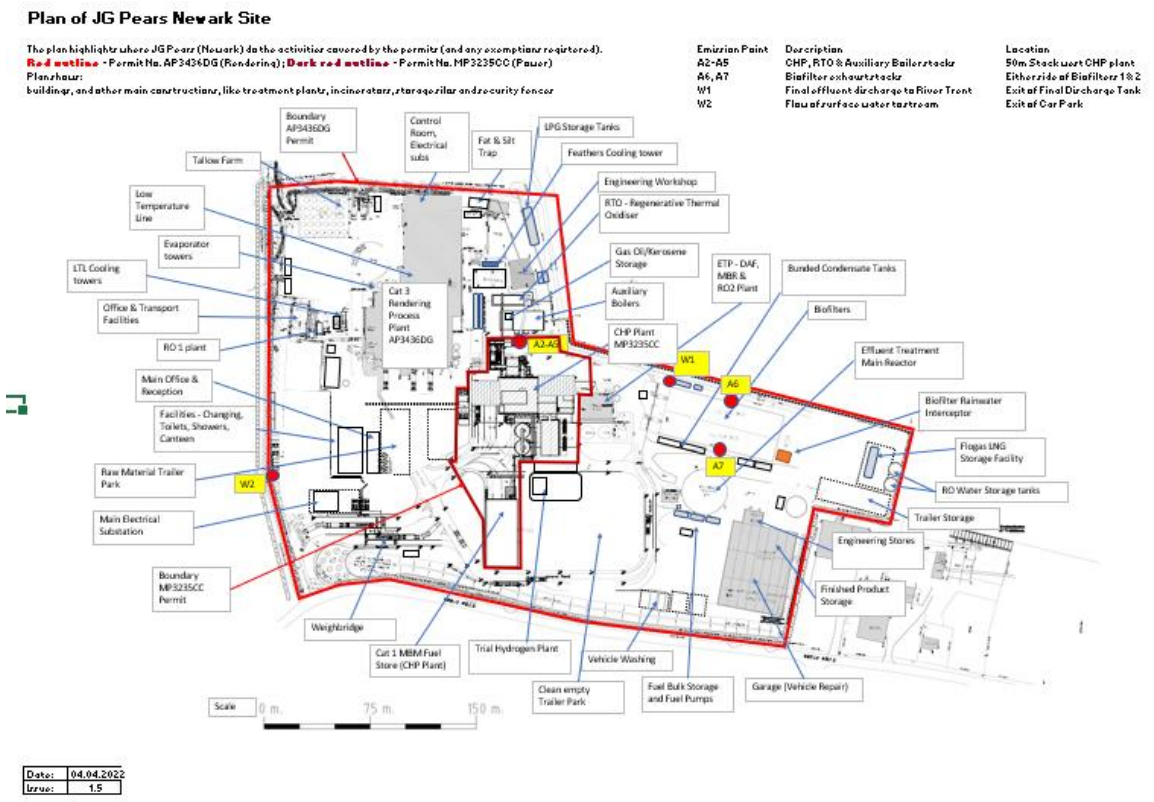
The overall landscape is rural with the plant surrounded by agricultural activities. The JG Pears CHP co-incinerator is located immediately to the southwest of the village of Low Marnham and approximately 1km to the east of the larger village of Normanton-on-Trent. The River Trent is 1.5km to the east 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 operated until 2003. It was decommissioned over 5 years, but it wasn't until 2012 that the five cooling towers were demolished. The site now is now being redeveloped as The High Marnham Green Energy Business Park for the UK transition to a low-carbon, sustainable economy. The site currently hosts a solar park, and is being developed by JG Pears for the production, storage, and transportation of low carbon hydrogen.



Satellite view of the JG Pears facility, Low Marnham, Newark

1.4 Site plan

A site plan for the Low Marnham CHP co-incineration plant and associated animal by-products processing facility is included with this variation application reference MP3235CC. The site plan is referenced MP3235/Plan and is also recorded electronically as appendix 1 of this report.



1.5 Environment Agency fees and charges

The JG Pears Power (O & M) Ltd CHP co-incineration facility is permitted under Section S5.1 A(1)(b) of The Environmental Permitting (England & Wales) Regulations 2016 (EPR) as incineration of a single non-hazardous waste.

The type of variation of a permit has three categories, minor, normal and substantial. For a substantial variation the definition is considered:

"a change in operation, which, in the opinion of EA, may have significant negative effects on human beings or the environment, or which in itself constitutes the carrying out of an activity described in Part 1 of Schedules 1 or 2 that exceeds any threshold capacity specified in those Schedules.

The use of alternative fuels will not require the existing permit conditions to be varied for emission limits and the volume/capacity as the overall fuel throughput would not exceed the amounts that the current permit regulates and is the maximum operational capacity of the CHP facility. The impact of the use of alternative fuels will not have significant negative

effects on human beings or the environment which is assed in later sections of this report. Pre-application advice has confirmed that the variation will be deemed as a "normal variation" however the odour management plan will require updating and an additional fee for assessment of the OMP of £1293.35 will need to be included in the variation application submission fee.

The fee structure shown below would apply under the Environment Agency's fees and charges document for 1st April 2026.

https://assets.publishing.service.gov.uk/media/69cd1c4feafd66b876458bb3/The-Environment-Agency-Environmental-Permitting-and-Abstraction-Licensing-England-Charging-Scheme-2022-amendments-up-to-1-April-2026.pdf

Table 1.6 Energy from waste, page 58 of the above charging scheme document.

Ref	Activity	Permit application	Minor variation	Normal variation	Substantial variation	Transfer application	Surrender application
1.6.2	Section 5.1 – incineration of mixed non-hazardous waste streams including municipal waste and refuse derived fuel; includes assessment of fire prevention plan.	£19,346.24	£5,803.46	£9,673.12	£17,411.41	£2,552.44	£11,607.95

The total fee to accompany this permit variation is £10,966.47 A previous fee of £7740. Had been submitted on the 24th October 2025 in preparation of submission of the application. A further £3226.47 has been paid by BACs transfer (13th April 2026) with a copy of the payments shown in appendix 2 of this variation application supporting report.

2.0 Description of Process

The CHP Plant involves the controlled combustion of renewable fuels with heat recovery via a boiler and power generation using a high efficiency turbine. In addition, the process includes fuel reception, storage and fuel feed systems, emissions abatement equipment, onsite temporary storage of residues (ash) and all systems for controlling and monitoring combustion operations. It operates under the Industrial Emissions Directive (IED).

The installation comprises several different processes:

a) Fuel Reception.
b) Physical filtration of fuel to remove unwanted debris and metals.
c) Storage of fuel.
d) Air intake and fuel mixing.
e) Main boiler.
f) Superheaters for optimal recovery of heat energy.
g) Steam to steam generation.
h) High pressure and low-pressure electricity generating turbines.
i) Air pollution control equipment, with continuous emissions monitoring.
j) Air condensers to remove excess heat and allow return of vapour to the boiler.
k) Ancillary service equipment – e.g., providing high quality water for steam, compressed air.

Currently, the plant's primary source of fuel is meat and bone meal (MBM) with an option for supplementation with wood pellets.

The CHP plant contains a single combustion line which processes approximately 75-85,000 tonnes of MBM per year, generating electricity at an average of around 7.9 MWe electrical power and 32 tonnes per hour of process steam.

Electrical output may vary if the process steam requirements are less from the adjoining rendering plant, and then more steam is able to be used to generate further electricity up to around 11MWe.

The fuel heat input total of the CHP Plant to achieve this is at 42 MW under standard operating conditions.

In outline the process is as follows.

1. Solid biomass fuel (MBM) is delivered to the installation by road and stored in the fuel reception building. The fuel reception building supplies via an enclosed conveyor system two 250 tonne fuel feed silos.

2. Biomass fuel is fed by a system of conveyors from the two storage silos to the travelling grate spreader stoker combustor, where the biomass is efficiently combusted.

3. Emissions of nitrogen oxides and carbon monoxide are controlled using controlled combustion and the injection secondary/tertiary air into the furnace.

4. Bottom ash from the grate is removed by a system of conveyors and a pneumatic conveying system to a silo. The bottom ash and fly ash (Air Pollution Control residue – APC) is removed from site by covered lorry trailer for use as agricultural fertilisers.

5. Hot gases from the biomass combustion are passed through a single boiler to raise steam. The steam is then passed to a high efficiency steam turbine to generate electricity for export to Animal Rendering Facility with any excess going to the National Grid, before being condensed in an air-cooled condenser and returned to the boiler.

6. Low pressure steam for generation of up to 45 tons per hour of process steam for the factory is extracted from a bleed on the turbine.

7. The combustion gases are cleaned in a flue gas treatment plant, including injection of solid alkali sorbent to remove acid gases and the use of a fabric filter, producing the APC. Emissions of nitrogen oxides and carbon monoxide are controlled using controlled combustion and flue gas recirculation. Additional

mitigation of nitrogen oxides is achieved by Selective Catalytic Reduction with the addition of ammonia.

8. The cleaned exhaust gases are released to atmosphere via a 50-metre stack.

9. There are no emissions to sewer or controlled water, as the limited process effluents produced by the CHP Plant are treated in the on-site effluent treatment plant at the adjacent animal rendering plant operated by J G Pears (Newark) Ltd

The current configuration of the plant is designed to burn a combination of MBM and wood pellets. The fuel ratios can be varied depending upon supply; however, the boiler has the capability to burn 100% of either the MBM or wood pellets. Based upon a mid-range calorific value, the annual fuel usage is circa 75,000 tonnes of MBM or wood pellets per year. The hourly combined usage rate of fuel by the boiler would be circa 9.5 tonnes/hr. Since the CHP began operation, its fuel has been 100% MBM.

The intake of the proposed alternative biomass fuels are similar in nature to the MBM biomass fuel already used, and the handling systems for storage and burning of the feedstocks will not at this stage need substantial change or modification based upon the proposals being made in this variation application for using blended alternative fuels.

2.1 Fuel Reception

MBM Fuel is delivered to the facility by road using sheeted HGV trailers. The vehicles are weighed at the site weighbridge before proceeding to the CHP fuel storage building.

Trailers carrying MBM enter the fuel storage building via a large, automated roller shutter door. Vehicles for off-loading are reversed into the building reception area and can either be reversed onto the automated tipping ramp for tipping or positioned in front of the storage bay where the trailer body tips the MBM fuel onto the floor. Once the vehicle has entered the building the main external door then closes prior to tipping.

Tipping into storage utilises a tele-handling loading shovel which pushes the MBM fuel into the back of the storage bay. Vehicles that are reversed directly onto the loading ramp can tip their MBM fuel directly into the fuel ground hopper bin. Once offloading is complete the external door opens, and the vehicle can then exit the building. Fuel from the storage bay is loaded from the bay to the ground hopper by a telehandler loading shovel. During weekends and bank holidays the fuel held in the storage bay is used whilst there are no deliveries.

The fuel deposited into the ground hopper is then graded and sorted using a rotating sieve and metal detector to remove large clumps of fuel and extraneous matter such as metals debris (e.g., screws, metal tags) and stray plastics (e.g., animal ear tags).

The material is then transferred from the fuel reception building using an air supported physical conveying system to one of two fuel storage silos. The silos each hold 300 tons,

equivalent to 33 hours of operation each. It is also possible, depending on the nature of the fuel to load the silos directly from a tanker or trailer by blowing the material via a pipe into the silos.

A negative pressure is maintained inside the fuel storage building by extracting the internal air for use to make up some of the volume of CHP boiler combustion air. This equates to approximately 1-2 air changes per hour. The negative pressure prevents release of any potential mild odours that may be associated with the MBM fuel.

The maximum quantity of throughput of fuel per annum stated in the permit is 85,000 tonnes. The CHP fuel feed rate at maximum combustion capacity is around 9.5 tonne/hr.

Table S2.2 of the issued permit (EPR/MP3235CC) lists the following permitted EWC waste codes.

Table S2.2 Permitted waste types and quantities for co-incineration plant	
Maximum quantity	**85,000 tonnes per annum**
Waste code	**Description**
02 01 02	Animal–tissue waste (meat and Bone Meal (MBM))
02 02 02	Animal–tissue waste (meat and Bone Meal (MBM))

3.0 Alternative biomass fuels

The potential changes due to the BREF update for the wider rendering, slaughterhouses and abattoirs industry along with changes to the Transmissible Spongiform Encephalopathy (TSE) regulatory framework could significantly impact the current operation of the JG Pears CHP installation which uses rendered category 1 and 2 animal by-products MBM fuel.

Very quickly the by-products industry would be processing cat 1 and cat 2 material for other more commercially advantageous uses and as such the availability of material in the form of MBM fuel would substantially reduce very quickly. This would have a significant commercial impact upon the JG Pears (O & M) Ltd CHP co-incineration facility and the associated avian bi-products processing plant located at Low Marnham.

In order to mitigant these potential significant changes to the facilities biomass fuel source it is essential that the JG Pears CHP facility has fuel flexibility to secure its continued sustainable operation along which the associated animal by-products processing plant which depends upon the CHP for supply of steam and electricity.

JG Pears has undertaken an initial scoping exercise to commercially identify biomass materials as potential alternative and supplementary fuels for use in the CHP co-incinerator. The scoping exercise has also involved engineering personal, AET (who designed and built the facility) and management of the CHP to ascertain the feasibility of using alternative biomass fuels with the CHP plants current fuel handling and storage configuration and combustion set up. At this stage it is important that suitable alternative fuels are identified and trialled in the boiler to assess performance and impacts before significant capital

investment is considered should the use of certain alternative biomass fuels require existing fuel handling and storing facilities to be adapted depending upon the quantities involved. Some alternative biomass fuels may involve significant investment and modification of existing fuel storage and handling systems, whereas others may only be procedural and operational adjustments in order for them to be successfully used and combusted on the co-incinerator.

The introduction of alternative fuels will require table S2.2 of the current issued permit to be varied to include additional EWC waste codes of the proposed alternative biomass fuels. The variation application for the use of additional alternative fuels to those already permitted in the existing permit would be considered as a normal variation as the proposal does not meet the definition of a substantial change as detailed in section 1.5.

The alternative biomass materials shown in table 1 below and their appropriate EWC waste codes have been identified as potential alternative fuel sources for the CHP co-incinerator. Discussions with suppliers and industry in respect to the wastes in question are that these materials, particularly those associated with the human food chain and food safety requirements must be disposed of as there is no alternatives other than disposal when the waste hierarchy is considered.

Table 1 – Proposed additional EWC codes

EWC Waste Codes	EWC Description	Description of Waste
030301	Waste bark and wood	As pellets*
170201	construction and demolition waste- wood	As wood chips
020107	Wastes from forestry	Chips or pellets
020106	Animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site	Poultry litter
020103	Plant tissue waste	Grain and seeds, cocoa shells, animal feed
020203	Preparation of meat and fish and other animal origin - Materials unsuitable for processing or consumption	Dry food, (eg. food ingredients or animal origin), crisps, pasta, petfood's
020304	Fruit, vegetables, cereals, edible oils, cocoa - Materials unsuitable for processing or consumption	(food ingredients or vegetable origin), crisps, pasta, petfood's, cereal
020501	Dairy products - Materials unsuitable for processing or consumption	Milk powders, food ingredients of dairy origin.
020601	Baking and confectionary - Materials unsuitable for processing or consumption	Dried confectionary products, confectionary ingredients

The EWC codes can be broken down into two categories; wood and forestry-based materials and the categories relating to 02 codes for animal and plant materials. To enable the use of alternative fuels at the facility in significant quantities, such as 100% poultry litter, wood chips from forest wood and wood chips from clean recycled wood, the existing fuel

handling and storage systems would require modifications or adaptations. For example, it would not be possible for 100% poultry litter to be stored in the existing silos as it will aggregate to form a solid mass, and the movement of poultry litter fuel would require a walking floor storage building. The majority of the alternative biomass fuels being proposed in the above table could successfully be used on the CHP if they are blended in controlled ratios with MBM fuel such that the existing fuel handling and storage systems which are designed for MBM could still operate effectively without any potential adverse technical issues or require any significant modifications at this stage.

The following sections describe the alternative fuels and their proposed storage, handling and suggested blend ratios with the existing MBM fuel.

3.1 Dried Food Products and ingredients

The food industry has strict standards for food ingredients, storage, production and distribution to ensure products are of high quality and safe for the end consumer. Inevitable there are occasions that such products are not suitable for input into the food chain or acceptable to the end user and the food industry must dispose of these materials as a waste.

The calorific value of dried food waste varies but is generally high, ranging from approximately 15.7 to 23.25 MJ/kg (Megajoules per kilogram) on a dry basis, making it comparable to woody biomass. The typical energy content of MBM is 17 megajoules per kilogramme (MJ/kg). The exact value depends on the specific composition of the food waste, as higher organic matter and carbon content, combined with lower moisture and ash, lead to a greater calorific value. The selection of dried food waste would be for products with less than 10% moisture content. Food products that could potentially have a moisture content greater than 10% could be accommodated but only as a smaller percentage blend with MBM.

There is the capacity that the existing MBM store at Low Marnham can be used for delivery of dried food products where the materials can be offloaded/tipped inside the building into the three-sided bay. Alternatively, the material could also be offload inside a building at the High Marnham site which is located approximately 1.5 miles from the CHP facility. Some dried food waste materials depending on their source and type would need to be de-packaged. An example would be 20kg bags of flour. The de-packaging would be done by hand when the material has been unloaded/tipped either inside the main MBM fuel store building or a storage building located at High Marnham. The residual waste packaging material would be removed from site for appropriate recycling or disposal depending upon the packaging materials involved.

The blending of the food ingredient materials with existing MBM fuel would be completed using a telehandler loading shovel which would blend on a ratio of shovel loads of material, for example, mixing 5 loading shovel buckets of MBM to 1 bucket of dried food would be a 20% blend. Blended material would be deposited into the fuel receiving hopper, either by a loading shovel or directly by a HGV tipper if the material is blended at High Marnham. It is

also possible, depending on the nature of the fuel to load the silos directly from a tanker or trailer by blowing the material directly into the fuel silos. This would be possible with ingredients such as flour.

The emergency fuel loading hopper could also be accessed using the conveyor belt system through a chute to the direct fuel feed system.

Consultation with AET who designed and built the JG Pears CHP co-incinerator advise that the fuel handling systems, silo storage, fuel spreader input onto the furnace would have no perceived technical issues in processing up to a 25% blend of MBM fuel with a dried food ingredient/product.

Depending upon the calorific value of the dried food the combustion conditions inside the combustion zones of the boiler would be comparable to firing on 100% MBM fuel.

A blend of MBM and dried food ingredient/product once tipped into the ground hopper would be graded and sorted using the rotating sieve and metal detector to remove large clumps of fuel and any extraneous matter (associated with MBM) such as metals debris (e.g., screws, metal tags) and stray plastics (e.g., animal ear tags) before it is conveyed using an air supported physical conveying system from the store to one of two fuel storage silos.

The feed hopper, rotating sieve, belt conveying and discharge into the silos will all add to the food ingredients being interspersed with the MBM. The offtake of fuel from the silos can be controlled so that both silos can be used simultaneously and that an alternative fuel blend (loaded into one silo) is inputted to the furnace as a 50/50 mix with the other silo containing 100% MBM. Similarly, there is also a degree of the food ingredients being homogeneously mixed with the MBM at the point of the fuel feed reaching the spreaders and being fired into the furnace. A silo which has a blend of an alternatively fuel can be

The anticipated amount of dried food material to be delivered to the CHP co-incinerator per month would be approximately 120 tonnes. The usage rate based upon a 25% fuel blend would be a firing campaign totalling 2.5 days during each month. The quantity of food waste materials received at any one time during a month would not mean that this alternative fuel is used consecutively for a 2.5-day period but would be used depending upon materials and volumes received from suppliers and burnt for a 4-6 hour minimum time period.

3.2 Wood chips and wastes from forestry

Forestry wood chips have a high moisture content when compared to EN standard wood pellets which could be up to 50% moisture. The higher moisture content of this material would have an effect upon the combustion conditions inside the furnace depending upon the quantities being burnt.

The sourcing of clean waste wood chips for the CHP co-incinerator would involve detailed and strict QA standards for suppliers to ensure that the supplied clean waste wood chips

do not contain any contaminants like plastic bags, large pieces of metal, painted or treated wood and fibrous plants.

Using the existing MBM set up for the CHP Co-incinerator, the boiler fuel systems and combustion programmes would make it possible to blend forestry wood chips at up to a maximum of 20%. It would be practical to store the forestry wood chips off site at the High Marnham site inside a building which would also assist in the woods chips to dry out before they are blended and used. A MBM/wood chips blend can be prepared either offsite or at the CHP fuel reception building. A HGV containing a premixed blend could tip its fuel load directly into the fuel feed ground hopper or into the storage bay of the main fuel reception building.

For the CHP co-incinerator to use a 100% firing of forestry wood chips fuel, the boiler would require the installation of a high-pressure air preheater on top of (downstream) the feedwater air preheater.

3.3 Clean waste wood

Clean waste wood, (Grade A) refers to waste wood that is uncontaminated, untreated wood which is free from paint, preservatives, or any other coatings. The waste wood material would require to be of <25mm particle size. A blend of up to 20% clean waste wood with MBM could be accommodated with the existing fuel handling and combustion systems installed on the plant. A blend of MBM and 20% clean waste wood would be prepared either offsite and delivered to the fuel storage reception building where it could be tipped directly into the ground hopper or tipped into the storage area or a blended mixed is produced within the fuel storage building located at the CHP. The existing metal detection and extraneous matter removal systems post the ground hopper would remove any unwanted materials prior to the fuel entering the storage silos and the boiler fuel feeding systems. For waste wood materials it is essential that the particle size is less than 25mm and that there is no foreign object matter contained in the wood that could damage the fuel handling and fuel feed systems to the boiler.

3.4 Poultry litter

The calorific value for chicken litter will vary dependent on its source from 11 to 23 MJ/kg. This is again similar to the CV for MBM. Poultry litter can contain slightly more moisture which would require additional monitoring, along with higher levels of nitrogen, sulphur, phosphorus, sodium and potassium. Typically, with poultry litter at 25% moisture, this will be in the region of 27.2% carbon to 2.7% nitrogen, 3.7% hydrogen, 0.3% sulphur and 0.7% chlorine.

Poultry litter is of the same friability and carbon content as dry MBM and will flow in similar ways. However, separate storage and feed equipment would need to be added if 100% poultry litter is to be used to ensure that the fuel will burn efficiently on the existing moving bed grate boiler. An earlier AET plant built specifically for poultry litter at Glanford (Glanford Power Station) in 1993 was converted to burn MBM. The AET retrofit in 1999 included a

redesigned fuel dosing system, advanced spreader stoker and upgrade of furnace and secondary air system

https://www.aet-biomass.com/en-gb/home/references/biomass-fired-plants/epr-glanford-scunthorpe.aspx

The JG Pears CHP co-incinerator could be retrofitted for receiving and burning 100% poultry litter however at this stage the modifications would involve significant capital investment for furnace modifications and poultry litter fuel storage arrangements.

The nitrogen and sulphur content of poultry litter can impact on the use of both bicarbonates and ammonia to ensure emissions are kept within limits but will aid in the production of a richer phosphate content bottom ash for fertiliser use. The chlorine levels remain within the existing MBM feedstock tolerances.

Advise from AET is that poultry litter could be introduced into the existing fuel handling and combustion systems only in measured amounts which the fuel handling and storage systems can handle as a blend with MBM. Blends starting at 10% could be trialled with up to 40% maximum poultry litter depending upon moisture content and quality of the poultry litter.

The poultry litter would be delivered to either the CHP fuel storage building or the High Marnham facility for storage inside a building where it can be blended with MBM at various ratios. The blended fuel would then be delivered to the Low Marnham CHP facility for tipping directly into the fuel storage reception building ground hopper or the HGV tipping the fuel into the storage bay. Alternatively a tipped trailer of poultry litter can be blended with MBM using the loading shovel in the CHP fuel reception building.

3.5 CHP modifications

A formal proposal for fuel feed modifications to include forestry wood chips, clean recycled wood chips and poultry litter had been prepared for JG Pears Power by AET in 2017 prior to the facility becoming operational. The rational for the report was to outline costs to investors should at some point early on in the facilities operation that there was a need to identify a different fuel source to MBM.

JG Pears Power (O & M) Ltd are discussing with AET the options that using alternative fuels such as 100% forestry wood chip or poultry litter would require in the level of investment of equipment and plant modifications needed to adapt and modify the existing CHP co-incinerator combustion furnace including fuel storage and handling systems. The outcome of these discussions are dependent on the full outcome of legislative changes around MBM and the future availability of the material as the conversion work to the installation would be a significant financial commitment.

4.0 Combustion

4.1 In the combustion zone MBM fuel quickly dries and gasifies. Smaller particles burn in suspension; larger and heavier particles fall onto the grate partially or completely dried and gasified and burn out gradually.

Approximately half of the combustion air needed for the fuel on the grate is supplied into the air hopper underneath from which it flows through small nozzles on the grate into the furnace. This so-called primary air cools the grate and ensures intensive burning of the fuel particles on the grate surface. The remaining part - the secondary air - is supplied through strategically arranged high-pressure air nozzles that provide high turbulence and intensive mixing of the oxygen and the flammable gases.

Combustion air is made up of extracted air from the rendering plant production building and cooking processes along with extracted air from the MBM fuel reception building. A small percentage of air is also taken from the top of the boiler house. The boiler combustion air fan would also be able to draw all required combustion air from inside the boiler house.

Approximately 70-80% of the energy content in the MBM biomass fuel is volatile, and the rest consists of solid carbon. The result of the pneumatic feeding is that nearly 50-70% of the total energy is released in suspension, and consequently the grate only requires half the area of a mass burn grate (e.g. an inclined grate or a step grate). The use of alternative fuels listed in section 3.3 are all bio-genic materials and the pneumatic feeding system would combust the additional fuels in the same way. The ash content compared to MBM would be less for the majority of the additional fuels listed.

The travelling grate is a simple and robust design with very high availability. The fuel injection system ensures a uniform fuel distribution over the travelling grate, which is the basis for good and stable combustion and low emissions. The principle behind a travelling grate design is that the grate travels from the rear of the boiler to the front to ensure that the larger pieces of fuel, thrown to the rear of the boiler, spend longer time in the combustion zone.

The amount of heat released in the furnace is controlled by the fuel feed rate. The fuel flow is controlled according to the set point for the steam load. The combustion controls are able to correspond very rapidly to load changes due to the high suspension burning rate. The AET combustion control systems would automatically adjust the combustion parameters to accommodate changes in fuel. The changes would differ depending upon the alternative fuel and blend ratio, but overall, the AET system would do this automatically. There are still parameters that have to be considered and observed in order not to push the technical boundaries of the existing set up of the CHP co-incinerator and the ratios of the alternative fuels to MBM will be carefully considered based upon technical advice and instruction from AET.

The grate speed can also be adjusted to suit specific fuel being burnt and differing fuel ratios. The grate driver has a frequency inverter variable speed motor and a gearbox to

allow fine changes in speed settings. The speed of the grate is controlled to ensure complete burn-out of material on the grate and control the temperature of the grate structure. Operators can check the thickness of the fuel layer on the grate by observing it through viewing ports in the furnace walls.

The fuel is supplied continuously into the boiler, and in general consists of small pieces with a large surface. The proposal of the additional alternative types of fuels would also consist of small pieces (so that they are suitable for the existing fuel spreader system). This ensures good mixing conditions of air and fuel, and consequently the mixing conditions can easily be controlled and adjusted. The primary air is fed from under the grate and is supplemented by re-circulated flue gases. By careful distribution of secondary air through the different injection points at various heights in the furnace creating turbulence and mixing, the oxygen content in the primary combustion zone can be controlled, which makes it possible to ensure under-stoichiometric conditions (oxygen deficit) in the lower part of the furnace. This is an effective means of reducing NOx emissions. The AET combustion system completes this automatically.

The combustion temperature can be controlled by flue gas recirculation (this increases the flue gas volume to be heated but does not increase the oxygen content).

The air feed used for combustion control works to a proven system, where the primary and secondary air is controlled in relation to the boiler load. This relationship between boiler and load and the air flows is implemented into the control system by means of two air curves. The combustion system will respond with a certain amount of primary and secondary airflow at a certain boiler load, with the actual airflows being measured. The control system incorporates O_2 correction by adjusting the fuel-air ratio either up or down in order to maintain an optimal O_2 level. The operation of the combustion air system and respective flows to primary and secondary air injection points is altered to suit the respective fuel/fuel ratios being burnt, subject to its specific combustion requirements.

The procedure for fuel feeding release during start-up/operation/shutdown is as follows:
Start-up:

- When the boiler and flue gas systems are cold, flue gas will be bypassed around the bag filter (to prevent condensation in the filter unit)
- Operation during start-up will be on gas burner only until flue gas conditions are sufficient to allow filter bypass to be closed.
- Once IED requirements for temperature & residence time etc. are achieved and air pollution control (APC) systems (incl. SCR) are operational, feeding of MBM to the grate will be released.

Normal operation:

- As long as IED requirements for temperature & residence time etc. are maintained and APC systems are operational, feeding of MBM to the grate will be possible.

- In case the combustion temperature falls to a level close to the minimum (850°C) an alarm is issued to the operator, who may then take appropriate action to maintain fuel feeding release (e.g. altering plant load, starting auxiliary burner etc.) or manually stopping fuel feeding, if so desired. Alternatively, an automatic start of the auxiliary burner may be implemented for this situation.
- In case the combustion temperature drops to below the minimum or an APC system fails (incl. opening of filter bypass due to e.g. high filter inlet temperature), fuel feeding is interlocked. Renewed release for MBM feeding will only be obtained once combustion conditions are once again at a certain level above the minimum temperature and APC systems are operational.

Normal shutdown:

- fuel feeding is stopped and combustion conditions are maintained above 850°C (using burner if necessary) until remaining fuel on grate has been combusted.
- Burner is stopped and boiler is shut down [unless wood chip firing is also involved, in which case a few additional steps are required:
- Boiler load reduced to boiler minimum load.
- Once heat release on grate is insufficient to maintain stable combustion, boiler is shut down.]

Emergency shutdown:

- In case of an emergency shutdown, some un-combusted fuel will most likely remain on the grate. The potential amount of unburned fuel on the grate will be limited, as fuel bed height on the grate is generally low. On renewed start-up of the plant additional fuel will not be brought into the furnace until appropriate conditions have been reached (see start-up above).

The use of alternative biomass fuel blends would be introduced into the combustion furnace during normal operation and not as a cold start up.

4.2 Emission controls

The flue gases produced by the boiler are directed through abatement equipment comprising of a compartmentalised fabric bag filtration system which incorporates a sodium bicarbonate sorbent injection and a SCR.

The injection of sodium bicarbonate absorbent into the flue gas reduces the content of SOx, HCL and HF. The system consists of a milling plant, silo, an extraction unit (dosing bin and variable speed screw) and a pneumatic conveying and injection system. The quantity of absorbent fed into the injection system is controlled by means of signals from the flue gas emissions monitoring equipment (CEMs). 100% firing of MBM fuel, which has a higher sulphur content will use more reagent than 100% wood pellets. The system would automatically adjust the sorbent amount to accommodate various fuel/fuel ratios. A flue gas desulphurisation reactor is installed upstream of the filter to increase residence time for

reaction. In addition, a recirculation system that passes a proportion of filter residue back to the reaction chamber increases the concentration of adsorbent in the flue gas and improves adsorbent utilisation.

The SO2 removal system is to reduce SO2 down to a level where fouling of the SCR catalyst due to ammonia bisulphate is unlikely to happen.

Flue Gas Recirculation (FGR) will be implemented as the primary method for reducing NOx emissions by reducing peak temperatures thereby reducing NOx generation. Secondary measures to control NOx and CO levels further use Selective Catalytic Reduction (SCR) for treatment of the flue gases. The reason for opting for SCR above SNCR when the plant was first built is that the abatement technique needs to mitigate the higher nitrogen content of MBM fuel (which is up to 10+% on dry, ash-free basis) which converts to NOx in the combustion process and to accommodate alternative fuels in the future. The SCR would comfortably cope with a 100% poultry litter fuel.

A SCR system also gives the option of fitting a CO catalyst in the future, should a different fuel source be considered with potentially higher moisture content, then additional CO emission reduction controls in the form of a CO catalyst could be installed to achieve IED emission levels. The amount of ammonia used for NOx abatement is automatically optimised to maximise NOx reduction and minimise NH3 slip.

CO and VOCs are minimised through use of proven combustion technology and careful combustion control.

The nature of the MBM fuel currently used at the installation limits the presence of metals in the combustion gases. The proposed biogenic fuels are also low in metals content and as such should not be an issue when combusted. All alternative fuels would be inspected for any foreign objects or contamination.

A summary of the abatement techniques deployed are listed in the table below.

Release Point	Source	Nature of Emission	Abatement Techniques
A1	Flue gas emissions from main stack	Oxides of Nitrogen (NO_X)	• Combustion technology, boiler design and good combustion control for low NOx • FGR • Independent control of primary and secondary air • Selective Catalytic Reduction SCR.
		Sulphur Dioxide	• Low sulphur fuels being used • Injection of sodium bicarbonate • Flue gas desulphurisation reactor for improved reaction
		Carbon Monoxide	• Good combustion control
		Particulates	• Fabric Filtration system
		HCL	• Low chlorine fuels being used • Injection of sodium bicarbonate • Flue gas desulphurisation reactor for improved reaction

		Volatile Organic Compounds	• Good combustion control
		Dioxins and Furans	• Good combustion control • boundary layers of slow moving gas are prevented along the boiler surfaces by good boiler design and temperature control
		Heavy Metals	• Low concentration in fuels • Fabric filtration system

4.3 Combustion of alternative fuels

In order to fully assess the performance of alternative fuels within the co-incinerator combustion process it is proposed that the facility undertakes controlled trials of blends of alternative fuels with MBM. These trials will be known as *fuel operational assessment trials* and will be monitored in the following way.

a) Alternative fuel assessed for quality, any foreign objects and placed in a quarantine status until approved for use.
b) An agreed percentage blend will be determined for the trial based upon the material being trialled, volume of material received, moisture content, particle size, calorific value. The blended material will be visually assessed prior to final approval for release and delivery to the CHP co-incinerator.
c) The duration of the combustion trial will depend upon quantity of material received and the percentage blend. A minimum 5-6 hour firing trial is required at a particular percentage blend with MBM in order to obtain meaningful data as the alternative fuel is being combusted.
d) Observation of fuel storage and handling systems as the alternative fuel blend is being introduced into the fuel handling and feed systems to ensure there are no blockages or technical issues associated with the fuel blend.
e) SCADA system records combustion conditions and fuel systems which are monitored in the CHP control room. CHP engineering personnel present in the control room to observe CHP combustion conditions as the alternative fuel blend is introduced into the boiler and onto the moving grate.
   Key parameters being observed:-
   - Operational temperatures monitored across the boiler and superheaters
   - O2 and CO levels immediately prior and during the trial
   - Fuel/air ratios over the furnace structure
   - Boiler load and output
   - SCR ammonia dosing
f) Monitoring of CEMs parameters for real time measurements of CO, O2, HCL, NOx, SO2, TOC and particulate matter during the trial period (also data logged by CEMs software).

The above data will be recorded and summarised in a report for review. The procedure will be repeated for trials with other biomass materials over various percentage blends with MBM.

If at any stage during a trial of an alternative biomass fuel any technical issues arise and combustion conditions begin to be adversely affected the trial will be aborted and the CHP co-incinerator will continue on 100% MBM firing.

5.0 Environmental impacts

The following sections assess the environmental impacts and risks associated with the proposal for the use of other alternative fuels for the JG Pears CHP co-incinerator.

The principle impacts for assessment are:

- Air emissions and emissions management (from combustion of alternative fuels)
- Emissions to sewer or surface water
- Odour management
- Fire prevention and protection (from the introduction of alternative fuels)
- Noise

Consideration shall also be given to the impacts and amendments for the use of the proposed alternative fuels for:-

- Emergency Plan (Accident Prevention Management Plan)
- Site condition report
- Fire prevention plan
- Odour management plan
- Habitats

The key technical standards which will be employed to ensure that the proposed activities do not give rise to a significant environmental impact are summarised below:

- The Incinerator Sector Guidance Note EPR5.01
- The Environmental Permitting (England and Wales) Regulations 2016;
- Develop a management system: environmental permits, April 2023;
- Control and monitor emissions for your environmental permit, November 2022;
- Risk assessments for your environmental permit, August 2022; and
- Sector Guidance Note S5.06: recovery and disposal of hazardous and non-hazardous waste, May 2013.

5.1 Environmental Risk Assessment

This section outlines the procedure that has been followed in the undertaking of an ERA for the introduction of additional alternative fuels for use in the JG Pears CHP Co-incinerator.

The first step of an ERA is to consider and identify the risks posed to the environment by the activities proposed for a site and in particular the impact that the storage, handling and use of alternative fuels for the JG Pears CHP Co-incinerator could have on the environment.

5.2 Identification of hazards

The EA Guidance states that an operator must: "…*identify whether any of the following risks could occur and what the environmental impact could be:*

- any discharge, for example sewage or trade effluent to surface or groundwater
- accidents (fire prevention)
- odour (not for standalone water discharge and groundwater activities)
- noise and vibration (not for standalone water discharge and groundwater activities)
- uncontrolled or unintended ('fugitive') emissions, for which risks include dust, litter, pests and pollutants that shouldn't be in the discharge
- visible emissions, eg smoke or visible plumes."

5.3 Identification of Receptors

Section 1.2 of this document describes the site setting and the land uses in the vicinity of the JG Pears CHP Co-incinerator installation. This information has been used in order to focus on the main receptors that could be potentially at risk from the activities of the site. An assessment of the impact upon receptors was conducted for the original permit application of the CHP Co-incinerator, specifically air emission impacts from the combustion process along with odours and emissions to ground and water.

It is not felt that the proposed variation for use of alternative biomass fuels will impact sensitive receptors, habitats or local environment further to those impacts assessed at the application stage for the facility back in 2017; however, the following ERA sections will assess for any potential impacts to receptors. All site activities are enclosed within a building either the fuel reception and storage building and the main CHP boiler house.

Emissions to air, water and land are controlled by the conditions contained in the issued permit (REF EPR/MP3235CC) to control and minimise the environmental impacts from the operation of the facility.

5.4 Discharges to surface water or sewer

The JG Pears animal by-products facility utilises a comprehensive effluent treatment plant (ETP) for its rendering operations. The ETP treats all liquid effluent from the rendering operation, vehicle washing and surface water from specific yard surfaces. The ETP is used for dealing with any CHP Plant discharges such as boiler blow down water which equates to approximately 3m^3 per day of blowdown and 1m^3 of backflush effluent.

The use of proposed alternative fuels would not result in any changes to the content or volume of effluent discharged by the CHP facility. None of the alternative fuels would contain liquid or leachate from the material that would require processing or cause any risk of leaching into the surface water drainage system from the existing storage and handling operations at the site. All surface waters at the facility are treated in the onsite ETP.

5.5 Emissions to Air

There is a single point source emission to air from the CHP co-incinerator which is via a 50m high stack.

The point source emissions to air shall comply with the emission limit standards listed in the tables shown overleaf taken from the issued permit (Ref EPRMP3235CC). Monitoring of these emission limits is done by selective continuous monitoring using the CEMs system installed and annual extractive emissions testing.

Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency
Particulate matter	MBM CHP plant	15 mg/m³	daily average	Continuous measurement
Total Organic Carbon (TOC)	MBM CHP plant	15 mg/m³	daily average	Continuous measurement
Hydrogen chloride	MBM CHP plant	15 mg/m³	daily average	Continuous measurement
Hydrogen fluoride	MBM CHP plant	3 mg/m³	periodic over minimum 1-hour period	Quarterly in first year. Then Bi-annual
Carbon monoxide	MBM CHP plant	75 mg/m³	daily average	Continuous measurement
Sulphur dioxide	MBM CHP plant	100 mg/m³	daily average	Continuous measurement
Oxides of nitrogen (NO and NO_2 expressed as NO_2)	MBM CHP plant	300 mg/m³	daily average	Continuous measurement
Cadmium & thallium and their compounds (total)	MBM CHP plant	0.05 mg/m³	periodic over minimum 30 minute, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Mercury and its compounds	MBM CHP plant	0.05 mg/m³	periodic over minimum 30 minute, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	MBM CHP plant	0.5 mg/m³	periodic over minimum 30 minute, maximum 8 hour period	Quarterly in first year. Then Bi-annual
water vapour content	MBM CHP plant		continuous	
Ammonia (NH_3)	MBM CHP plant	15 mg/m³	periodic over minimum 1-hour period	For periodic measurement, quarterly in the first year of operation, then bi-annual
Nitrous oxide (N_2O)	MBM CHP plant		periodic over minimum 1-hour period	For periodic measurement, quarterly in the first year of operation, then bi-annual

Emissions to air table continued on next page.

Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency
Dioxins / furans (I-TEQ)	MBM CHP plant	0.1 ng/m^3	periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Dioxins / furans (WHO-TEQ Humans / Mammals)	MBM CHP plant		periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Dioxins / furans (WHO-TEQ Fish)	MBM CHP plant		periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Dioxins / furans (WHO-TEQ Birds)	MBM CHP plant		periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	MBM CHP plant		periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Dioxin-like PCBs (WHO-TEQ Fish)	MBM CHP plant		periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Dioxin-like PCBs (WHO-TEQ Birds)	MBM CHP plant		periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual
Specific individual poly-cyclic aromatic hydrocarbons (PAHs), as specified in Schedule 6.	MBM CHP plant		periodic over minimum 6 hours, maximum 8 hour period	Quarterly in first year. Then Bi-annual

The standards are from the Industrial Emission Directive (Directive 2010/75/EU of the European Parliament and of the Council) (IED) requirements to be met for a co-incineration plant (Annex VI).

During a *fuel operational assessment trial,* the CEM's will continuously monitor the key parameters of CO, O2, HCL, NOx, SO2, TOC and particulate matter. Careful observation will be made of emissions during the trial in conjunction with the data produced by the AET combustion systems for the boiler conditions, steam load, combustion air and fuel feed systems. The trial will be managed and operated in accordance with the CHP management systems for control of air emissions.

The data will be evaluated by technical personnel both at JG Pears Power (O & M) Ltd and AET.

5.6 Fugitive emissions from proposed alternative fuels

All alternative fuels will be stored inside a building. This can be either at the CHP fuel reception building or inside a building located at the JGP High Marnham facility. Blends of fuels that are delivered to site would have the same delivery and handling procedures as the existing 100% MBM fuel arriving at the CHP facility. Minimal storage of blends of alternative fuels would be held inside the fuel reception building which has extraction and the air is used as combustion air in the CHP boiler. The only material identified as having an odour would be a fuel blend containing poultry litter fuel. This would be kept inside the fuel reception building at all times with the doors closed and extraction operating. It would be used immediately that the blend is offloaded or mixed at the CHP facility.

5.7 Emissions to Land

There would be no emissions to land from the use of alternative fuels. All of the alternative fuels identified are solid and have no leachate. The alternative fuels would be stored inside a building on an impervious concrete floor. The blended fuels arriving for use ands storage at the JG Pears CHP co-incinerator would be handled, stored and used to the facilities SOP's and conditions of the issued permit.

5.8 Noise

There would be no additional noise impacts associated with the use of alternative fuels in respect that they will be delivered, stored and handled in the same manner as the existing MBM fuel. There is no additional processing of alternative fuels such as size reduction or milling needed to take place which would involve additional machinery and potential noise impacts.

5.9 Odours

The JG Pears Low Marnham site has an Odour Management Plan (OMP) which 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 odour management plan is 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. The OMP has been updated to include the additional biogenetic fuels that are proposed to be used at the CHP co-incinerator (section 6.0). All odour complaints are investigated and where corrective action is required this will be incorporated into the OMP, if not already covered. A copy of the current version of the OMP (V9.9) is detailed as appendix 3 of this permit variation application.

The alternative biomass fuels identified in table 1 of section 3.0 have been rated against their odour potential.
Green (low) = minimal odour potential no additional controls
Amber (medium) = potential for mild odour (nuisance) with procedural controls some physical controls
Red (high) = potential of offensive odour, both physical and procedural controls

EWC Description	Description of Waste	Odour Potential	Controls
Waste bark and wood	As pellets*	Not offensive, minimal odour released on storage	No additional controls
construction and demolition waste- wood	As wood chips	Not offensive, minimal odour released on storage	No additional controls
Wastes from forestry	Chips or pellets	Not offensive, minimal odour released on storage	No additional controls
Animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site	Poultry litter	Can be described as nuisance or offensive odour	Odour extraction system in place for MBM at the fuel storage building
Plant tissue waste	Grain and seeds, cocoa shells, animal feed	Not offensive, minimal odour released on storage	No additional controls
Preparation of meat and fish and other animal origin - Materials unsuitable for processing or consumption	Dry food, (food ingredients or animal origin), e.g. crisps, pasta, petfood's (dried dog biscuits, dried cat food)	In dried form not offensive, minimal odour released on storage	No additional controls, in dried form limited potential for odours
Fruit, vegetables, cereals, edible oils, cocoa - Materials unsuitable for processing or consumption	(food ingredients or vegetable origin), eg crisps, pasta, petfood's, cereal, cocoa shells	In dried form not offensive, minimal odour released on storage	No additional controls
Dairy products - Materials unsuitable for processing or consumption	Milk powders, food ingredients of dairy origin.	In dried form not offensive, minimal odour released on storage	No additional controls
Baking and confectionary - Materials unsuitable for processing or consumption	Dried confectionary products, confectionary ingredients	In dried form not offensive, minimal odour released on storage	No additional controls

Poultry litter has been identified as having as having a medium risk for the potential generation of odours. Poultry litter will be delivered to the High Marnham facility where it will

be stored inside a building and blended with MBM. The maximum amount of poultry litter held will be 250 tonnes. The blended material will be transported the 1.5 miles to the permitted CHP facility where it will be tipped inside the CHP fuel reception and storage building. The building will have its doors closed at all times and the extraction system will be constantly running. The OMP will be updated at the next review to include details of the alternative biomass fuels.

5.10 Risks from spillages

All the alternative fuels being proposed are dried materials. The risk of spillages is very low as none of the alternative fuels being proposed involve liquids. There is very low risk of spillages of material at the site during the delivery, handling and usage stages of the materials. Any spillages of dried material will be immediate cleaned in accordance with the sites existing SOP's for dealing with any MBM spillages. None of the biogenic alternative fuel materials are classed as a risk, toxic of are of harmful nature and as such do not pose a risk to the environment, land, groundwater or surface water. The site has a closed surface water drainage system, whereby all surface water is captured and treated in the onsite effluent treatment plant. There are no surface water courses located around the site or immediately adjacent to the facility as a pathway.

5.11 Risk to local human population, livestock, wildlife and environment

The JG Pears CHP co-incinerator facility has a secure high metal fence which surrounds the facility. The facility is located within the overall JG Pears animal by-products processing operations which are also subject to security fencing and controlled access gates. The security fencing and controlled access gates prevents unauthorised access from the public or livestock accidentally entering the site.

5.12 Fire prevention plan

The Environment Agency (EA) requires Fire Prevention Plans (FPPs) for sites that store or treat combustible waste as a mandatory part of the environmental permitting process. The FPPs must be approved by the EA and are designed to meet three key objectives:

- Minimise the likelihood of a fire happening.
- Aim for a fire to be extinguished within four hours.
- Minimise the spread of fire within the site and to neighbouring sites.

A compliant FPP must be a detailed, site-specific document and management system that addresses the following areas:

- Site Activities and Layout
- Waste Storage
- Ignition Source Control
- Fire Detection and Suppression

- Water Supply and Firewater Containment
- Quarantine Area

The JG Pears CHP co-incinerator has a FPP which is periodically updated to accommodate any changes which could raise a risk of fire.

The alternative biomass fuels used at the JG Pears CHP co-incinerator facility will be subject to the procedures and controls that the facility has for the storage, handling and combustion of MBM fuel products. These controls in include fire detection systems for the fuel storage and reception building along with fire detection and suppression controls inside the main CHP building. The CHP has a water supply hydrant system and fire water storage tanks and a quarantine area which is the large concrete pad between the fuel reception building and the main CHP building.

The alternative biomass fuels that have been listed in this permit variation application do not increase the fire risk to the facility in terms of the flammability or potential for self-combustion of the proposed alternative fuel materials

At the next review of the FPP the details of the use of the alternative fuels will be incorporated into the FPP.

6.0 Ash products

The ash products produced from the CHP co-incinerator (bottom ash and fly ash) are subject to an end of waste decision which was issued by the Environment Agency in March 2022. The bottom ash product also has REACH accreditation.

Both the bottom ash and fly ash have met the end of waste test in article 6 of the Waste Framework Directive 2008, as amended to account for EU Exit, and the material has achieved end of waste status for use as an agricultural fertiliser. The ash products are sold commercially as Tigerphos 40 (bottom ash) and Tiger 0-13-6. The MBM ash products, particularly the bottom ash is a very phosphorus rich material which can be added to soil at specific ground deployment rates or mixed/blended with other fertiliser materials by specialist fertiliser companies who provide bespoke fertiliser blends covering various soil types and crop nutrient requirements.

Ash products from the JG Pears CHP co-incinerator are supplied to Tigerfert Ltd who are a fertiliser merchant/broker.

The products are subject to monthly testing at an MCERTS accredited laboratory to ensure a final specification for the Tigerphos products, which includes both minimum and maximum values for micronutrients and maximum values for other substances.

As part of the alternative fuel's operational trials additional samples of ash products will be taken and tested for EoW conformity. Should the ash products for blended fuels not fully

meet the EoW specification for macro and micronutrients then ash produced from blended alternative fuels can be blended with 100% MBM ash products to ensure that the final ash products comply with the issued EoW approval. In the unlikely situation that the ash product does not comply with the EoW approval it will be directed to landfill.

7.0 Bicarbonate milling

The operation of the air pollution control system requires the use of bicarbonate for acid gas reduction of the exiting combustion gases from the CHP. Supplies of bicarbonate nationally have tended to rely on a small number of suppliers to deliver bicarbonate in bulk tankers and to the correct specification, specifically its required size specification needed which is <10 microns.

During 2024 the existing supplier of <10-micron bicarbonate material gave notice that the company would not be able to supply material of that size fraction in the future with the smallest fraction available being 50 microns. 50-micron size bicarbonate would not be suitable for the existing plant equipment to process and for the CHP facility to potentially achieve the necessary acid gas emission limits. Alternative suppliers were contacted for availability of a <10 -micron material but none of the suppliers were able to provide a high degree of certainty for uninterrupted supply in the quantities needed for continued operation of the CHP facilities air pollution abatement systems.

A commercial decision was taken to invest in the equipment necessary to be able to complete the milling of the available 50-micron bicarbonate material down to <10-microns.

The equipment installed includes two 60 tonne silos used for receiving the 50-micron material. Each silo is fitted with high level alarms and reverse pulse filtration units. The size reduction mill is located inside the ash house building and consists of an air classifier mill (ACM). ACMs simultaneously classify particles by their size whereby the operation is a blend of hammer milling with air classification in producing evenly sized particles with great efficiency. A key advantage in air classifier mills is that both mechanical and aerodynamic forces operate simultaneously to determine precisely the resultant particle size distribution. The grinding chamber, classifier wheel, feed inlet, and exhaust outlets are the typical components of the equipment.

The materials to be milled are fed into the grinding chamber, where they are crushed and then carried into the classifier where the finer particles are separated from the coarser ones and collected, allowing for optimal particle size control.

The operation of an air classifier mill can be broken down into several key steps:

1. Material Feeding: Material is first fed into the mill's grinding chamber via a hopper supplied from on of the two bulk storage silos.

2. Preliminary Milling: In the milling chamber, there are rotating hammers or blades that further grind the material to the finest. The speed of rotation and the mill element configuration determine the size of the particles from this grinding.

3. Air Flow and Classification: During grinding, air flow enters through the bottom of the mill. The airflow carries the ground particles upward to the classifier section located at the top of the chamber.

4. Classification: On the classifier wheel, a bladed wheel imparting centrifugal force separates material according to the size of particles. Smaller particles are moved over into a collection area of the product; larger particles go back into a grinding chamber where they are re-diminished.

5. Collection: The ground fine particles are collected and discharged to the existing APC feed silo. Coarser materials are continuously recycled back for additional grinding, which ensures a high level of efficiency.

6. Air Filtration and Exhaust: After processing, the air, which consists of not just the fine powder but also dust and other silt, gets filtered through a series of filters in order to take out any more particles before the air is allowed to externally vent.

The mill has a production capacity about 350-450 Kg / hour.

8.0 Co-incineration classification

For the purposes of the IED, waste co-incineration is where the main purpose of the plant is generation of energy or production of material products, and waste is fed as a regular or additional fuel, or in which waste is thermally treated for disposal purposes.

Co-incineration plants constitute a particular form of incineration plant and the Environment Agency Regulatory Guidance 2 (appendices 1 and 2) can be used to help decide when a plant should be considered a co-incineration plant, based on a set of criteria that establish the primary purpose of the plant.

JG Pears biomass CHP is operated and regulated as a co-incineration plant for the burning of MBM fuel or wood pellets.

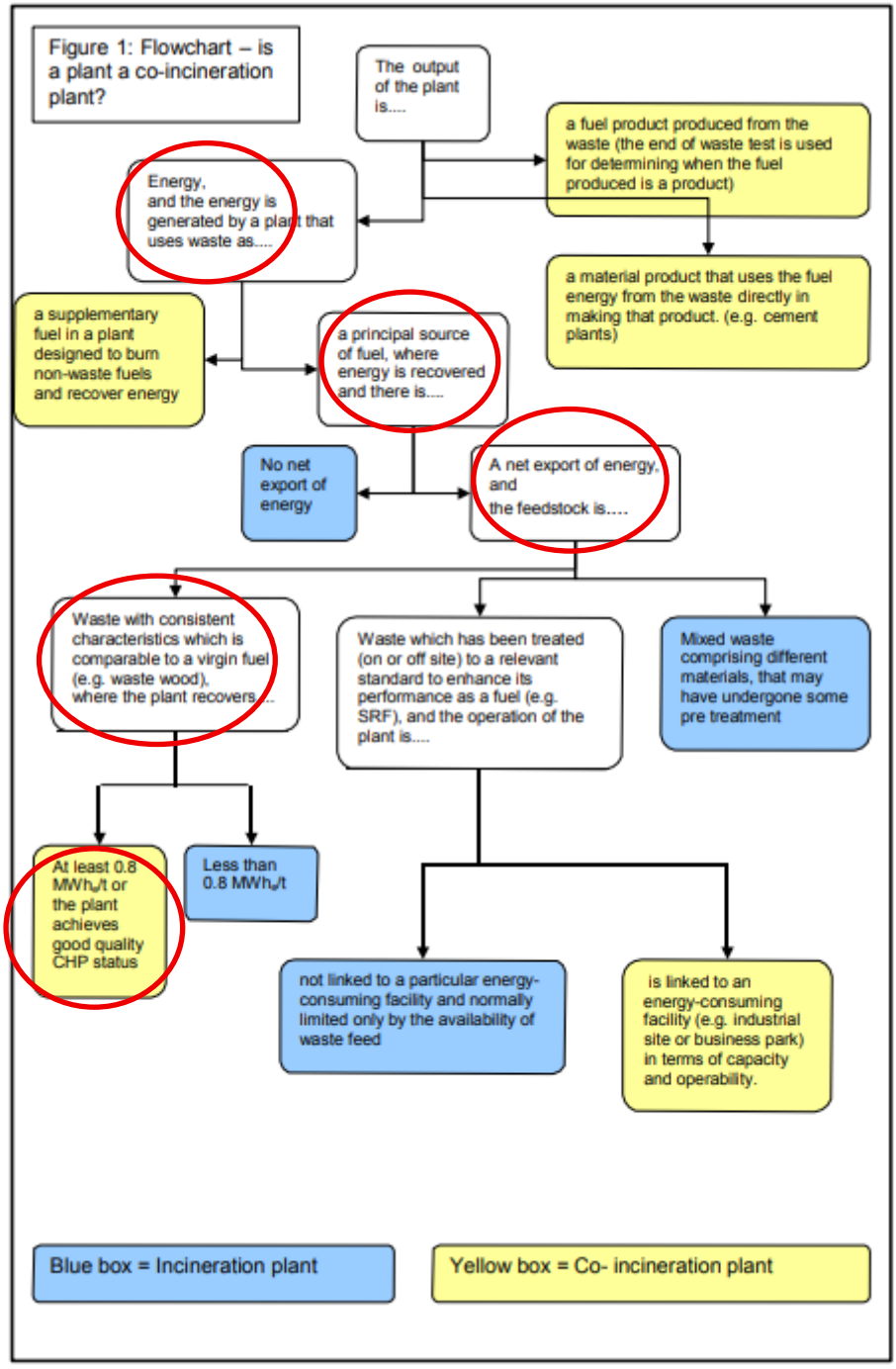
The primary purpose of the plant can be reassessed at a later date should the facts change and in this instance a re-assessment has been completed in considering the use of additional biogenic materials as fuel for the plant.

Table 2 (appendices 1 and 2) in Environment Agency Regulatory Guidance 2 provides an operator with an assessment framework for determining the operation of the facility by providing scenarios, of which one is selected of the two descriptions most aptly fits the plant under consideration.

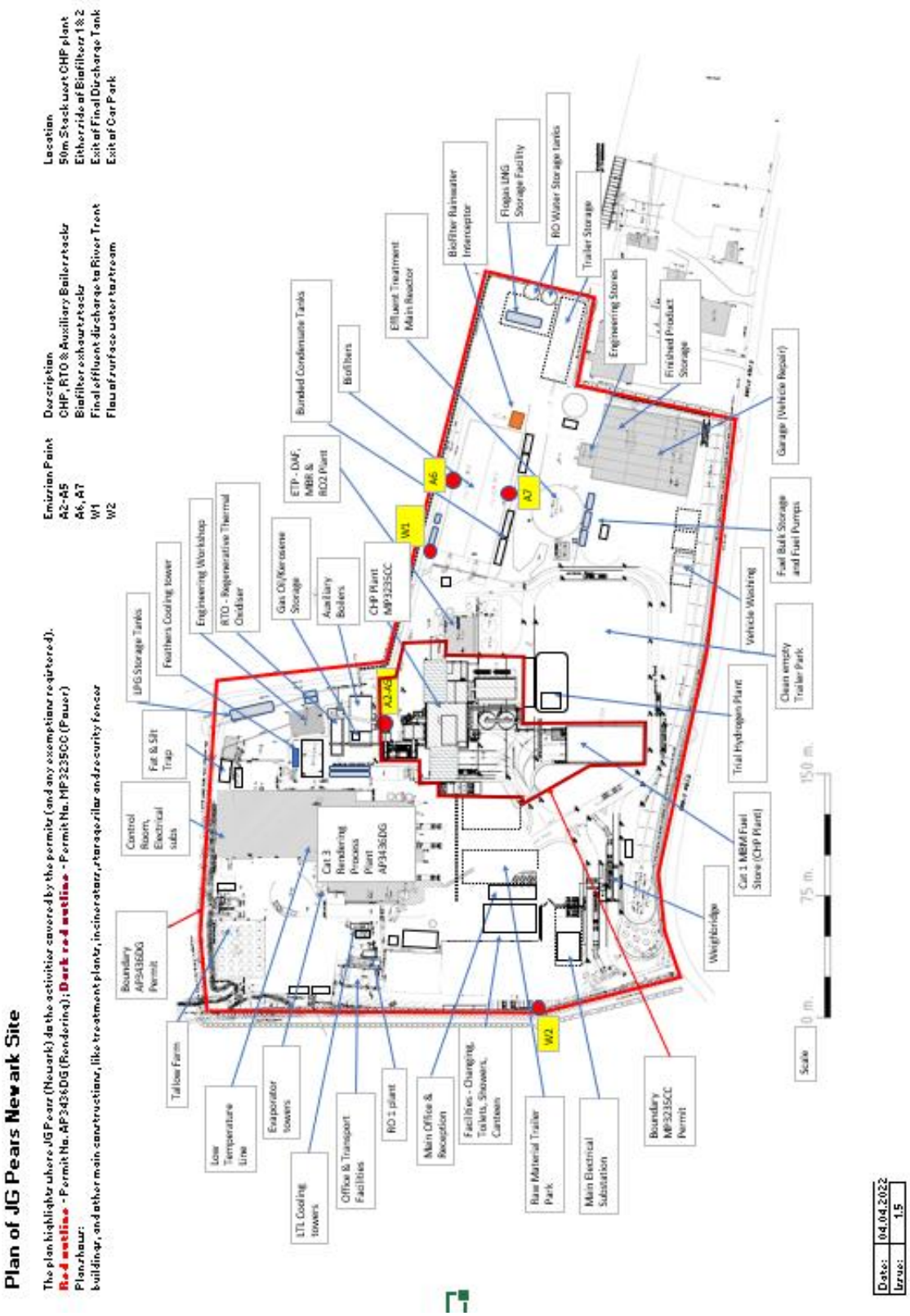
The table has been recreated below and the assessment completed.

Table 2: Is a plant is a co-incineration plant?		
1. Does the plant produce Material Outputs?		
No	Or	Yes
The plant only produces energy (electricity and / or heat).		e.g. the plant produces a fuel product[3] from waste or uses the fuel energy from the waste directly in making a product. (e.g. Cement plants).
Proceed to Question 2		**The Plant is a Co-Incineration Plant** – end of assessment.
2. Is energy recovered from the waste burning plant?		
No	Or	Yes
		There is a net export of energy (as electricity or heat) to other plant in the installation or users outside the installation.
The Plant is an Incineration Plant – end of assessment.		Proceed to Question 3
3. Is the waste the principal source of fuel?		
Yes	Or	No
Waste is burnt as the principal source of fuel. (i.e. the plant operates on non-waste fuels only occasionally, or not at all)		The waste is a supplementary fuel in a plant designed to burn fuels which are not waste.
Proceed to Question 4		**The Plant is a Co-Incineration Plant** – end of assessment.
4. Is the waste being burnt mixed waste comprising different materials?		
Yes	Or	No
The waste being burnt comprises different materials (e.g. mixed municipal waste, RDF).		The waste has consistent characteristics and can be compared to a virgin fuel (e.g. waste wood)
Proceed to Question 5		Proceed to Question 6
5. Has the waste been treated to improve its fuel quality?		
No	Or	Yes
The waste being burnt does not undergo any significant pre-treatment to enhance its performance as a fuel.		All the waste has been treated (on or off site) to a relevant standard to enhance its performance as a fuel (e.g. SRF has CEN TS 15359)
The Plant is an Incineration Plant		Proceed to Question 7
6. What level of Energy Recovery is achieved?		
Energy recovery is below 0.8 MWh_e/tonne waste	Or	Energy recovery is at least 0.8 MWh_e/tonne[4] waste or the plant achieves good quality CHP status[5].
The Plant is an Incineration Plant		**The Plant is a Co-Incineration Plant**
7. How is the plant operation managed?		
The plant operation is not linked to a particular energy-consuming facility and is normally limited only by the availability of waste feed (e.g. The principal output is electricity which is mainly supplied to the national grid).	Or	The plant operation is linked to an energy-consuming facility (e.g. industrial site, business park) in terms of capacity and operability. When the consuming facility is not operating (other than short-duration maintenance), the producing plant stops operating.
The Plant is an Incineration Plant		**The Plant is a Co-Incineration Plant**

The flow diagram assessment method has also been followed from the guidance document and the final outcome for the facility using waste with consistent characteristics is that the plant remains and co-incinerator. The boxes applicable to the JG Pears CHP facility have been circled in red on the flow diagram.



Appendix 1- Site Plan
(also sent as a separate Excel file with the variation application)



Appendix 2 – Remittance for payment to EA from JG Pears of variation application fee.

HSBC | Statement details

Account name	J G Pears Power O AND M
Account number	402510-74450116
Bank name	HSBC UK Bank PLC
Currency	GBP
Location	United Kingdom
BIC	HBUKGB4B
IBAN	GB15HBUK40251074450116
Account status	Active
Account type	Current account

Closing ledger balance brought forward
From 04 Dec 2025
Closing available balance brought forward
From 04 Dec 2025
Current ledger balance
As at 05 Dec 2025 14:29
Current available balance
As at 05 Dec 2025 14:29
Specified date range 06 Oct 2025 to 05 Dec 2025

Bank reference	Customer reference	TRN type	Value date	Credit amount	Debit amount	Balance	Time	Post date
Balance as at close 24 Oct 2025								
38807AF0230I	ENVIRONMENT AGEN	Debit	24 Oct 2025		-7,740.00		00:00	24 Oct 2025
Narrative	ENVIRONMENT AGEN, 38807AF0230I							
Balance brought forward 24 Oct 2025								

HSBC | Single payment - Faster Payment (Priority Payment)

The status for payment **89407F701NRM** is: **Processed by bank**

Your Faster payment has been made and should reach the beneficiary straight away, subject to internal checks. Once the payment has been made it cannot be recalled. **(GPA6235-PS)**

Debit account and beneficiary details

Pay from	J G Pears Power O AND M GB GBHRFBCA402510-74450116 GBP
Debit currency	GBP

Pay to

Beneficiary name and address	Beneficiary bank	Account number or IBAN
ENVIRONMENT AGENCY	Great Britain NAT WEST BANK PLC	10014411 Sort code 607080

Payment details

Amount	GBP 3,226.47
Value date	Mon 13 Apr 2026
Payment service	Faster Payment This will be sent as a Faster Payment.
Charges	Share Charges must be shared for this payment.
Your reference	ENVIRONMENT AGY

Additional details

Information for the beneficiary	PSCAPPINSTPEARS102 JG PEARS POWER OM LTD

Appendix 3 – Odour Management Plan (V9.9)

Sent as a pdf attached document to this permit variation application.