



Palm Paper Limited

APPLICATION TO VARY ENVIRONMENTAL PERMIT EPR/FP3132UE

Supporting Report





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1 NON-TECHNICAL SUMMARY

Palm Paper Limited (hereinafter 'Palm Paper') is responsible for the operation of the Saddlebow Paper Mill, which is permitted under the Environmental Permitting Regulations (2016), Schedule 1 for listed activities including the production of pulp, paper and board.

The installation comprises an integrated recovered paper facility which produces newsprint, from recycled newspaper and magazines, for sale into wholesale paper distributors and newspaper outlets. All process effluent from the paper manufacturing process is directed to the Effluent Treatment Plant (ETP) where it is subjected to biological wastewater treatment prior to discharge to the River Great Ouse. Palm Paper is seeking to vary its Environmental Permit in relation to its effluent treatment, through the installation of up to four Anaerobic Reactors to treat organic wastes in the effluent stream, a biogas treatment system (BGTS) and coarse Biological Sulphur Removal (BSR). This proposed project will also involve the use and utilisation of biomethane, extracted from the Anaerobic Reactors for energy production.

The objective and purpose of these changes will enable Palm Paper to reduce peak COD levels in the final effluent, greenhouse gas emissions (CO₂), sludge production, and organic loading on downstream aerobic systems (the aeration tanks and mixer aerator systems) and energy costs via biomethane utilisation. This will improve energy efficiency and reduce the overall environmental impact of the site.

Therefore, ahead of these modifications being developed and implemented, they will need to be assessed and reviewed by the Regulator, the Environment Agency, and included ahead of commissioning and operation, within the site's Environmental Permit EPR/FP3132UE/V012.

In summary the changes that require a permit variation comprise the following:

- Installation of four new Anaerobic Reactors; and
- Installation of a BGTS, including coarse BSR and a flare.

As part of this permit variation application, the following requirements have been considered:

- **Management Systems:** Palm Paper currently operates the installation in accordance with an Environmental Management System (EMS) which is certified to ISO14001. There will be no overarching changes to the structure and implementation of the EMS as a result of this permit variation.

However, where appropriate, new operational processes and procedures will be established in relation to the changes. Existing processes, procedures and management plans will be reviewed and updated as necessary, ensuring that all operations are undertaken in accordance with the EMS.

A summary of Palm Paper's EMS and how it meets the EA's guidance is provided below in Section 3 of this supporting report. Appendix H contains the ISO Certification for the site's EMS.

- **Energy Efficiency:** Palm Paper are accredited to, and operate the Saddlebow Paper Mill under, ISO 50001 and so activities on site have energy efficiency considerations incorporated. The changes proposed as part of this permit variation application will reduce the natural gas consumption, due to the utilisation of biomethane produced on-site.
- **Raw Materials and Water:** There has been seven new raw materials identified for use on site, and these are detailed in Section 3.3. There is no significant change to water consumption anticipated as a result of the proposed changes.

- **Waste Management:** Waste management at the installation is unlikely to be affected by the changes on site.
- **Emissions to Air:** Twelve new emission points to air will be added as a result of the changes to the site, which are detailed below:
 - Eight overpressure release valves (A10-13 & A16-19);
 - Two desulphurisation emission points (A14-15) which will release biogas that has been treated using a heated activated carbon filter to remove odorous compounds;
 - A Flare (A7) for the combustion of biogas during abnormal operation and emergency conditions; and
 - A Lean Gas Exhaust Outlet (A8) which will continuously release small volumes of lean gas.

Existing point source emissions to air (A1-A6) will remain unchanged.

- **Emissions to Water:** There will be no new point source emissions to water introduced as part of this project.
- **Emissions to Sewer:** There will be no new point source emissions to water introduced as part of this project.
- **Emissions of Substances not controlled by Emission Limits:** The new process will be enclosed to prevent fugitive emissions as far as possible.
- **Odour:** Following assessment, there will be no changes required to the measures in place to manage odour at the facility. Odour has been assessed by Mueller-BBM, who determined that no changes are to be expected from the operation of the source under consideration that would have an odour impact in the area of the nearest neighbours. There is no anticipated impact on odour emissions as a result of this permit variation, as the Anaerobic Reactors are closed systems. It is therefore not deemed necessary to produce an Odour Management Plan for the site. Following completion of the proposed development, odour will continue to be monitored, and an RTO may be retrofitted to the lean gas treatment if required.
- **Noise and Vibration:** Although there will be noise-generating equipment introduced to the site, the noise levels expected to be generated are not anticipated to be above the levels that are already produced and managed at the site and much of the equipment will be enclosed. The Environmental Impact Assessment, included as Appendix D, determined that noise and vibration do not pose a significant risk to the environment. This is further confirmed by the EA's Noise Advisory Tool, which determined that a Noise Impact Assessment and a Noise Management Plan are not required as part of this variation.
- **Environmental Risk Assessment:** An Environmental Risk Assessment has been conducted in relation to this project and all risks associated with the proposed changes on site are deemed to be acceptable when considered in line with the intended risk management techniques.
- **Best Available Techniques (BAT):** A full review of the proposed changes has been carried out against the relevant BAT Conclusions from Waste Treatment BREF (October 2018). Additionally, a review of the relevant BAT Conclusions from the Production of Pulp, Paper and Board (September 2014) has been included in this permit application.
- **Appropriate Measures:** A full review of the changes on site has been carried out against the relevant biological waste treatment appropriate measures for permitted facilities (September 2022).
- **Site Condition Report (SCR):** As part of this Environmental Permit variation application, an addendum to the Application Site Report has been prepared in accordance with the EA's H5



Guidance and is included in Appendix C. A three stage Relevant Hazardous Substances review has been conducted and included in the SCR.

2 BACKGROUND AND INTRODUCTION

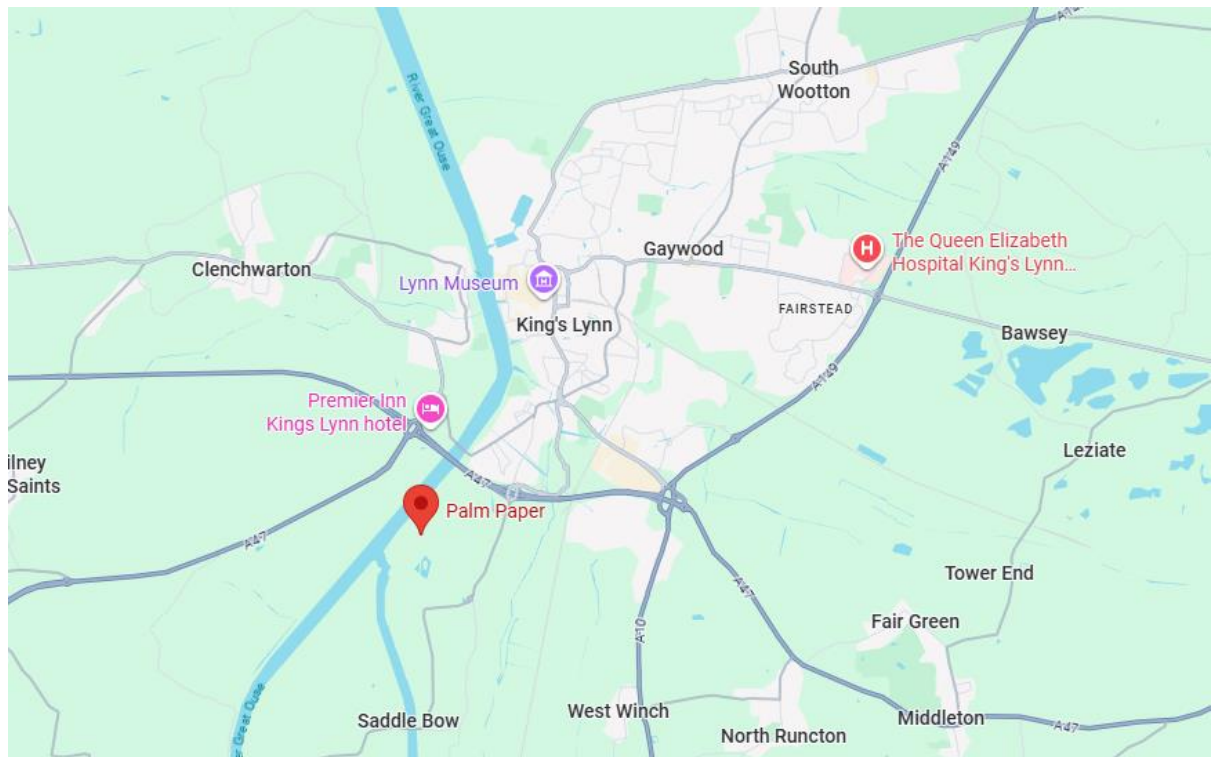
2.1 ABOUT THE INSTALLATION

This application is for a variation to the Environmental Permit (EPR/FP3132UE) for the Palm Paper Mill, in King's Lynn, operated by Palm Paper Limited (hereinafter 'Palm Paper'). The site address is as follows:

Saddlebow Paper Mill
Saddlebow Industrial Estate
Poplar Avenue
Kings Lynn
Norfolk
PE34 3AL

The site location is shown below in Figure 2-1. The installation is sited at Saddlebow Industrial Estate, located on Poplar Avenue in the town of King's Lynn, Norfolk, United Kingdom. It is situated approximately 2.5 km southwest of the town centre of King's Lynn, along the bank of the River Great Ouse.

Figure 2-1 - Site Location



The closest sensitive receptor to the Palm Paper facility is The Elms residential property, located approximately 480m to the north-west of the site boundary. Residential properties are also present within the South Lynn/Saddlebow area, with the nearest located approximately 500m to the north-east along Hillen Road. A caravan park is situated approximately 580m to the east of the site. To the south, a standalone residential property is located on High Road approximately 540m away, while farm buildings lie off Pullover Road to the west, approximately 640m from the facility boundary. The nearest relevant area for nature conservation is located around 800m from site (the River Nar).

A Pre-application Nature and Heritage Conservation Report (EPR/FP3132UE/P001, Appendix D) was received from the Environment Agency which has been reviewed as a part of this risk assessment. The habitat features listed below in Table 2-1 are derived from this report. The ecologically designated sites within the vicinity of the site are shown in Figure 2-2.

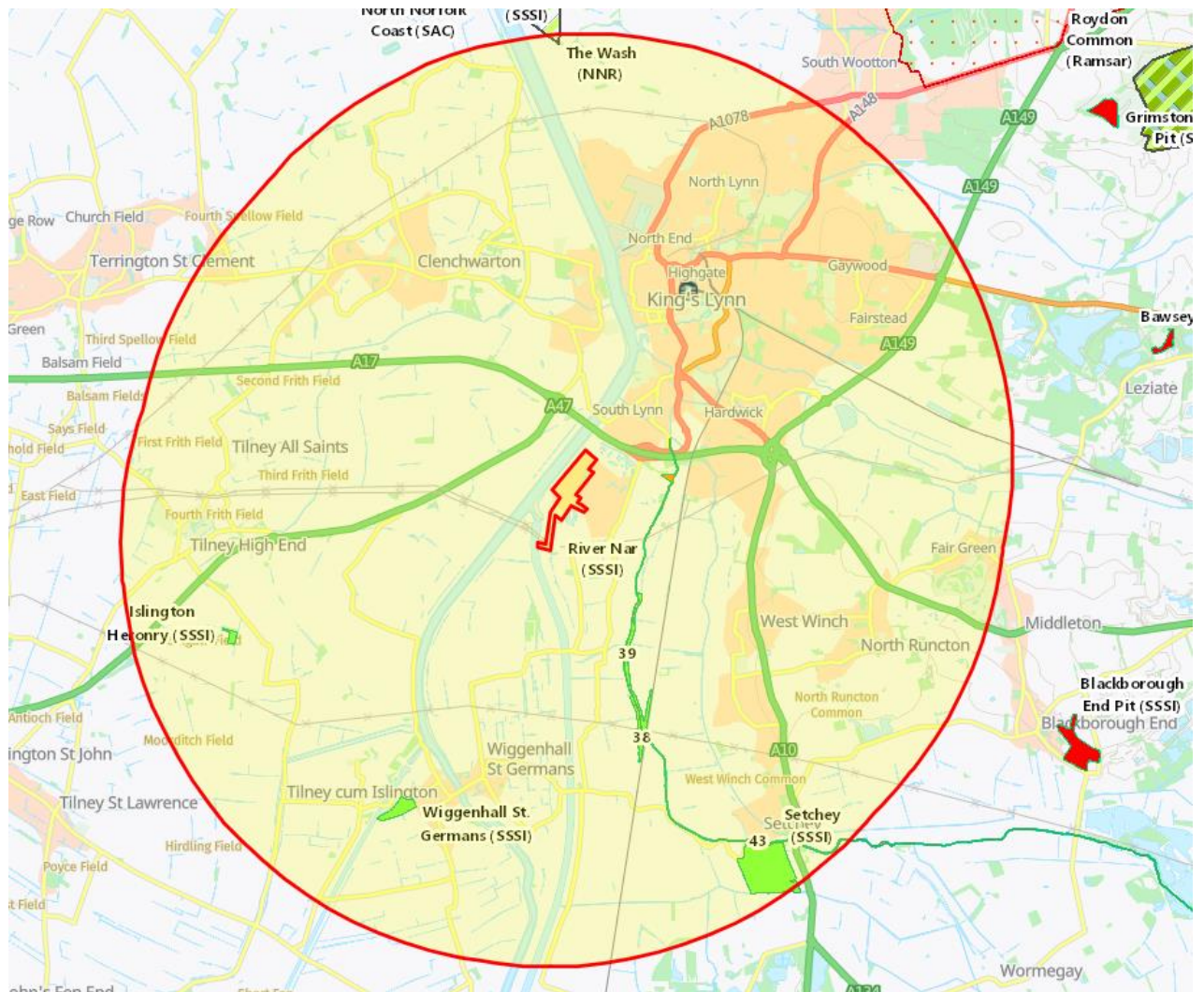
Table 2-1 – Habitat Sites

Habitat Site	X	Y	Distance from Site (km)
Special Areas of Conservation			
The Wash & North Norfolk Coast	559833	323665	5.7 km to the north of the installation
Roydon Common & Dersingham Bog	567823	322311	7.6 km to the northeast of the installation
Special Protection Area			
The Wash	559836	323682	5.7 km to the north of the installation
Ramsar			
The Wash	559836	323682	5.7 km to the north of the installation
Roydon Common	567823	322311	7.6 km to the northeast of the installation
Sites of Special Scientific Interest			
River Nar	562004	317852	0.8km to the east of the installation

As well as the identified sites, the following Local Wildlife Sites are within 2 km of the installation:

- Saddlebow Reedbeds;
- Adj. River Nar;
- Clenchwarton Road;
- West Winch Common; and
- Rush Meadow.

Figure 2-2 - Ecologically designated sites in the vicinity of the Palm Paper Mill



The site covers an area of approximately 3 hectares; centered on National Grid Reference for which is TF 60876 17786.

This application to vary environmental permit EPR/FP3132UE relates only to the existing onsite ETP.

Planning permission for the proposed development was granted by the Borough Council of King's Lynn & West Norfolk on the 12th of February 2026 (application reference 25/01610/FM).

2.2 REGULATORY CONTEXT

The site is currently regulated as an installation under the Environmental Permit EPR/FP3132UE, with several activities being undertaken from Schedule 1 of the Environmental Permitting Regulations, 2016.

The Environmental Permit was issued in February 2009 and was most recently varied in December 2020; to include a new Calendar Heating Facility.

The Environmental Permit authorises the following prescribed, scheduled activities on site, listed under Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2016, as amended (EPR):

Table 2-2 – Current Prescribed Activities

Activity Reference	Activity listed in Schedule 1 of the EPR	Description of Specified Activity	Limits of Specified Activity
AR1	<u>Section 6.1 Part A(1)(a)</u> Producing, in industrial plant, pulp from timber or other fibrous materials.	Producing, in industrial plant, pulp from timber or other fibrous materials.	From receipt of recovered paper and other raw materials to storage of de-inked pulp. Waste types as specified in Table S2.2.
AR2	<u>Section 6.1 Part A(1)(b):</u> Producing, in industrial plant, paper and board where the plant has a production capacity of more than 20 tonnes per day.	An integrated recovered paper facility which receives around 630,000 tonnes of recycled newspaper and magazines and produces approximately 550,000 tonnes per annum of newsprint.	From receipt of recycled waste paper and other raw materials to despatch of finished paper Waste types as specified in Table S2.2.
AR3	<u>Section 1.1 Part A(1)(a)</u> Producing inorganic chemicals such as gases, such as oxides of sulphur	LCP 422 (LCP unit 1): CCGT for production of steam and electricity (emission point A5): Operation of a combined cycle gas turbine (CCGT) with a net rated thermal input of 146MW and associated infrastructure including steam turbine and heat recovery steam generator. LCP 257 (LCP units 2 and 3): Standby boilers for production	From receipt of gas, gas oil (as standby fuel for package boilers), water and other raw materials to transfer of steam to the process including storage of wastes.

		of steam (emission point A3): Operation of two gas-fired package boilers for the generation of process steam, including firing on gas oil during periods of interrupted gas supply, each with a net rated thermal input of 36MW producing an aggregate net rated thermal input of 72MW.	
		Natural gas fired boiler with a net rated thermal input of 4.5MWth. Operation of gas fired boiler to heat a transfer fluid (oil) for use within the Calendar Heating System.	From the receipt of natural gas to combustion with the release of combustion gases to air. Includes oil receipt and storage.
AR4	<u>Section 5.1 Part A(1)(b):</u> The incineration of non-hazardous waste in a waste incineration with a capacity exceeding 3 tonnes per hour.	Operation of a fluidised bed paper sludge combustor for the generation of process steam and electricity.	From receipt of paper to storage and despatch of combustion bottom ash and fly ash (paper sludge ash) Waste types and quantities as specified in Table S2.3.
AR5	<u>Section 5.4 Part A(1)(a):</u> Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment.	Operation of the Effluent Treatment Plant for the biological treatment and disposal of waste waters.	From collection of effluent and waste waters and discharge to controlled waters.
Directly Associated Activities			
AR6	Treatment of water	Treatment of water abstracted from the	From the treatment of abstracted water to its

		Great Ouse Flood Relief Channel.	transfer into the process
AR7	Surface water collection and discharge.	Surface water collection and discharge.	From collection of surface water to discharge from installation
AR8	Paper Separation Plant.	Paper Separation Plant.	From receipt of mixed wastepaper to despatch of separated paper.

This Supporting Report has been developed to provide the required and necessary information to vary the site Environmental Permit EPR/FP3132UE to allow and demonstrate that no significant environmental impact or harm will result from the proposed changes. This report has been written in accordance with the latest Environment Agency Guidance.

2.3 ENVIRONMENTAL PERMIT INSTALLATION CHANGES

The site is permitted to operate an integrated paper production facility that includes pulp and paper manufacturing, large combustion plant for steam and electricity generation, and a fluidised bed combustor for incinerating paper sludge (although permitted, the sludge combustion plant has never been built). Furthermore, and specific to this variation, the installation operates an ETP for the biological treatment of wastewater, which will be upgraded and permitted through this variation application.

The proposed changes will comprise of the following, and are summarised in a proposed activity table, with the changes shown in red:

- The installation of four Anaerobic Reactors to treat organic wastes in the effluent stream. These will be installed upstream of the aerobic stage.
- The installation of a BGTS - coarse BSR, biogas storage and a flare for the combustion of biogas during abnormal operation and emergency conditions. The addition of the emergency flare associated with the anaerobic digestion (AD) will constitute a Directly Associated Activity and is classified functionally as D10 (incineration on land).
- Chemical storage and dosing for the Anaerobic Reactors.
- Utilisation of biomethane extracted from the Anaerobic Reactors for energy production by supply to the low-pressure network on site, reducing the imported energy demand for the site.

Table 2-3 – Updated Permitted Activities and Directly Associated Activities

Activity Reference	Activity listed in Schedule 1 of the EPR	Description of Specified Activity	Limits of Specified Activity
<u>AR1</u>	<u>Section 6.1 Part A(1)(a)</u> Producing, in industrial plant, pulp from timber or other fibrous materials.	Producing, in industrial plant, pulp from timber or other fibrous materials.	From receipt of recovered paper and other raw materials to storage of de-inked pulp. Waste types as specified in Table S2.2.
<u>AR2</u>	<u>Section 6.1 Part A(1)(b):</u> Producing, in industrial plant, paper and board where the plant has a production capacity of more than 20 tonnes per day.	An integrated recovered paper facility which receives around 630,000 tonnes of recycled newspaper and magazines and produces approximately 550,000 tonnes per annum of newsprint.	From receipt of recycled waste paper and other raw materials to despatch of finished paper Waste types as specified in Table S2.2.
<u>AR3</u>	<u>Section 1.1 Part A(1)(a)</u> Producing inorganic chemicals such as gases, such as oxides of sulphur	LCP 422 (LCP unit 1): CCGT for production of steam and electricity (emission point A5): Operation of a combined cycle gas turbine (CCGT) with a net rated thermal input of 146MW and associated infrastructure including steam turbine and heat recovery steam generator. LCP 257 (LCP units 2 and 3): Standby boilers for production of steam (emission point A3): Operation of two gas-fired package boilers for the generation of	From receipt of gas, gas oil (as standby fuel for package boilers), water and other raw materials to transfer of steam to the process including storage of wastes.

		process steam, including firing on gas oil during periods of interrupted gas supply, each with a net rated thermal input of 36MW producing an aggregate net rated thermal input of 72MW.	
		Natural gas fired boiler with a net rated thermal input of 4.5MWth. Operation of gas fired boiler to heat a transfer fluid (oil) for use within the Calendar Heating System.	From the receipt of natural gas to combustion with the release of combustion gases to air. Includes oil receipt and storage.
<u>AR4</u>	<u>Section 5.1 Part A(1)(b):</u> The incineration of non-hazardous waste in a waste incineration with a capacity exceeding 3 tonnes per hour.	Operation of a fluidised bed paper sludge combustor for the generation of process steam and electricity.	From receipt of paper to storage and despatch of combustion bottom ash and fly ash (paper sludge ash) Waste types and quantities as specified in Table S2.3.
<u>AR5</u>	<u>Section 5.4 Part A(1)(a):</u> Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment.	Operation of the Effluent Treatment Plant for the biological treatment and disposal of waste waters. Anaerobic Digestion of waste by four Anaerobic Reactors to treat organic wastes in the effluent stream	From collection of effluent and waste waters and discharge to controlled waters.
Directly Associated Activities			
AR6	Treatment of water	Treatment of water abstracted from the Great Ouse Flood Relief Channel.	From the treatment of abstracted water to its transfer into the process

AR7	Surface water collection and discharge.	Surface water collection and discharge.	From collection of surface water to discharge from installation
AR8	Paper Separation Plant.	Paper Separation Plant.	From receipt of mixed wastepaper to despatch of separated paper.
AR9	Emergency flare operation associated with the anaerobic digestion	D10: Incineration on land.	Emergency flare associated with the anaerobic digestion will constitute a Directly Associated Activity and is classified functionally as D10 (incineration on land).

The introduction and implementation of anaerobic treatment at the ETP will result in reduced load through the downstream aerobic treatment. All aeration lanes will continue to run with reduced air demand, thus saving energy (two of the four lanes can be taken out of operation without impacting the system, for maintenance purposes etc). Direct discharge into the Great Ouse will continue to take place after the aeration process.

These changes are anticipated to reduce the environmental impact of the site through the reduction of energy demands. The biogas extracted from the Anaerobic Reactors will be treated and the resulting biomethane will be harvested for energy production. This will directly reduce the imported energy demand and greenhouse gas emissions. Further energy savings will be made due to a reduction in chemical oxygen demand (COD) in the effluent, which will require less aeration in the aerobic treatment stage. These changes will also result in an increased treatment capacity and improved operational safety of the plant.

The new plant will be built within the existing installation boundary, as shown on Schedule 7 of the Environmental Permit, thus there are no changes to the site boundary. The location of the additional plant equipment associated with the proposed changes is shown the Site Layout Plan in Appendix B, with the new plant is shown in red.

Pre-Application Advice

An initial pre-application submission was made to the Environment Agency by WSP, on behalf of Palm Paper, in relation to the changes that are outlined in this permit variation application. It was advised that the planned upgrades to the ETP will constitute an additional scheduled activity within the Environmental Permit and therefore meets the definition of a Substantial Variation.

2.4 APPLICATION STRUCTURE

The application to vary an Environmental Permit requires of the Environment Agency's Forms A, C2, C3 and F1 as required under the EPR.

The completed application forms are provided in Appendix A, are supported by this report, which comprises the main application document detailing the proposed changes on site and their environmental impact, including consideration of management techniques to avoid and control emissions and design of the process to meet BAT.

This Supporting Report contains the following appendices, providing further supporting information and detailed environmental assessments:

- Appendix A – EPR Application Forms;
- Appendix B – Plans and Drawings
- Appendix C – Site Condition Report
- Appendix D – Environmental Risk Assessment.
- Appendix E – Detailed Air Modelling Report
- Appendix F – Hazard Identification (HAZID) Report
- Appendix G – Noise assessment

This report has been structured and developed in accordance with and with reference to the relevant technical guidance for the site activities, namely:

- Environmental permit guidance obtained from GOV.UK webpages (replacing previous EPR 1.00 'How to Comply' guidance)¹;
- Waste Treatment BREF and BAT Conclusions (August 2018);
- Production of Paper, Pulp and Board (September 2014); and
- Biological waste treatment: appropriate measures for permitted facilities (September 2022)

It should be noted that the information provided in this report relates to the new changes on site only. Where there have been no changes to processes, procedures, emissions or monitoring as a result of the proposed changes, the relevant information in the original permit application or previous variation application remain valid and should be referred to.

¹ [Environmental permitting guidance: Core guidance - GOV.UK](#)

3 MANAGING YOUR ACTIVITIES

3.1 GENERAL MANAGEMENT

The effective management of environmental performance is a key requirement for ensuring that all pollution prevention and control techniques are delivered reliably, monitored and measured appropriately, and on an integrated basis. An EMS helps to maintain compliance with regulatory requirements and to understand and manage all other significant environmental impacts.

The EMS employed by Palm Paper has been certified to ISO14001:2015 and will continue to be implemented, reviewed and updated as necessary in order to reflect any changes introduced by this permit variation. Table 3-1 below provides a summary of the EMS and how it complies with the Environment Agency requirements, outlined in GOV.UK guidance. The fundamental approach to EMS maintenance remains unchanged as a result of the permit variation being applied for.

Where there have been no changes to processes, procedures, emissions or monitoring as a result of the proposed changes, the relevant information in the original permit application or previous variation application remain valid and should be referred to and such information or environmental assessments are not repeated in this document.

Table 3-1 - Indicative BAT Requirements for Environmental Management Systems from GOV.UK Guidance

GOV.UK Requirements	Current / Proposed Arrangements	BAT?
Site Infrastructure Plan The EMS must include a plan of the site, drawn to scale, highlighting where the activities covered in the Environmental Permit are undertaken. The plan must also include: ■ Buildings and other main constructions such as treatment plants, incinerators, storage silos and security fencing; ■ Storage facilities for hazardous materials like oil and fuel tanks, chemical stores, waste materials; ■ Locations of items for use in accidents and emergencies; ■ Entrances and exits to be used by emergency services; ■ Pollution control points, such as inspection and monitoring points; ■ Trade effluent or sewage effluent treatment plants; ■ Effluent discharge points; and ■ Contaminated land, or land you believe is contaminated.	Current arrangements meet requirements with the EMS employed by Palm Paper certified to ISO14001:2015. The existing Site Infrastructure Plan will be updated to show the new plant (including flare and associated emission and monitoring points) including pipe runs that will be clearly marked. New raw materials and chemical storage areas will also be clearly marked on the plan. There are no changes to waste storage locations associated with this variation.	Yes

The plan must also show areas that are particularly vulnerable to pollution, on or nearby to the site, including rivers or streams; groundwater used for drinking water; residential commercial or industrial premises; and areas where wildlife is vulnerable or protected. Foul and combined drainage facilities should also be marked on the plan, marked in red, alongside surface water drainage facilities, marked in blue. It must also show: ■ The direction of flow of water in the drain; ■ The location of discharge points to sewer, watercourse or soakaway; ■ The location of manhole covers and drains; and ■ The location of stop and diverter valves and interceptors. Mains water, gas and electricity supplies should also be highlighted on the plan, including: ■ The mains water stop tap; ■ Gas and electric isolating valves and switches; and ■ The routes for gas, electricity and water supplies around the site. If the permit covers a standalone water discharge activity or point source standalone groundwater activity, the site plan must show: ■ The wastewater treatment plant; ■ Monitoring points; ■ Locations of emergency equipment; ■ Location of any mitigation measures referred to in the management system; ■ The outlet to surface water; and ■ The infiltration system (standalone groundwater activities only).		
Site Operations List the activities and processes involved in the operations that will be carried out on site during start up, normal operation and shut down. For waste, mining waste, and installations, list the wastes that will be produced by each activity or process. List the steps you will take to prevent or minimise risks to the environment from each activity or process and type of waste.	A process flow diagram will be produced for the new plant and equipment, as well as a plan showing all new raw material and chemical storage locations. There are no new waste storage locations associated with this variation. The site has a fire prevention plan which will be updated to	Yes

If you are a waste operator you must include a waste storage plan that states: ■ The longest amount of time you will store each type of waste; ■ How you will make sure you will not exceed these time limits; ■ The maximum amount of each type of waste you will store in terms of volume; ■ The maximum height of each storage pile on site; ■ How you will identify the specific types of waste you are storing; ■ How you will separate different types of waste if required; and ■ How you will make sure your site only takes waste that your permit allows you to store. Fire prevention plans: If you need a permit for waste activities and you plan to store combustible waste, you will need to write a fire prevention plan and submit with your application. This must explain how you would prevent fire at your site or manage risks from fire if one occurs.	reflect changes made to site, and any new risks, associated with the proposed variation. Palm Paper has proposed an Improvement Condition as detailed below in Section 7.	
Site and Equipment Maintenance Plan You will need a plan for how you will maintain site infrastructure and any machinery.	The existing Site and Equipment Maintenance Plan will be updated to include the new equipment.	Yes
Contingency Plans You will need a plan for how you will minimise the impact on the environment of any breakdowns; enforced shutdowns; and any other changes in normal operations (e.g. due to extreme weather).	The existing site contingency plan will be updated to include the new equipment, including detail of procedures to follow should equipment failure occur, or any other disruption which could impact the new equipment.	Yes
Accident Prevention and Management Plan You will need a plan for how you would deal with any incidents or events that could result in pollution or not being able to comply with your permit. Identify any potential accidents including: equipment breakdowns, enforced shutdowns, fires, vandalism, flooding and any other incident that causes an unexpected change to normal operations (such as extreme weather). For each potential incident, it must also state:	A HAZOP/HAZID has been produced for the new equipment to be included in the existing EMS. Refer to Appendix F. Palm Paper also have a procedure in place for the reporting of fires to the Environment Agency hotline. The existing Emergency Action Guide for the site will be reviewed and updated to	Yes

▪ Likelihood of the accident happening; ▪ Consequences of the accident happening; ▪ Measures taken to avoid the accident from happening; and ▪ Measures to minimise any impacts if the accident happens. The plan must say how you will record, investigate and respond to accidents or breaches of your permit. It must also include: ▪ Date last reviewed; ▪ Date of next review; ▪ A list of emergency contacts and how to reach them; ▪ A list of substances stored on site and storage facilities; and ▪ Forms to record accidents on. Consider the following actions, if you think they are relevant to operations on site: ▪ Make emergency services aware of your activities; ▪ Take out insurance to cover the cost of clean up following an accident; ▪ Check whether you're in a flood risk area² and sign up for flood warnings³; and ▪ Develop a system to allow access to important information away from your site. Online Security: Simple steps can be taken to protect the business against online security threats. Good online security will help make sure your business does not cause pollution. Contact Information for the Public: If you have a waste or installations permit, you must display a notice board at or near the site entrance telling the public about the site, including the following information: ▪ Permit holder's name; ▪ Emergency contact name and telephone number; ▪ Statement to show the site is permitted by the Environment Agency;	include and changes which may result from the new flare.	
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² [Flood risk and coastal change - GOV.UK](https://www.gov.uk/flood-risk-and-coastal-change)

³ [Sign up for flood warnings - GOV.UK](https://www.gov.uk/sign-up-for-flood-warnings)

■ The permit number; and ■ Environment Agency contact number and incident hotline number.		
A Changing Climate If your permit was issued: ■ On or after 1 April 2023, you need to integrate climate change adaptation planning into your management system; or ■ Before April 2023, whilst your management system should already consider climate impacts, you need to complete a climate change adaptation risk assessment by 1 April 2024 It is important you consider if a changing climate could affect your operations, including how this might affect your ability to comply with your permit. Plan for negative climate impacts on how you operate now, during and after any transition to net zero. Include the associated risks to local communities and the environment. These impacts and risks may change over the lifetime of the activity. Plan for the impacts of multiple events, such as supply chain failure and extreme weather, happening at the same time. To anticipate and prevent risks to local communities and to the environment, plan to test the effectiveness of your: actions, policies, procedures, and assessments. Finally, plan timely reviews and revisions in response to new information or learning. Use the adapting to climate change: industry sector examples⁴ for your risk assessment when developing or reviewing your management system. You can also: ■ Follow the guidance climate change: risk assessment and adaptation planning in your management system⁵	Considerations for climate change have been incorporated into the site's climate change adaptation risk assessment, as part of the EMS. These will be reviewed in relation to the proposed changes and updated as appropriate. The basis of the proposed changes at the factory supports the adaptation to climate change and associated impacts, as it increases energy efficiency and lowers COD levels in the effluent. This will improve compliance with environmental discharge standards and support the sustainability of the site's operations.	Yes

⁴ [Adapting to climate change: industry sector examples for your risk assessment - GOV.UK](#)

⁵ [Climate change: risk assessment and adaptation planning in your management system - GOV.UK](#)

Follow or adopt ISO 14090:2019⁶ and associated standards		
Complaints Procedure You need a procedure that records: - Any complaints received in relation to the activities covered in your permit; - How complaints are investigated; and - Any actions taken as a result of complaints.	A Complaints Procedure is implemented at the site as part of Palm Paper's EMS, and is owned by the Compliance Manager, who is responsible for the investigation of any environmental complaints, as well as any remedial actions and preventative measures. The complaints procedure is not expected to be affected by the changes proposed as part of this permit variation application and will continue to be implemented at the site.	Yes
Managing Staff Competence and Training Records You need to have enough staff and resources to make sure the site is run effectively. The management system needs to include: - An explanation of who is responsible for what procedures; - Technical competency records; - A list of roles carried out in relation to activities covered in the permit and by whom; and - Competency check procedure and training records.	Staff competence and training is managed through the current EMS and will continue to be implemented effectively. Competency checks for operation and maintenance of the new equipment will be carried out and relevant documentation kept on record.	Yes
Keeping Records Any records required by your permit must be kept. You must keep records to show how your management system is being implemented. Records to be kept include: - Permits issued to the site; - Legal requirements;	Records are kept in line with the requirements of the implemented EMS. This will continue to be the case for records required for the new flare. Environmental testing results including those required by the Environmental Permit are held on dataPARC indefinitely. Process data is	Yes

⁶ [ISO 14090:2019\(en\). Adaptation to climate change — Principles, requirements and guidelines](#)

■ Risk assessment; ■ Management system plans; ■ Any other plans required by your permit (such as noise); ■ All operating procedures; ■ Staff competence and training; ■ Emissions and any other monitoring undertaken; ■ Compliance checks, investigation findings and actions taken; ■ Management reviews and changes made to the management system; and ■ Certification audit reports and any actions taken. You also need to include copies of the plans in the management system if: ■ Your permit requires you to implement an approved plan; or ■ You have been asked to do this because there is a problem at your site. Waste operators must also record the following for each waste delivery to the site: ■ Quantity (weight or volume); ■ LoW code; ■ Origin of the waste; ■ Producer identity of the waste; ■ Date of arrive of waste to site; ■ Date when the waste was produced; ■ Quarantined materials as part of the deliver; ■ Duty of Care records; and ■ Compliance with the site record and return requirements for hazardous waste. If you hold a permit for waste, mining waste or installations, a Site Condition Report is required. This must detail the condition of land or groundwater on the site and be kept updated regularly. The following information is to be included: ■ Details of historic spills or contamination and responses to these incidents; and ■ Evidence of the effectiveness of any measures taken to protect land and groundwater.	also stored in dataPARC - 2 years at 1 second resolution and 5 years at 1 minute.	
Review your Management System A procedure needs to be in place for checking you are complying with permit conditions and management system requirements. The management system is to be reviewed and updated when:	The EMS is regularly reviewed and updated as required if changes are implemented on site. The new equipment will be captured within the EMS and relevant sections updated to reflect monitoring	Yes

- Changes are made to the site, operations, or equipment that affect activities covered by your permit; - If you apply to change / vary your permit; - After an accident, complaint or breach of your permit; and - If a new environmental issue is encountered and new control measures are implemented. Changes made to the management system will be recorded.	requirements, maintenance and training.	
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Table 3-2 - BAT Requirements for Environmental Management from the Waste Treatment BREF (2018)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 1: In order to improve the overall environmental performance, BAT is to elaborate and implement an EMS that incorporates all of the required features.	The EMS employed by Palm Paper has been certified to ISO14001:2015. This existing EMS will continue to be implemented at the site, and it will be reviewed and updated as necessary in order to reflect any changes introduced by this permit variation.	Yes

Table 3-3 - Biological Waste Treatment Appropriate Measures for Management Systems

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. The following measures apply to all processes and operations. You must have an up to date, written management system . The level of detail you need will be related to the size of your operation, site location and complexity. Your management system must aim to improve the overall environmental performance of the site.	The EMS employed by Palm Paper has been certified to ISO14001:2015. This existing EMS will continue to be implemented at the site and reviewed and updated as necessary in order to reflect the changes introduced by this permit variation.	Yes
2. You must have management commitment, including from senior managers (where applicable) to develop an environmental policy that is defined by senior managers (where applicable). This policy must include the continuous improvement of the facility's environmental performance, so you can identify pollution risks and minimise them through	Management is committed to maintaining and upholding commitments documented within the certified EMS.	Yes

appropriate measures and make best and most efficient use of resources.		
Your management system must also incorporate the features that follow.		
3. You plan and establish the resources, procedures, objectives and targets needed for environmental performance alongside your financial planning and investment.	Environmental performance will continue to be reviewed in line with the implemented EMS, and will include the new equipment.	Yes
4. You implement your environmental performance procedures, paying particular attention to: • staff structure and relevant responsibilities • staff recruitment, training, awareness and competence • communication (for example, of performance measures and targets) • employee involvement • documentation • effective process control • maintenance programmes • emergency preparedness and response • making sure you comply with environmental legislation	Palm Paper have a clear organisational structure, document competence and training, have process control maintenance procedures, and hold an Emergency Action Guide. These documents will be reviewed and updated to reflect any changes as a result of this permit variation.	Yes
5. You check environmental performance and take corrective or preventative action (or both), paying particular attention to: • monitoring and measurement • investigating and learning from incidents, near misses and mistakes including those of other organisations • records maintenance • independent (where practicable) internal or external auditing of the management system to confirm it has been properly implemented and maintained	Monitoring will continue to be undertaken in line with the requirements of the Environmental Permit (including any changes resulting from this variation). Records of incidents and maintenance will continue to be kept in line with the EMS. The EMS will continue to be audited to maintain compliance.	Yes
6. Senior managers and or operators must periodically review the management system to check it is still suitable, adequate and effective.	The EMS will continue to be routinely reviewed by appropriate senior managers or operators to ensure suitability, adequacy and effectiveness.	Yes
7. You review the development of cleaner technologies and their applicability to site operations. The Environment Agency would expect you to consider cleaner technologies:	Consideration has been given to cleaner technologies when planning the changes associated with this permit variation. This will continue to	Yes

• as a result of substantiated pollution incidents • when reviewing management systems • when planning investment decisions, for example new items of plant	be the case with any future developments or changes, or potential pollution incidents.	
8. When designing new plant, you must assess the environmental impacts from the plant's operating life and eventual decommissioning. You must make sure that new plant is authorised by your Environmental Permit.	Assessments have been made and submitted in demonstration to the Regulator that the changes are all in line with Best Available Techniques and the latest guidance, with no significant impact on the environment. The new equipment will be incorporated and authorised via this permit variation.	Yes
9. You must have a written procedure for proposing, considering and approving changes to procedures or infrastructure related to storing or treating waste or pollution control. This is so you can track and control the process of change.	The sites EMS contains a management of change procedure. There is no anticipated change to the procedure as a result of the proposed variation.	Yes
10. You consider the risks a changing climate presents to your operations and have appropriate contingency plans in place to assess and manage future risks.	Considerations for climate change have been incorporated into the site's climate change adaptation risk assessment, as part of the EMS. These will be reviewed in relation to the proposed changes and updated as appropriate. The basis of the proposed changes at the factory supports the adaptation to climate change and associated impacts, as it increases energy efficiency and lowers COD levels in the effluent. This will improve compliance with environmental discharge standards and support the sustainability of the site's operations.	Yes

11. You compare your facility's performance against relevant sector guidance and standards on a regular basis, known as 'sectoral benchmarking'.	Sectoral benchmarking is undertaken on a regular basis and will continue to be done. This has been applied as part of this application to vary the permit through application of the Environment Agency Guidance and Sectoral BAT.	Yes
12. You document and implement appropriate waste stream management.	Waste stream management is documented as part of the EMS.	Yes
13. You have and maintain a site condition report for installations. For waste facilities the Environment Agency recommends that you carry out a site condition assessment during the life of the site. You would need to carry out this assessment on surrender. Please read the guidance Environmental permitting: H5 site condition report.	The site condition report will be updated to reflect the changes included this permit variation.	Yes
14. You have and maintain: • an inventory of waste water, waste gas streams or fugitive emissions • a product and residues management plan • an accident management plan • a site infrastructure plan • an odour management plan • a bioaerosol risk assessment and management plan • a fire prevention plan, if required • a noise and vibration management plan, if required • a pest management plan, if required • a dust, mud and litter management plan (emissions management plan) if required • a leak detection and repair plan, if required By 'inventory' we mean a complete and detailed list of all waste water and waste gases produced, handled and treated by your process or plant. Where possible, for example from channelled emissions points (point-sources), your inventory must quantify characteristics such as: • substance concentration • load value and variability of each waste water and waste gas stream	All relevant plans are held and maintained for the site.	Yes

Table 3-4 - Biological Waste Treatment Appropriate Measures for Inspection, Maintenance and Monitoring

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must have a schedule of inspection, maintenance and monitoring programmes for all plant and equipment (including the impermeable surfacing and drainage systems).	Inspection maintenance and monitoring programmes are held and adhered to. Any new requirements resulting from this permit variation will be incorporated.	Yes
2. You must inspect, maintain and monitor plant, equipment and infrastructure in accordance with manufacturer or design guidelines.	Inspection, maintenance and monitoring plans are adhered to across the site and will be updated as required to reflect changes resulting from this permit variation.	Yes
3. Where manufacturers' guidelines are not available, or where you have modified them, you must provide evidence that there are sound reasons for not following these guidelines, and that you have a robust alternative.	Manufacturers guidelines will be followed.	Yes
4. You must be able to produce proof of all inspection and maintenance through records of maintenance and inspection when requested.	Records of inspection and maintenance are kept as part of the implemented EMS.	Yes
5. If the site is more complex (AD, IVC and MBT plants) you must do a Hazard and Operability Study (HAZOP) or a similar study or risk assessment.	A HAZOP/HAZID has been produced for the new equipment to be included in the existing EMS. This is included in Appendix F.	Yes
6. You must consider stocking or holding a list of critical spare parts and chemicals. You must be able to procure and install spares without undue delay.	Existing maintenance procedures ensure that critical spare parts and chemicals are held on site and available if required. If a spare part or chemical cannot be held on site for any reason, there is a clear process documented to obtain the item.	Yes
7. You must have a programme of review and consider design improvements which take into	Palm Paper review possible improvements on a regular basis in line with their EMS.	Yes

account future de-commissioning (for existing plants). These improvements may include: • improving or replacing underground tanks and pipework – or proposing an inspection regime • installing secondary containment or instigating a suitable monitoring programme depending on the risks identified and the sensitivity of the potential receptors • inspecting, draining and cleaning out vessels and pipework (especially before decommission and before dismantling) • inspecting and reviewing lagoons to make sure there is no leakage or damage – you must consider the life of the facility and any future decommissioning and clean up • reviewing insulation – this should be easy to dismantle without producing dust or causing a hazard to staff and local receptors • using recyclable materials, taking into account operational or other environmental objectives	There is no proposed change. Tank and pipework inspection regimes will be implemented within the site's PPM programmes.	
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Table 3-5 - Biological Waste Treatment Appropriate Measures for Staff Competence

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. Your site must always be operated or monitored (or both) by an adequate number of staff who have appropriate qualifications or training (or both) and competence .	Palm Paper ensure relevant training and competence is upheld for all staff. A shift supervisor is always present.	Yes
2. If you operate a 24-hour process, for example an in vessel or AD facility you must have: • remote or telemetric systems in place to make sure an alarm would be raised in the event of an incident during unmanned hours • appropriate personnel on call to deal with such incidents	Appropriate systems are in place throughout the process, with emergency procedures documented within the EMS.	Yes
3. You must adequately explain these procedures in your management system and make sure they are implemented.	Procedures are communicated regularly to employees and documented within the EMS.	Yes
4. The design, installation and maintenance of infrastructure, plant and equipment must be carried out by competent people, including using CQA where appropriate.	The new equipment has been designed and will be installed and maintained by competent people.	Yes
5. You must have appropriately qualified managers for your waste activity who are members of a	No change to technical competency expected as a	

government-approved [technical competence scheme](#).

result of this proposed variation.

Table 3-6 - Biological Waste Treatment Appropriate Measures for Accident Management Plans

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. As part of your written management system you must have a plan for dealing with incidents or accidents that could result in pollution, including near misses.	The accident management plan implemented as part of the EMS will be updated to reflect changes resulting from this permit variation.	Yes
2. Your accident management plan must identify the hazards, risk and mitigation measures that will protect the environment in the event of an accident or event.	The accident management plan implemented as part of the EMS will be updated to reflect changes resulting from this permit variation.	Yes
3. Particular areas to consider may include: - waste types and reactions of mixed waste - transferring substances, for example filling (including overfilling) or emptying of vessels and containers, over pressure of vessels and pipework, blocked drains - preventing incompatible substances coming into contact with each other - failure of plant and equipment, for example storage tanks and pipework, or blocked drains - failure of containment, for example bund failure or drainage sumps overfilling - making the wrong connections in drains or other systems - failure to contain firefighting water - failure of abatement systems - hazardous atmospheres in confined spaces - failure of main services, for example power, steam or cooling water - checking the composition of effluents before their emission - vandalism and arson - operator error - accessibility of control equipment in emergency situations - extreme weather conditions, for example flooding or very high winds - having a contingency arrangement to divert waste feedstock when your ability to spread	The accident management plan implemented as part of the EMS is suitable for the site and its operations. Any changes resulting from this permit variation will be included.	Yes

outputs to land, or inject gas to grid, is limited		
4. You must assess the risk of accidents and their possible consequences. To help you do this you can either use: - the Environment Agency's risk assessment guidance - a HAZOP or a similar detailed assessment that identifies hazards through possible deviations from the design intention	The accident management plan implemented as part of the EMS will be updated to reflect changes resulting from this permit variation. A HAZOP/HAZID has been produced for the new equipment to be included in the existing EMS.	Yes
5. Risk is the combination of the likelihood that a hazard will occur and the severity of the impact resulting from that hazard. Having identified the hazards, you can assess the risks by addressing 6 questions: - how likely is it that the accident will happen? - what may be emitted and how much? - where will the emission go – what are the pathways and receptors? - what are the consequences? - what is the overall significance of the risk? - what can you do to prevent or reduce the risk?	Appropriate risk assessments are implemented at the site which address these 6 questions.	Yes
6. The depth and type of accident risk assessment you carry out will depend on the complexity of your facility and its location. The main factors to take into account are the: - scale and nature of the accident hazard presented by the facility and its activities - risks to areas of population and the environment (the receptors)	All risk assessments are suitable to the site and its activities. A review will be undertaken to ensure the new equipment and any additional risks are captured.	Yes
7. Through your accident management plan, you must also identify the roles and responsibilities of the staff involved in managing accidents. You must provide them with clear guidance on how to manage each accident scenario, for example as a result of a spillage of a potentially polluting liquid.	The existing Emergency Action Guide for the site will be reviewed and updated to include and changes which may result from the new flare. The plan identifies key personnel and has a step-by-step guide for management of accident scenarios.	Yes
8. You must have a suitably trained facility employee available at all times who will act as an emergency co-ordinator and will take responsibility for implementing the accident management plan.	A suitably trained facility employee is available at all times in line with the implemented EMS.	Yes

9. You must train your employees so they can perform their duties effectively and safely and know how to respond to an emergency.	Palm Paper will continue to ensure up to date and appropriate training is provided. The Emergency Action Guide will be updated to include any changes required as a result of this permit variation.	Yes
10. You must also: - establish how you will communicate with relevant authorities, emergency services and neighbours (as appropriate) before, during and after an accident - implement emergency procedures, including for safe plant shutdown and site evacuation - implement post-accident procedures that include doing an assessment of the harm an accident caused (or may have caused) and actions you will take to prevent further accidents - consider the impact of accidents on the function and integrity of plant and equipment - have contingency plans to relocate or remove waste from the facility and suspend incoming waste - test the accident management plan by carrying out emergency drills and exercises	A HAZOP/HAZID has been produced for the new equipment to be included in the existing EMS. Palm Paper also have a procedure in place for the reporting of fires to the Environment Agency hotline. The existing Emergency Action Guide for the site will be reviewed and updated to include and changes which may result from the new flare. A Flood Plan document is held and updated for the site to prepare suitably in the event that a flood is likely.	Yes
11. Following a flooding event you must inspect and assess the integrity of affected plant and equipment, in particular infrastructure that may have been in contact with floodwater or groundwater. Tank inspections should include non-destructive testing methods to verify their integrity.	Appropriate site inspection procedures are in place and would be carried out following a flooding event.	Yes
12. Storage and drainage lagoons must have adequate storage capacity to make sure structural integrity is not compromised during extreme weather events.	There are no storage or drainage lagoons associated with this permit variation.	Yes

Table 3-7 - Biological Waste Treatment Appropriate Measures for Preventing Accidental Emissions

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must have a drainage plan and in the event of an emergency this must be available to emergency services. The drainage plan should clearly identify clean and dirty or foul drainage.	The existing drainage plan will be reviewed and updated in line with the	Yes

	changes resulting from this permit variation.	
2. You must make sure that in an emergency you can contain on site: - process waters - contaminated site drainage waters - emergency firefighting water - chemically contaminated waters - spillages of chemicals	Appropriate containment measures will continue to be in place across the site. New process areas will have spill containment measures in place.	Yes
3. You must put spill contingency procedures in place to minimise the risk of an accidental emission of raw materials, products, and waste materials, and to prevent their entry into water, land and air.	The existing spill management procedure will be updated to reflect the new equipment.	Yes
4. Your drainage and collection system must take account of additional firefighting water flows or firefighting foams. You may need emergency storage to prevent contaminated firefighting water reaching a receiving water body.	This is accounted for in existing procedures. They will be reviewed to ensure adequacy to cover the new equipment.	Yes
5. You must consider and reduce the risk of accidental emissions from: - loss of containment – all polluting matter - vents - safety relief valves – making sure these are checked and maintained (preventing sticking and over feeding, see site capacity in section 4) - bursting discs and seals - tank wall penetrations - storage containers	The existing spill management procedure will be updated to reflect the new equipment.	Yes
6. Liquids or fire water held in the buffer storage must be removed from site.	Any liquids or fire water in buffer storage will be removed from site as per existing procedures.	Yes

Table 3-8 - Biological Waste Treatment Appropriate Measures for Security Measures

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must have security measures in place (including staff) to prevent: - entry by vandals and intruders - damage to the equipment - theft - fly-tipping - arson	Appropriate security measure will continue to be implemented as per the EMS.	Yes

2. Facilities must use one or a combination of the following measures: • security guards • total enclosure (usually with fences) • controlled entry points • adequate lighting • warning signs • 24 hour surveillance such as CCTV	Appropriate security measure will continue to be implemented as per the EMS.	Yes
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Table 3-8 - Biological Waste Treatment Appropriate Measures for Fire and Explosion Prevention

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must have a fire prevention plan that meets the requirements of the Environment Agency's fire prevention plan guidance. The plan should include: • preventing the uncontrolled decomposition and self-heating of stored waste by managing and monitoring temperature and moisture • implementing written systems to prevent unsafe situations during site operations, repair and maintenance • having a 'permit to work' system in place for maintenance and repairs, such as hot work on plant and equipment, and where the risk of unsafe conditions could occur • having appropriate systems in place for fire and explosion prevention, detection and suppression or extinction – you must document these measures in your accident management plan or fire prevention plan, if required, to comply with your permit conditions	The existing Fire Prevention Plan for the site will be reviewed and updated to include any changes which may result from the new flare. Palm Paper also have a procedure in place for the reporting of fires to the Environment Agency hotline.	Yes
2. You must prevent the build-up of loose combustible material (including dust and waste) particularly around treatment plant, equipment and other potential sources of ignition.	Regular inspection, maintenance and cleaning procedures included in the EMS will continue to be implemented to prevent build-up of potentially combustible materials.	Yes
3. You must: • make sure that all the measurement and control devices you would need in an emergency are easy to access and operate in an emergency situation • maintain plant in a good state through a preventive maintenance programme and a control and testing programme	Existing maintenance, testing and emergency preparedness procedures will be updated to include the new equipment.	Yes

• use techniques such as suitable barriers to prevent moving vehicles damaging equipment • put procedures in place to avoid incidents due to poor communication between operating staff – during shift changes, periods of cover by temporary staff and following maintenance or other engineering work • where relevant, use equipment and protective systems designed for use in potentially explosive atmospheres		
4. You must be mindful of alarm fatigue and make sure all alarms are appropriately set and promptly responded to.	Appropriate HSE measures will continue to be implemented, including provision of training. Alarms are routinely inspected as part of the inspection and maintenance procedures employed on site; this will continue to be the case with the new equipment.	Yes
5. You must make sure that critical safety equipment, for example sprinklers, pressure relief valves and flares are maintained and kept in good working order.	Regular inspection and maintenance procedures included in the EMS will continue to be implemented to ensure critical safety equipment is functioning correctly.	Yes
6. Workers on site must be protected and monitored in line with the Health and Safety Executive (HSE) guidelines and regulations.	Appropriate HSE measures will continue to be implemented, including provision of training.	Yes
7. You must carry out all assessments in line with your facility's occupational exposure process and health and safety guidelines.	Assessments will continue to be undertaken in line with HSE guidelines and exposure processes.	Yes
Fire prevention and explosion – AD plants only 9. The following measures only apply to AD plants. All AD facilities must comply with The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR). More information is available from HSE . All AD plants must undertake a DSEAR risk assessment. This is not only for facility staff but for those attending the site in an emergency.	Compliance with DSEAR will be continued, a review will be undertaken to ensure any changes resulting from the new equipment are captured in the risk assessment.	Yes

If a DSEAR risk assessment has identified potential explosion hazards you must make sure the design and planning of your plant includes appropriate structural, technical and organisational fire protection measures.		
10. You must install protective measures on your site and implement procedures such as: - a permit to work system - using specialised personal protective equipment (PPE) - health and safety protection signage - using ATEX-rated equipment	Appropriate protective measures will continue to be in place across the site.	Yes
11. Organisational protective measures include regular maintenance of the plant, systems and components.	Regular maintenance will continue to be undertaken in line with procedures documented within the EMS. These procedures will be reviewed and updated to include the new equipment.	Yes
12. You must follow national guidelines and standards on fire protection when designing and planning your site.	Fire protection standards will be followed for the installation of the new equipment.	Yes
13. You must consider whether the Control of Major Accident Hazard (COMAH) Regulations 2015 apply to your activities, for example, the quantity of flammable gas (biogas) in combination with any other dangerous substances stored on site.	The site is not a COMAH regulated facility.	N/A
14. You must risk assess your site in line with BS EN 62305-2 to determine the lightning protection level. Where you have assessed that lightning protection measures are not necessary, you must make an assessment against transient over voltage, complying with BS7671. Where lightning condition systems are in place, they must comply with BS 62305 (part 1 to 4). A competent person must validate the system.	There is no anticipated change to the lightning risk as a result of the proposed changes	Yes
15. You should share your accident management and fire prevention plans, and liaise, with your local fire and rescue service.	Updated accident management and fire prevention plans will be shared reflecting any changes resulting from this permit variation.	Yes
16. You must maintain plant control in an emergency using one or a combination of the following measures:	Appropriate plant control measures will be	Yes

- alarms - process trips and interlocks - automatic systems based on microprocessor control and valve control - tank level readings such as ultrasonic gauges, high level warnings, process interlocks and process parameters - using a flare to manage biogas in AD systems	implemented with the new equipment.	
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Table 3-9 - Biological Waste Treatment Appropriate Measures for Firefighting

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. Your accident plan must clearly state what actions are taken to extinguish fires on site and operators must be trained in these procedures.	An appropriate accident management plan will continue to be implemented, with required training upheld.	Yes
2. Your facility must have access to water supplies to extinguish fires. In remote locations where water supplies are not available you must seek advice from your local fire service.	The site has a fire prevention plan for waste paper operations, and the fire service visit the site for familiarisation with activities and layout. There are no identified issues with water supply. There are no additional measures required in terms of access to water as a result of this permit variation.	Yes
3. In the event of a fire on site, your accident plan must consider how you will prevent firefighting run-off leaving site. Where possible you should have the capability to collect, contain and store firefighting water run-off.	The site is covered with an impermeable surface, with site drainage running to the on-site ETP. Fire water can held here and then be treated through the ETP prior to discharge. In the unlikely event that the fire water cannot be treated, it may be tankered off-site for treatment elsewhere.	Yes
4. You must isolate drainage systems from flammable waste storage areas to prevent fire spreading along the drainage system by solvents or other flammable hydrocarbons.	The waste storage area containment is separated from the site drainage system, and this will continue to be the case with	Yes

	the changes arising from this permit variation.	
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Table 3-10 - Biological Waste Treatment Appropriate Measures for Record Keeping and Procedures

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must: - keep an up-to-date record of all accidents, incidents, near misses, changes to procedures, abnormal events, and the findings of maintenance inspections - carry out investigations into accidents, incidents, near misses and abnormal events and record the steps taken to prevent their reoccurrence - maintain an inventory of substances, which are present (or likely to be) and which could have environmental consequences if they escape - record and hold a critical plant and equipment asset register, including a register of equipment installed in explosive atmospheres (ATEX-rated equipment)	Records will continue to be kept in line with the implemented EMS.	Yes
2. You must notify the Environment Agency without delay if you detect any of the following events and they are causing, or may cause, significant pollution: - a malfunction - a breakdown or failure - an accident - an emission of a substance not controlled by an emissions limit - a breach of an emissions limit	Any pollution incidents or potential pollution incidents will be reported to the Environment Agency as per current procedures.	Yes

Table 3-11 - Biological Waste Treatment Appropriate Measures for Contingency Plans and Procedures

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must have and implement a contingency plan which makes sure that you: - comply with all your permit rules and operating procedures during maintenance or shutdown, or critical failure at your site or elsewhere - do not exceed limits in your permit and you continue to apply appropriate measures for waste storage, handling and treatment	An appropriate contingency plan is in place and will be reviewed to incorporate any changes resulting from this permit variation.	Yes

• stop accepting waste unless you have a clearly defined method of recovery or disposal, and enough permitted storage capacity when land bank availability is limited, for example, during exceptional weather events such as prolonged rain or snowfall, deep frosts and severe drought • plan for any restrictions that will affect the spreading of digestate or compost to land, for example, nitrate vulnerable zones (NVZ) closed periods		
2. You must have the following information in your contingency plan: • a description of each waste and material and the correct LoW code for each waste (inputs and outputs) • details of permitted waste facilities that could accept and manage your waste if site holding capacity will be exceeded – you must obtain a copy of the site permit to make sure it can accept your waste type • the capacity (volume) of all contingency options and the length of time for which it would be available or needed • potential environmental and health and safety risks and hazards of all contingency options (for example, odour and emission generation, or leachate production from longer-term storage) • any legal restrictions or constraints for each contingency option	An appropriate contingency plan is in place and will be reviewed to incorporate any changes resulting from this permit variation.	Yes
3. You must identify your contingency options for use over the short term (1 to 2 weeks), medium term (4 to 6 weeks) and the long term (up to 6 months).	Contingency options will be added for the new equipment.	Yes
4. Your management procedures and contingency plan must also: • identify known or predictable malfunctions associated with your technology and the procedures, spare parts, tools and expertise needed to deal with them • make sure you have the spare parts, tools, and competent staff needed before you start maintenance • record where you can get critical spare parts from and how long it would take to obtain them if you cannot hold them on site • have a defined procedure to identify, review and prioritise items of plant which need a preventative regime	Management procedures and contingency plans will be produced for the new equipment.	Yes

- include all equipment or plant whose failure could directly or indirectly lead to an impact on the environment or human health - identify non-productive or redundant items such as tanks, pipework, retaining walls, bunds, reusable waste containers, ducts, filters and security systems		
5. You must make your feedstock suppliers and customers aware of your contingency plan, and of the circumstances in which you would stop accepting waste from them.	Contingency plans will continue to be shared with the relevant suppliers.	Yes
6. You must consider whether the sites or companies you rely on in your contingency plan: - can take the waste at short notice - are authorised to do so in the quantities and types likely to be needed in addition to carrying out their existing activities – if in doubt contact your local Environment Agency office for advice	Contingency plans will continue to be reviewed to consider the companies relied on.	Yes
7. You must not include unauthorised capacity in your contingency plan. If your contingency plan includes using temporary storage for additional waste on your site, then you must make sure your site is authorised for this storage and the appropriate infrastructure is in place.	Only authorised storage is included in contingency plans.	Yes
8. Your management system must include procedures for auditing your performance against all the contingency measures detailed above and for reporting the audit results to the site manager.	The implemented EMS system contains procedures for performance auditing.	Yes
9. If you produce an end of waste material at your facility, your contingency planning must consider storage capacity for end of waste products and materials that fail the end of waste specification.	Existing contingency plans account for storage capacity and will be reviewed to determine any changes as a result of the permit variation.	Yes
Contingency plans – AD plants only This additional measure only applies to AD plants. 10. You must stop accepting waste or reduce feeding rates unless you have a clearly defined method of gas management when national grid capacity is restricted.	Appropriate gas management is in place, including the addition of the emergency flare.	Yes

Table 3-12 - Biological Waste Treatment Appropriate Measures for Plant Commissioning, Validation and Decommissioning

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. The term commissioning means to bring an item of plant or equipment into working condition. You must notify the Environment Agency before you start commissioning. You must consider communicating with local communities during the commissioning phase, to comply with your management system and odour management plan.	Commissioning will be undertaken in line with requirements, notifying the Environment Agency and communicating with relevant parties.	Yes
2. You must consider the arrangements for commissioning your plant at the design stage. You must have a commissioning plan in place before you start commissioning to minimise the risks of pollution and harm to human health and the environment. The level of detail can be based on the complexity of, and risks associated with, the process.	Commissioning arrangements have been included at design stage and a commissioning plan has been produced to manage risks.	Yes
3. You must define the suite of indices you will use to determine and monitor process performance and efficiency.	These will be defined in line with the manufacturer's recommendations and monitored using the DCS system. Palm Paper's management system is certified to ISO 50001:2018	Yes
4. You must review and refine the relevant monitoring parameters during the facility's operation as part of an on-going process of system optimisation.	Monitoring parameters will be reviewed and refined in conjunction with the manufacturer to ensure effective optimisation of the system.	Yes
5. You must test and validate all systems and components of your plant and building(s) against operational requirements identified at the design stage. This must include, for example, the air extraction and abatement system and containment structures.	All new containment and equipment will be suitably tested and validated against the designs to ensure safe and compliant operation.	Yes
6. You must have completion certificates (for each commissioning phase) in place, signed by an appropriately qualified person.	Completion certificates will be obtained following commissioning and will be signed by an appropriately qualified person.	Yes

7. Commissioning must be carried out to relevant industry standards where they are available or follow manufacturers' guidelines. As a minimum, the commissioning plan must include summaries of: • commissioning phases (and sequences) including milestones and timeframes (for example pre, cold, hot commissioning) • procedures and mechanical tests at each phase including relevant industry test standard (or otherwise), for example manufacturers' guidelines Mechanical tests could include, for example: • tests for leaks • pressure tests of piping and equipment • purging or inerting requirements • pressure and vacuum safety relief where required • temperature • flow and pressure control • mixing • air flow ventilation • extraction	Commissioning will be undertaken in line with manufacturers guidelines. Timescales and details of appropriate testing will be included in the commissioning plan.	Yes
8. Your commissioning plan must also include the: • scope of performance tests, for example, acceptance criteria, measurement requirements, sampling requirements, reference to analytical procedures, chemical and biological analysis • identification of potential releases to the environment of displaced and generated emissions and measure to mitigate these, for example, lean burn flares • scope of responsibilities of the person(s) related to the test procedures, including the sign-off process • qualifications of the responsible person(s) involved • process for dealing with failed tests and problems that you may encounter • health and safety precautions and protective measures employed	The commissioning plan will detail all relevant information and procedures, including required testing, competent persons, and health and safety procedures and measures employed.	Yes
Plant commissioning – AD plants only The following measures only apply to AD plants. 9. When commissioning AD plants that have mixing systems installed, you must test the mixing system is effective. You should document the methodology in the commissioning plan.	A commissioning plan has been produced with a clear methodology to ensure appropriate testing is carried out when the new equipment goes into operation.	Yes

10. You can only seed and commission AD plants using waste after the Environment Agency has issued your Environmental Permit. The permit must contain the relevant LoW code and description for the seeding material.	The AD plant will be seeded using biologically active sludge from another Paper mill AD plant. The European Waste Catalogue (EWC) code for this sludge will be 03 03 11.	Yes
11. You must allow enough time for the Environment Agency to issue your permit when planning the start of your commissioning and any tariff guarantee date. Sending correct and exact information with your application means that the Environment Agency can issue your permit more quickly.	All information sent with the permit variation is correct and exact.	Yes
12. You should source the biomass (inoculum) used in seeding a digester that matches the type of feedstock the facility is designed to process. This will provide a more stable substrate.	The AD plant will be seeded using biologically active sludge from another Paper mill AD plant. The EWC code for this sludge will be 03 03 11.	Yes

Table 3-13 - Biological Waste Treatment Appropriate Measures for Decommissioning and Mothballing

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must consider plant decommissioning or ceasing activities (mothballing) at the design stage.	The Site Closure Plan will be reviewed and updated to incorporate the new assets associated with the proposed variation. Options for decommissioning have been considered at design stage and will be documented in management systems.	Yes
2. You must have plans that minimise risks during the time decommissioning or mothballing takes place. This includes removing or replacing individual items of plant throughout the life of the facility.	Options for decommissioning have been considered at design stage and will be documented in management systems. The new assets will be incorporated into the Site's	Yes

	closure plan which forms part of the EMS.	
3. Before you decommission plant you must notify the Environment Agency and provide a copy of your decommissioning plan.	The new assets will be incorporated into the Site's closure plan which forms part of the EMS. The operator will notify the Regulator ahead of any decommissioning activities.	Yes
4. Once decommissioning is complete you must provide a written report to the Environment Agency verifying that you have carried out activities in line with your plan.	This requirement will be adhered to following decommissioning.	Yes
5. If you bring plant back into service after a period of dormancy you must follow the commissioning requirements set out in this document or be directed by a suitably qualified person.	If the plant undergoes a period of dormancy, the manufacturer will be engaged to recommission the plant.	Yes
6. You must have a decommissioning plan to demonstrate that: • plant can be decommissioned without causing pollution • the site will be returned to a satisfactory condition, for example in line with your site condition report	Options for decommissioning have been considered at design stage and will be documented in management systems. The new plant will be constructed on an already permitted area and an addendum to the SCR has been produced.	Yes
7. The decommissioning plan must include details of (but not limited to): • removing or flushing out pipelines and vessels where appropriate and completely emptying any potentially harmful contents • drawings showing all the underground pipes and vessels • the method and resources needed for clearing lagoons • how you will dismantle buildings and other structures in a way that protects surface water and groundwater at construction and demolition sites • the soil testing needed to understand the degree of any pollution caused by the site activities, and information on what remediation is needed to return the site to a	Options for decommissioning have been considered at design stage and will be documented in management systems. The new plant will be constructed on an already permitted area and an addendum to the SCR has been produced.	Yes

satisfactory state as defined by the initial site report - the measures proposed, once activities have ceased, to avoid any pollution risk and to return the site to a satisfactory state (including, where appropriate, those covering the design and construction of the plant) - how you will clear any residues, waste, and any contamination resulting from the waste treatment activities		
Decommissioning and mothballing – AD plants The following measures only apply to AD plants. 8. Decommissioning plant and equipment, where there are potentially explosive atmospheres, is a specialist activity. You must make sure you have written procedures in place and follow it to support the safe removal or closure of plant on site.	Decommissioning plans will be produced to ensure the safe removal of plant and equipment and will consider potentially explosive atmospheres.	Yes
9. You must make sure that equipment permanently taken out of use is decontaminated and removed from the site.	This will be covered under the decommissioning plans.	Yes
10. You must have a procedure and follow it for inspecting, maintaining and validating the recommissioning of plant and equipment following periods of dormancy.	If the plant undergoes a period of dormancy, the manufacturer will be engaged to recommission the plant and a procedure will be implemented.	Yes

3.2 ENERGY EFFICIENCY

The King's Lynn site holds ISO 50001:2018 certification for its energy management system, which is international standard for energy management, which is used to ensure that regular reviews and improvements for energy performance are considered and implemented where possible.

Activities undertaken at the facility have energy efficiency measures built in, and this approach will be extended to encompass the changes that will be introduced as a result of this permit variation.

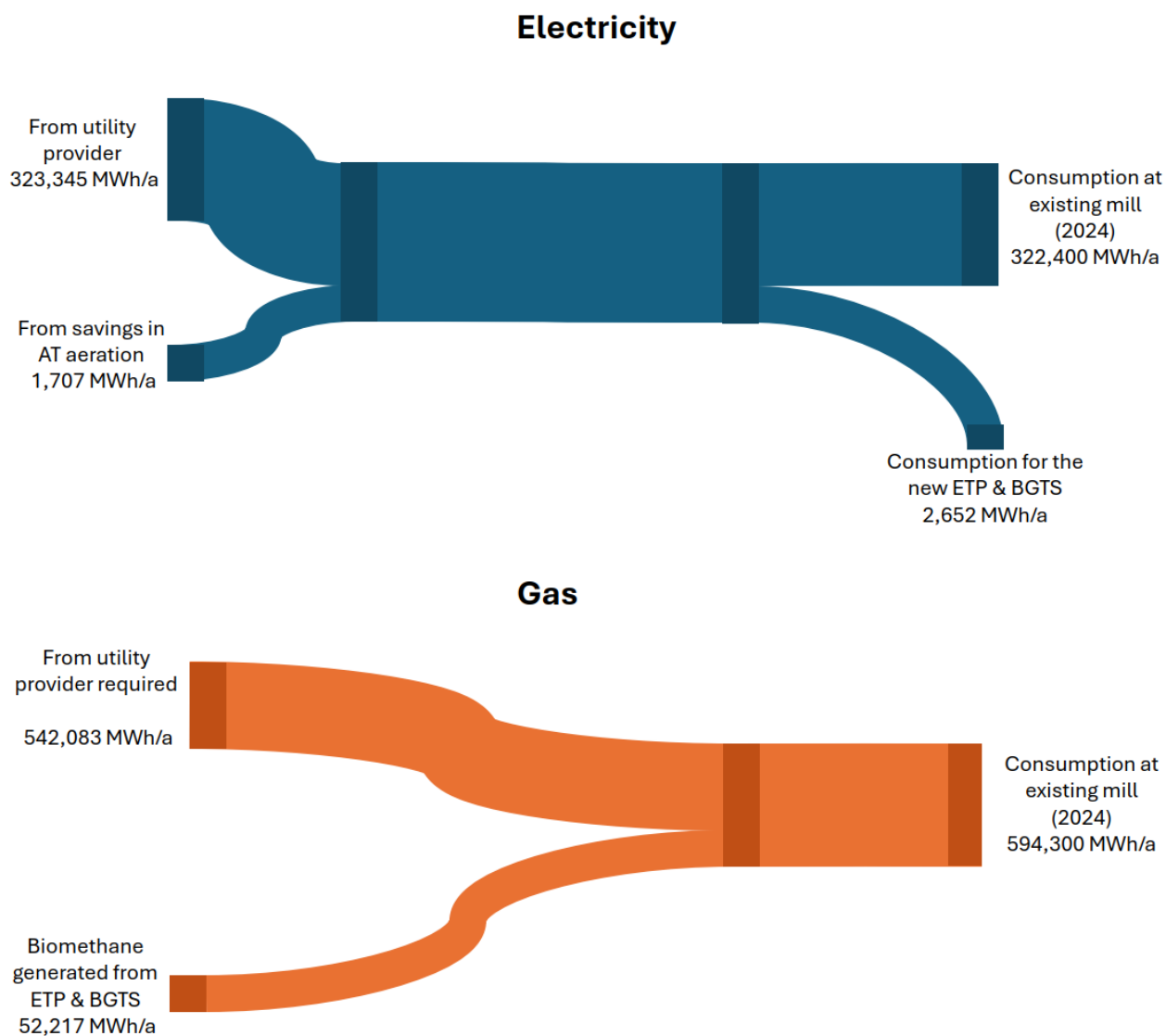
The proposed changes at the site will improve the overall energy efficiency. While electricity consumption will increase slightly due to the operation of the AD treatment tanks and BGTS, this will be partially offset by the reduced energy demand for aeration in the subsequent aerobic treatment stage. Additionally, the implementation of an anaerobic treatment stage is expected to generate approximately 52.2 MWh of biomethane per annum, which will directly reduce natural gas consumption. The predicted change in energy consumption as a result of the proposed ETP upgrades are shown in Table 3-14 below.

Table 3-14 - Current and Estimated Future Annual Energy Consumption

Energy Source	Current Primary Energy Consumption (MWh)	Future Primary Energy Consumption (MWh)	Proposed change due to variation (MWh)
Electricity from public supply	322.4	323.3	-0.9
Gas	594.3	542.1	52.2
Other (biomethane)	0	52.2	-52.2

While there is a slight increase in electricity consumption, the overall environmental impact of the site will be reduced due to the utilisation of biomethane produced during the anaerobic treatment stage. This will optimise the site's operational efficiency and reduce Palm Paper's carbon footprint and overall greenhouse gas emissions. The anticipated changes in electricity and gas input/consumption profiles are shown in the Sankey diagram below, Figure 3-1.

Figure 3-1 - Sankey Energy Balance Diagram



The proposed upgrades to the ETP on the King's Lynn site align with the BAT for energy efficiency for waste treatment, as discussed below in Table 3-15.

All electrical motors installed on site will meet either IE4 or IE5 efficiency standards, and Variable Frequency Drives (VFDs) will be used to optimise motor performance and energy efficiency.

Table 3-15 - BAT Requirements for Energy Efficiency from Waste Treatment BREF (August 2018)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 23: In order to use energy efficiently, BAT is to use both of the techniques given below: - Energy efficiency plan; and - Energy balance record providing a breakdown of energy consumption and generation by the type of source.	Tables 3-4 and 3-5 above provide the current and estimated future breakdown of energy consumption for the site by the type of source.	Yes

Table 3-16 – Appropriate Measures for Energy Efficiency

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must create and implement an energy efficiency plan at your facility in accordance with BAT reference document BAT 23.	The existing EMS contains an energy efficiency plan which will be updated to reflect the changes resulting from this permit variation.	Yes
2. You must regularly review and update your energy efficiency plan as part of your facility's management system.	The energy efficiency plan is regularly reviewed as part of the implemented EMS.	Yes
3. You must have operating, maintenance and housekeeping measures in place to make sure you use energy efficiently, for example for: - air conditioning, process refrigeration and cooling systems (leaks, seals, temperature control, evaporator or condenser maintenance) - motors and drives - compressed gas systems (leaks, procedures for use) - steam distribution systems (leaks, traps, insulation) - space heating and hot water systems - lubricating to avoid high friction losses - boiler operation and maintenance, for example, optimising excess air - other maintenance relevant to the activities within the facility	Appropriate energy efficiency measures are in place at the site and are monitored via operating, maintenance and housekeeping procedures that are included in the EMS. These procedures will be updated in line with the changes resulting from this permit variation.	Yes

4. You must have basic, low cost physical techniques in place to avoid gross energy inefficiencies. These may include for example: • insulation • containment methods (such as seals and self closing doors) • avoiding the unnecessary release of heated water or air (for example, by fitting simple control systems such as timers and sensors)	Measures are in place to avoid energy inefficiencies, all motors to be used in the AD plant will be super premium efficiency (IE4) or ultra-premium efficiency (IE5). The anaerobic reaction stage will be a closed process which will help maintain control of temperature.	Yes
5. You must regularly review and update your energy balance record as part of your facility's management system, alongside the energy efficiency plan.	The energy balance record is regularly updated as part of the implemented EMS.	Yes

Table 3-17 - BAT Requirements for Energy Efficiency from Production of Paper Pulp and Board BREF (September 2014)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 6a: Use an energy management system that includes all the following features: i) assessment of the mill's overall energy consumption and production ii) Locating, quantifying and optimising the potentials for energy recovery iii) Monitoring and safeguarding the optimised situation for energy consumption	The King's Lynn site holds ISO 50001:2018 certification for its energy management system, which is international standard for energy management, which is used to ensure that regular reviews and improvements for energy performance are considered and implemented where possible. Appropriate energy efficiency measures are in place at the site and are monitored via operating, maintenance and housekeeping procedures that are included in the EMS. These procedures will be updated in line with the changes resulting from this permit variation.	Yes

3.3 EFFICIENT USE OF RAW MATERIALS AND WATER

There will be no anticipated change to the volume or quality of water used at the paper mill or ETP as a result of the changes implemented through this permit variation.

Six new raw materials will be introduced on site in order to facilitate the operation of the AD tanks and BGTS and are identified within Table 3-18. Anticipated changes to current raw material consumption are also detailed in Table 3-18 below.

Table 3-18 - Current and Estimated Future Material Usage

Material:	Current Annual Usage (2024) (tonnes/annum)	Future Estimated Usage (tonnes/annum)	Justification for change
Urea	1460.0	1160.6	Anaerobic biomass grows slower and uses less nutrients than aerobic biomass. This means that despite the capacity increase, the amount of used chemicals will remain within a similar range.
Phosphoric acid	83.0	164.3	
Defoamer biology	10.2	5.1	The anaerobic treatment removes the easily biodegradable organics, which usually increases formation of foam in the aerobic treatment. This reduces defoamer demand in the aerobic treatment.
Defoamer desulphurization	0.0	0.2	Used for the desulfurization bioreactor.
Flocculent	44.5	<44.5	A reduction is anticipated but cannot yet be quantified.
Ferric chloride	686	<685.8	
NaOH (50%)	0	185.9	Used for desulfurization bioreactor.
Nutrimix	0	7.5	
Activated carbon	0	8	Used for fine desulfurization.
Monopropylene Glycol	0	1000 litres (preliminary fill of the refrigerant – not to be stored)	Used as a preliminary one-time fill of the BGTS cooling circuit.

Difluoromethane, 2,3,3,3-Tetrafluorop-1-en	0	60 litres (preliminary fill of the refrigerant – not to be stored)	Used as a preliminary one-time fill as a BGTS refrigerant.
Seeding and Re-seeding sludge	0	TBC	03 03 11 used seed and re-seed AD plant

Table 3-19 - BAT Requirements for Efficient Use of Raw Materials and Water from Waste Treatment BREF (August 2018)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 19: To optimise water consumption, to reduce the volume of waste water generated and to prevent, or, where that is not practicable, to reduce emissions to soil and water, BAT is to use an appropriate combination of the following techniques: a. Water management; b. Water recirculation; c. Impermeable surface; d. Techniques to reduce the likelihood and impact of overflows and failures from tanks and vessels; e. Roofing of waste storage and treatment areas; f. Segregation of water streams; g. Adequate drainage infrastructure; h. Design and maintenance provisions to allow detection and repair of leaks; and i. Appropriate buffer storage capacity.	There will be no change to the volume or quality of water used at the site as a result of this permit variation. Existing water consumption optimisation methods will continue to be employed. Leak detection and repair will be implemented across the new plant to reduce emissions to soil and water. The proposed plant will be developed on hardstanding. Surface water from the new proposed development will be directed to the existing surface water drainage system. The drainage will continue to be managed under existing procedures, with regular cleaning and inspections.	Yes
BAT 22: In order to use materials efficiently, BAT is to substitute materials with waste.	Given the nature of waste materials generated at the installation, it is not appropriate to achieve this BAT in many instances.	YES

Table 3-20 – Biological Waste Treatment Appropriate Measures for Raw Materials

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
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1. You must keep a list of the raw materials you use at your facility and their properties. This includes materials and other substances that could have an environmental impact.	An inventory of raw materials is kept and maintained. A Relevant Hazardous Substances review has also been undertaken as part of this permit variation.	Yes
2. You must check if you can use raw materials new to the market that have less environmental impact. This must include, where possible, substituting raw materials with waste.	Palm Paper undertake a raw materials review every 4 years and consider substitutions as part of this exercise.	Yes
3. You must justify why you continue to use any substance which has a beneficial alternative.	Use of raw materials at the site is reviewed at least 4-yearly as part of permit compliance. Substances used within the AD plant will be subject to this review process.	Yes
4. You must have quality assurance procedures in place to control the content of raw materials.	Quality assurance procedures will continue to be implemented.	Yes

Table 3-21 – Biological Waste Treatment Appropriate Measures for Water Use

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
The following measures apply to all processes and operations at installations only. Whilst this is an IED requirement for installation operations, all operations should consider using potable and clean water efficiently and reducing its use. 1. You must take measures to make sure you optimise water use to: - reduce the volume of waste water generated - prevent or, where that is not practicable, reduce emissions to soil and water	There will be no change to the volume or quality of water used at the site as a result of this permit variation. Existing water optimisation methods will continue to be employed. Appropriate secondary containment will be used to prevent emissions to soil and water.	Yes
2. Measures you must take include: implementing a water saving plan (which involves establishing water efficiency objectives, flow diagrams and water mass balances)	There will be no change to the volume or quality of water used at the site as a result of this permit variation. Existing water	Yes

• optimising how you use water for washing (for example, dry cleaning instead of hosing down, using trigger control on all washing equipment) • recirculating and reusing water streams within the plant or facility, if necessary, after treatment • where relevant, reducing water used for vacuum generation (for example, using liquid ring pumps with high boiling point liquids)	optimisation methods will continue to be employed	
3. You must carry out a review of water use (water efficiency audit) at least every 4 years.	Palm Paper undertake 4 yearly water usage reviews in conjunction with their raw materials review.	Yes
4. You must also: • produce flow diagrams and water mass balances for your activities • establish water efficiency objectives and identify constraints on reducing water use beyond a certain level (usually this will be site specific) • have a time-tabled improvement plan for implementing additional water reduction measures	There will be no change to the volume or quality of water used at the site as a result of this permit variation.	Yes
5. To reduce emissions to water, you must apply these general principles in sequence: • use water efficient techniques at source where possible • reuse water within the process, by treating it first if necessary – or if not practicable, use it in another part of the process or facility that has a lower water quality requirement • if you cannot use uncontaminated roof and surface water in the process, you must keep it separate from other discharge streams – at least until after you have treated the contaminated streams in an effluent treatment system and have carried out final monitoring	Palm Paper will continue to employ water efficient techniques, reuse water within the process where possible, and ensure segregation or treatment of contaminated streams.	Yes
6. You should establish the water quality requirements for each activity and identify whether you can substitute water from recycled sources and where you can, include it in your improvement plan.	The use of water at the site is reviewed at least 4-yearly as part of permit compliance. The use of recycled water within the AD plant will be subject to this review process. Currently limited opportunities exist for use of recycled water.	Yes

7. Where there is scope for reuse (possibly after some form of treatment) you must keep less contaminated water streams, such as cooling waters, separate from more contaminated streams.	Palm Paper will continue to ensure segregation or treatment of contaminated streams.	Yes
8. You must directly measure fresh water use and record it regularly at every significant usage point – ideally on a daily basis.	Fresh water use will continue to be monitored regularly.	Yes

3.4 AVOIDANCE, RECOVERY AND DISPOSAL OF WASTES

The quality and quantity of the final effluent from the plant will remain largely unchanged as a result of the described changes to the treatment process.

The current and future effluent quality and flow rate are shown below in Table 3-22. There will be a small increase in the volume of treated effluent, as this will incorporate water from the anaerobic stage, cleaning operations and condensation from biogas drying. This will amount to a few litres per day and will be treated at the ETP as part of the effluent.

As a result of anaerobic conversion of organic matter into biogas, the effluent entering the aerobic stage will have a lower COD once the proposed changes have been implemented. Subsequently, the aerobic stage will be operated as a low-load final treatment stage, which will decrease the energy demand for aeration, but also reduce sludge production in the aerobic stage by approximately two thirds. Excess sludge from the anaerobic stage will be removed as required and transported by tanker truck to customers who replace pellet sludge loss.

Furthermore, sulphur sludge from the coarse desulphurisation will be fed into the aeration process and disposed of with the excess sludge. This will amount to several litres per day of additional waste sludge.

There will be no additional waste storage areas introduced as a result of this permit variation.

Table 3-22 – Current and Future Effluent Quality and Flow Rate

Parameters	Unit	Current Operation		Future Operation	
		Average	Max	Average	Max
Dimensioning peak flow rate with wet weather from combined and separate sewer systems	m ³ /h	481	635	543	615
Calculated COD in effluent	mg/l	132	237	163	170

Nitrogen in effluent	mg/l	7.0	10.0	7.0	10.0
Total Phosphorous in effluent	mg/l	1.0	1.5	1.0	1.5

There will be no continuous waste streams produced through the operation of the BGTS, though small volumes of waste will require infrequent disposal by a licensed waste carrier. These additional wastes are shown below in Table 3-23.

Table 3-23 - Infrequent Waste Streams Generated from BGTS

Waste codes	Material	Amount used
13 02 xx ^a	Machine, gearbox lubrication oil	Every 3 to 10 years, approx. 1 m ³
15 01 yy ^b	Packaging (including separately collected municipal packaging waste)	Max 1 ton per year
-	Activated carbon (desulphurization) (To be disposed of as required)	Max. 5 m ³ per year
15 02 02* 15 02 03	Suction and filter materials, wiping cloths and protective clothing	Max. 2 m ³ per year
^a The type of oil has not yet been determined, as it depends on the manufacturer of the units. As the waste oils produced all require monitoring, the subtype of oil (last two AVV key digits) is initially irrelevant. ^b All packaging types that are subdivided with the sub-numbers "yy" occur, with the exception of those marked with an "***".		

Following the introduction of these new, infrequent, waste streams, the site will continue to meet the BAT requirements for the avoidance, recovery and disposal of waste, as discussed in Table 3-24 below.

Table 3-24 - BAT Requirements for Avoidance, Recovery and Disposal of Wastes from Waste Treatment BREF (August 2018)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 24: In order to reduce the quantity of waste sent for disposal, BAT is to maximise the reuse of	In accordance with the Waste Hierarchy and existing waste management	Yes

packaging, as part of the residues management plan.	measures already implemented on site, Palm Paper will ensure that any packaging waste generated by the changes on site is re-used wherever possible. Drums, containers, IBCs and pallets, e.g. from the delivery of raw materials, will be returned to suppliers for re-use, wherever possible. The re-use of such packaging will be dependent on the risk of contamination of the waste and health and safety considerations associated with re-using containers. Other packaging waste streams, such as plastic film and cardboard, will be removed from site by a third-party contractor for recycling.	
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Table 3-25 – Biological Waste Treatment Appropriate Measures for Waste Minimisation, Recovery and Disposal (12.4)

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
The following measures apply to all processes and operations at installations only. 1. You must create and implement a residues management plan that: • minimises residues generated from treating waste • optimises the reuse, regeneration, recovery, recycling or energy recovery of residues, including packaging • makes sure residues are disposed of properly if recovery is technically or economically impractical	Palm Paper will continue to implement waste minimisation measures and ensure residues from waste treatment are minimised where practicable. Correct disposal will be followed should reuse, regeneration, recovery, recycling or energy recovery be impracticable. As part of this variation, excess sludge is anticipated to be reduced by two thirds as a result of reduced COD within the effluent entering the anaerobic stage.	Yes

	Palm Paper will continue to ensure that any packaging waste generated by the changes on site is re-used wherever possible. Drums, containers, IBCs and pallets, e.g. from the delivery of raw materials, will be returned to suppliers for re-use, wherever possible.	
2. Where you must dispose of waste, you must carry out a detailed assessment identifying the best environmental options for waste disposal.	Existing waste management procedures will continue to be followed; this includes reviewing environmental options.	Yes
3. You must review, on a regular basis, options for recovering and disposing the waste produced at the facility. You must do this as part of your management system. This is to make sure you are still using the best environmental options and promoting the recovery of waste where technically and economically viable.	Opportunities for waste recovery will continue to be reviewed as part of the implemented EMS.	Yes

Table 3-26 – Appropriate Measures for Waste Pre-Acceptance, Acceptance and Tracking

Appropriate Measures Requirement	Appropriate Measures?
All waste is generated at the paper mill and is treated on-site at the ETP. Therefore, it is considered that the Appropriate Measures for Waste pre-acceptance, acceptance and tracking are not applicable.	N/A

Table 3-27 - Appropriate Measures for Waste Treatment (8)

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must not receive waste if you do not have enough capacity to store and treat it in line with your design criteria.	All waste will continue to be treated on-site at the ETP in line with design criteria.	Yes
2. For all stages of the process, you must manage the waste to make sure the process is stable and to minimise the risk of: - over-heating - re-heating - foaming	The treatment process will continue to the monitored and managed to maintain stability within the process and minimise any risks including: over-heating	Yes

• uncontrolled biological activity • leachate breakout	• re-heating • foaming • uncontrolled biological activity • leachate breakout	
3. Waste treatment must have a clear and defined benefit and result in a fully recovered material. You must fully understand, monitor and optimise the waste treatment process to make sure that you treat waste effectively and efficiently. The treated output must be suitable for its intended use.	The waste treatment process will be optimised as a result of this permit variation, with a reduction by two thirds in excess sludge.	Yes
4. You must identify risks and characterise emissions from the process and take appropriate measures to control them at source or abate them.	Please refer to Section 5 Emissions and Monitoring.	Yes
5. You must have accurate and up-to-date written details of your treatment activities and process controls. The complexity of the waste you treat and the processes on site will determine the level of detail. You should include: • information about the control system philosophy and how the control system incorporates environmental monitoring information • simple process flow sheets that show the origin of emissions • process instrumentation diagrams • process flow diagrams (schematics) for waste, water and air and gas flow • descriptions of process integrated techniques and waste water or waste gas treatment at source including their performances • an equipment inventory, detailing plant type and design parameters, for example, time, temperature, pressure • details of chemical reactions and the rate of reaction and energy balance • venting and emergency relief provisions • operating and maintenance procedures	These are being developed in line with the manufacturers recommendations and instruction of the AD plant and incorporated into site management systems and planned preventative maintenance regimes.	Yes
6. You must use material flow analysis to identify potential contaminants in waste inputs, outputs and	Waste entering the AD plant is effluent from the paper	Yes

emissions; in particular where you accept packaged or bespoke waste streams.	making process and, in that respect, will be of a consistent quality. Monitoring of effluent quality and monitoring of the paper making process, as well as site management techniques, will ensure that contamination is unlikely	
7. You must ensure you fully understand the fate of any contaminants to make sure that you minimise, remove and recover them from the process. You may need pre-treatment methods to minimise the carry-over of contaminants through to the treatment process.	As above.	Yes
8. You must not dilute undesired materials into the recycling or product cycle.	No foreign materials will enter the process or be diluted into the process in any way. Should this occur, the process would be shut down and investigated.	Yes
9. You must not proceed with the treatment if your material flow analysis indicates that losses from a process will cause: • a breach of an Environmental Quality Standard or your permit • a breach of a benchmark • a significant environmental impact • an issue in using the end material beneficially	The process would be shut down in the event of any process losses which may result in breaches in environmental standards, benchmarks or permit requirements, significant environmental impact or any issue in use of the end material.	Yes
10. You must clearly define the objectives and reaction (chemical, physical or biological) steps for each treatment process. You must define the end point to the process so that you can monitor and control the reaction.	The treatment process is fully defined and will be monitored to ensure the desired end point is reached.	Yes
11. You must define the suitable inputs to the process, and the design must consider the likely variables expected within the waste stream.	There are no changes to the waste input type associated with this permit variation.	Yes
12. You must sample and analyse the waste to check that you have reached an adequate end point.	Waste outputs will continue to be sampled and analysed to ensure the correct	Yes

	operation of the treatment process.	
13. You must manage the pre-treatment of waste and biological treatment activities in a way that minimises the risk of pollution from: • odour • bioaerosols • dusts • other emissions	There is no change to the pre-treatment as part of this variation. The treatment process is enclosed, and the reactor's separators retain sludge and prevent biogas loss and odour including limitation of dust and bioaerosol generation.	Yes
14. You must use plant and equipment that you can contain to minimise fugitive emissions.	The new AD tanks are enclosed and therefore fugitive emissions are limited. The Flare (A7) will be used in emergency circumstances where gas quality is not suitable for use, or parts of the system are not functioning, gas will be flared. There are 8 pressure relief valves (A10-13 and A16-19) which will not be used under normal operating conditions.	Yes

Table 3-28 - Appropriate Measures for Waste Storage, Segregation, Transfer and Handling

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. Your facility must have enough physical and permitted capacity for the wastes, raw materials and 'end of waste' materials that you store on site.	Current capacity will not be exceeded as a result of the changes to be implemented on site, and waste storage will continue to be managed in accordance with permit limits.	Yes
2. You must comply with the limits set in your Environmental Permit and with any additional regulatory requirements that may apply, for example, the: • Animal By-Products (Enforcement) (England) Regulations 2013	All permit requirements will continue to be adhered to, any changes as a result of this permit variation will be incorporated into procedures to meet requirements.	Yes

COMAH regulations		
3. You must store all waste on an impermeable surface with contained drainage that meets the recommendations of CIRIA 736.	All waste will continue to be stored appropriately and safely, with suitable containment which includes impermeable surfacing with contained drainage that meets the recommendations of CIRIA 736. No changes to the current waste storage areas are planned as a result of this permit variation.	Yes
4. Storage area drainage must: - contain all possible contaminated run off - prevent incompatible wastes coming into contact with each other - make sure that fire cannot spread - be designed to allow access for inspection and cleaning	There are no changes to waste storage areas associated with this permit variation. The areas will continue to be managed under existing procedures, with regular cleaning and inspections.	Yes
5. Where possible you must keep clean rainwater separate from wastes and waste waters to limit storage requirements.	The surface water from the new proposed development will be directed to the existing surface water drainage system. The drainage will continue to be managed under existing procedures, with regular cleaning and inspections. The treated effluent from the new AD process will be directed back to the original effluent pathway.	Yes
6. You must store waste in locations that minimise handling waste and have handling procedures in place. Only competent staff must handle waste. They must use appropriate equipment.	Existing waste handling procedures will continue to be followed, which includes appropriate equipment used by trained and competent staff.	Yes
7. Where possible, you must locate storage areas away from watercourses and sensitive perimeters	There are no changes to the waste storage capacity or	Yes

(for example those close to public rights of way, housing or schools).	locations as a result of this permit variation.	
8. You must store all waste within the security protected area of your facility to prevent unauthorised access and vandalism.	All waste will continue to be stored on site in designated waste storage areas, within the site boundary.	Yes
9. Your management system and odour management plan must clearly state the maximum storage capacity of the site and the designated storage areas.	Palm Papers EMS will be updated to incorporate all proposed changes from the proposed variation including the maximum storage capacity and designated storage areas.	Yes
10. You must provide signage that clearly states the maximum quantity and types of waste that can be stored in an area. You must communicate these maximum capacities to site operatives.	There are no changes to the waste storage capacity or locations as a result of this permit variation. Existing signage will remain in place.	Yes
11. You must define capacity in clear terms, for example: • maximum tank or vessel capacities • tonnage • number of pallets or containers	Existing limits and capacities will remain in place. There are no changes to the waste storage capacity or locations as a result of this permit variation.	Yes
12. You must regularly monitor the quantity of waste stored on the site and in designated areas to check you do not exceed the maximum storage capacities.	There are no changes to the waste storage capacity or locations as a result of this permit variation. Waste quantities will continue to be monitored in line with existing procedures.	Yes
13. For in vessel composting and AD, available storage capacity and throughput will be influenced by the period of time the waste is in the treatment vessels. You must make sure you have sufficient capacity to store waste inputs and outputs, taking account of the loading rate and capacity for treatment. Information on determining capacity is available in Regulatory Guidance Note 2 .	The AD vessels are only part of the effluent treatment process. No storage of waste inputs is necessary as the ETP can operate independently of the AD process by utilising the available capacity in the aerobic treatment lanes.	Yes
14. You must store highly putrescible wastes, including odorous and ammonia-rich wastes and	All effluent is contained within sealed pipework and a	Yes

wastes containing animal by-products, in a contained or enclosed building. The building should be fitted with an appropriately engineered extraction and ventilation system, with the air extracted and directed to a suitable abatement system. You can install localised point source air extraction in buildings to minimise a source emission from that locality. For liquid wastes this is either: • a sealed tank fitted with an air control system which may include air circulation • local extraction to a gas recovery plant or engineered abatement system	sealed treatment system process. Gas is extracted from the treatment process and treated prior to use as biogas or emission through the lean gas exhaust outlet.	
15. Your storage areas must be large enough to manage foreseeable changes in feedstock supply and your ability to despatch outputs without causing pollution. For example, during: • public holidays • periods of adverse weather • seasonal peak volumes of waste acceptance	Ongoing treatment system. Changes in feedstock are not anticipated.	Yes
16. You must not over accumulate wastes. You must treat wastes or remove them from the site as soon as possible. You must prioritise the treatment or off-site transfer of waste based on: • its type • its age on arrival • date of arrival • duration of storage on site	Existing waste treatment and handling procedures will continue to be implemented and followed.	Yes
17. Storage area surfaces used for putrescible waste must be of a type and quality suitable for effective cleaning and or disinfection. You must put procedures in place and use them to make sure that surfaces are regularly cleaned or disinfected (or both).	N/A	N/A
18. You must design your storage facilities and procedures to make sure there is no cross-contamination between inputs and outputs of the process, and during the treatment cycle (where applicable). For example, during the sanitisation and stabilisation of composting waste.	N/A	N/A

19. For waste in storage you must follow the first-in, first-out principle. You must also identify and prioritise dealing with wastes with a higher risk of causing odour, litter or pest problems. You can do this by filling and emptying bays alternately or operating an all-in, all-out approach.	There is no expected impact from the changes proposed on odour, litter or pest issues associated with waste.	Yes
20. You must make your on-site waste inventory readily available.	Existing waste management procedures will continue to be implemented, including waste inventory keeping.	Yes
21. You site must have safe pedestrian and vehicular access (for example, for forklifts) (at all times) to storage areas so that you can retrieve waste safely.	There are no changes to the waste storage locations or accessibility as a result of this permit variation.	Yes
22. You must design bunkers, bays and pits so that waste and debris does not build-up in inaccessible areas such as corners. You must regularly clean bunkers, bays and pits.	There are no changes to the waste storage capacity or locations as a result of this permit variation. Existing maintenance, inspection and cleaning procedures will continue to be implemented and adhered to.	Yes

Table 3-29 - Appropriate Measures for Biogas Production and Management – AD Plants

Appropriate Measures	Current/Proposed Arrangements	Appropriate Measures?
1. You must manage gas production volumes within the processing constraints of the facility.	Gas production volumes will continue to be closely monitored and remain well within the constraints of the facility.	Yes
2. You must have contingency measures in place and appropriately manage any excess gas produced, including when there is limited gas to grid availability during low demand periods.	Excess gas will be managed via biogas storage and in emergency circumstances where gas quality is not suitable for use, or parts of the system are not functioning, gas will be flared.	Yes
3. You must use measures such as decreasing loading rate and diverting feedstock if gas demand is compromised.	Effluent can be diverted to the existing aerobic treatment lanes which have capacity to treat all effluent from the mill.	Yes

4. When determining gas storage capacity, you must consider how changes in climatic conditions, such as high temperatures in the summer, affect the volume of gas for storage.	The mill operations require a constant feed of gas. The biogas from the AD plant is supplementary to the site gas requirements so there will always be demand for the biogas and the need for storage beyond capacity is not anticipated. The flare and pressure relief valves are in place in the unlikely event that storage capacity is exceeded.	Yes
5. You must protect your biogas upgrading and energy recovery plant with flame arrestors and slam shut valves.	Flame arrestors and slam shut valves will be used.	Yes
6. You must install a permanent back-up generator to power critical plant and equipment in the event of power failure.	Palm Paper has its own CHP providing electricity to the site. Electricity from the national grid can be used in the event of interruption to the CHP supply.	Yes
7. You must implement a leak detection programme that identifies and controls methane slippage from all processes and storage on site.	Leak detection measures will be in place to monitor for biogas release, incorporating existing leak detection measures.	Yes
8. Your procedures must make sure propane and odorants (for example mercaptans) are handled safely.	See Section 5.5 Odour.	Yes
9. You must inspect and maintain all gas utilisation plant and equipment, as a minimum, following manufacturers' recommendations. You must record all routine and non-routine inspection and maintenance.	New equipment within the ETP will be added to existing maintenance and inspection procedures, to ensure continued safe operation. There are no new gas engines as part of this permit variation, only the emergency flare.	Yes
10. Gas combustion stacks must be vertical and unimpeded by cowls or caps.	The flare stack is vertical and unimpeded.	Yes
11. Stacks for releasing point source emissions must have an 'effective stack height' unless otherwise stated in your permit, for example, if you operate under a standard rules permit.	The flare has an effective stack height of 7.9 m.	Yes

12. You must monitor emissions following the requirements in your permit.	All permit requirements will be fulfilled, including any addition emissions monitoring required as a result of this permit variation.	Yes
13. You must submit a record of each combustion unit and fuel type yearly.	There are no combustion units associated with this permit variation, only the emergency flare.	Yes
14. You must consider whether you can use the heat from processing or combustion.	Heat exchangers are present within the ETP process and will continue to remain in place.	Yes
15. You must comply with the emission limits in your permit, and you must use the relevant monitoring standards.	Any additional monitoring required within the permit as a result of this permit variation will be completed as required and to the relevant monitoring standards.	Yes

Table 3-30 - Appropriate Measures for Biogas Treatment and Storage

Appropriate Measures Requirement	Current/Proposed Arrangements	Appropriate Measures?
1. You must prevent the emission of uncontrolled release of biogas and biomethane.	The reactor's inlet system ensures optimal mixing, while separators retain sludge and prevent biogas loss	Yes
2. You must inspect, maintain, routinely test and keep a record of all gas storage and treatment plant and equipment following the manufacturers' recommendations or your inspection regime.	New equipment within the ETP will be added to existing maintenance and inspection procedures, to ensure continued safe operation.	Yes
3. You must identify the intended end use of the biogas to determine the appropriate treatment method. You must consider the following factors: - dewatering - removing hydrogen sulphide which may corrode gas engines - removing oxygen and nitrogen - removing ammonia	Biogas will go through desulphurisation and cleaning via an Expanded Granular Sludge Blanket (EGSB) process prior to use in the low-pressure network on site, or storage.	Yes

- removing siloxanes, particularly from digesting sewage sludge - removing particulates - removing carbon dioxide particularly when upgrading from biogas to biomethane - adding propane to improve calorific value for biomethane gas grid injection		
4. You must assess hydrogen sulphide levels in the biogas to determine the efficiency of the removal methods applied. You should do this by monitoring gas quality before and after using gas cleaning equipment.	Gas quality and quantity will be monitored continuously as an indication of the stability of the anaerobic biological processes.	Yes
5. You must continuously monitor biogas flow, quality, pressure and composition. Monitoring systems must be interlocked where possible and have remote alarm capability.	Gas quality and quantity will be monitored continuously as an indication of the stability of the anaerobic biological processes.	Yes
6. You must remove water (condensate) from the biogas to protect the collection system, energy recovery plant and auxiliary flare. Condensate must be discharged into a contained drainage system or recirculated back into a digester. Condensate storage must not produce odorous emissions.	The condensate will be extracted from the biogas and treated as part of the effluent treatment process.	Yes
7. You must collect biogas from all digesters and all other treatment and storage vessels where methane is actively generated.	Biogas (biomethane) will be collected from the ADs as part of the process. This will be stored in a buffer tank or utilised in the low-pressure network on site.	Yes
8. Biogas storage facilities must be gas tight, pressure-resistant, weather proof, and resistant to ultraviolet light and fluctuations in temperature.	The biogas storage facility will meet these requirements.	Yes
9. You must not allow biogas and air to mix unless it is used for desulphurisation. If you use oxygen to desulphurise biogas you must automatically monitor oxygen levels. You must also use high-level alarms which are set to automatically stop adding air before the lower explosive limit is reached.	Biogas and air will not be mixed other than in the desulphurisation process. High-level alarms will be included in the design.	Yes
10. If you use carbon filters, for example to clean gas before combustion, you must use procedures that minimise the risk of exothermic reactions during their maintenance, for example, by purging	The maintenance procedure for carbon filters will be developed in line with the manufacturer's recommendations, taking	Yes

with nitrogen. You must contain and treat purged gases.	into consideration the requirements of these appropriate measures.	
11. You must install or have a gas flare available for use at all times. You must not routinely use flares or vent directly to the atmosphere.	The gas flare included in this permit variation is for emergency use only. Gas will only be flared if the desulphurisation equipment or the BGTS is out of service, or if the BGTS is failing to reach adequate biomethane quality for use in the boilers or in the event of an abnormal operating scenario and emergency where it is required for safety	Yes
12. You should use enclosed (ground) design flares on all new plants. They should be capable of achieving a minimum of 1,000°C with 0.3 seconds retention time at this temperature.	The site will use an enclosed flare, achieving a minimum temperature of 1,000°C with 0.3 seconds retention time at this temperature.	Yes
13. On existing sites where shrouded or open flare are installed you must make sure that gas can effectively combust to destroy trace elements.	The flare is designed with appropriate temperature and retention time to effectively combust and destroy trace elements.	Yes
14. You must make sure that the finish on the exterior of the flare is weatherproof as well as heat-resistant. The structure of the flare must be designed to withstand wind stresses.	The flare will be constructed with appropriate weatherproof and heat-resistant materials.	Yes
15. You must protect ancillary items such as control and instrumentation equipment, including cabling. Providing housing makes maintenance tasks easier, but you must consider any explosion hazards.	Instrumentation equipment, including cabling, will be protected.	Yes
16. You must minimise the operation of the flare and use it only for emergencies and during maintenance to protect the integrity of the plant (for example, during start-ups or shutdowns).	Flare is for emergency use only, either if desulphurisation equipment or the BGTS is out of service, or if the BGTS is failing to reach adequate biomethane quality for use in the boilers.	Yes

17. You must specify measures in your procedures to minimise flare use during routine maintenance. This includes, for example, to: • reduce feed rates to lower gas production • increase the safe storage of gas where capacity is available • install stand-by gas utilisation plant	Procedures will be developed to minimise flare use. As previously mentioned, biogas production will be supplementary to the onsite gas demand. This will decrease the necessity for reduced feed rates, additional storage capacity or the need for stand-by gas utilisation plant.	Yes
18. You must monitor and record the use of your flare. Your records must include the date, duration and number of flaring events.	Emergency flaring events will be monitored as required and kept on record.	Yes
19. Your SCADA systems must be able to continuously monitor gas flow and when the flare is activated.	SCADA systems will continuously monitor gas flow and the activation of the flare.	Yes
20. You must be able to quantify emissions if required and identify any potential improvements that would reduce flaring events.	Gas quality and quantity will be monitored continuously as an indication of the stability of the anaerobic biological processes.	Yes
21. You must routinely measure other parameters, for example: • composition of gas flow • gas temperature • ratio of assistance • velocity • purge gas flow rate	Gas quality and quantity will be monitored continuously as an indication of the stability of the anaerobic biological processes.	Yes
22. You must routinely measure pollutant emissions, for example: • oxides of nitrogen (NOx) • carbon monoxide (CO) • VOCs	Emissions will be monitored as per permit requirements. Biogas will be used onsite within existing combustion equipment, emissions from which are currently monitored in line with existing permit requirements.	Yes

23. Monitoring and interlocking must be linked to your SCADA system.	Monitoring and interlocking will be linked to the site's SCADA system.	Yes
24. Flares must be automatically activated when the quantity of biogas exceeds a set maximum limit and before venting of biogas occurs.	The flare will be automatically activated when the quantity of biogas exceeds the maximum limit and prior to venting of biogas.	Yes
25. During commissioning, you should consider lean burn flares where gas quality is poor to prevent venting and pollution.	The flare will be used during commissioning phase to prevent venting of poor-quality gas.	Yes
26. Flares can cause noise. This can come from the vents, the combustion process and smoke suppressant injection. You must design new flares to minimise noise emissions. Noise avoidance can include the following measures: • reducing or attenuating the high-frequency steam jet noise by using multi-port steam injectors – designing the orifice to cope with potential coke formation is essential • installing the injectors in a way that allows the jet stream to interact and reduce the mixing noise • increasing the efficiency of the suppressant with better and more responsive forms of control • restricting the steam pressure to less than 0.7MPa gauge • using a silencer around the steam injector as an acoustic shield for the injectors • using enclosed ground flares	Enclosed ground flare to be used. Noise is discussed in Section 5.6.	Yes

4 OPERATING TECHNIQUES

4.1 INSTALLATION OPERATIONS AND CHANGES TO ONSITE PROCESSES

Section 4.2 provides an overview of the operations and processes which are currently taking place at the facility, as part of Palm Paper's paper production. For a more detailed description of existing operations (and full consideration of BAT), the original Environmental Permit application and subsequent variation applications should be referred to.

Section 4.3 of this report describes the proposed changes which result in the need for this variation application to Environmental Permit EPR/FP3132UE.

4.2 OVERVIEW OF CURRENT OPERATIONS

The site is currently permitted to operate an integrated paper production facility, including pulp and paper manufacturing, large combustion plants for steam and electricity generation, and a fluidised bed combustor for incinerating paper sludge (although permitted, the sludge combustion plant has never been built). The site also operates an ETP for the biological treatment of all process effluent from the paper manufacturing process, prior to discharge to the Great Ouse River. Please see table 2-1 for the full list of activities.

The existing ETP has been in operation since 2008 and is comprised of the following treatment units:

- Primary Treatment at PM 7
- Storage Tank
- Installation Channel to the ETP
- Conditioning and Nutrient Dosing
- Aerobic Biological Treatment (four lanes)
- Settling tanks (two secondary clarifiers)
- Sludge Pumping Station
- Ferric Salt Dosing
- Flocculant Dosing
- Cooling

At present, the mill's effluent is mechanically treated by screening and micro-flotation to remove fibrous materials from the production line. It is then sent to heat exchangers to reduce the water temperature to mesophilic levels ($< 40^{\circ}\text{C}$) to enable biological treatment using 4 lines of aerobic treatment and two secondary clarifiers.

4.3 CHANGES TO OPERATIONS

4.3.1 OVERVIEW OF CHANGES

This application pertains to an upgrade of the existing ETP via upstream anaerobic treatment. The biogas produced during anaerobic purification will be processed into biomethane and injected into the paper mill's low pressure gas grid for use on site.

This will improve the energy efficiency of the plant by reducing the CO_2 footprint, the consumption of process chemicals and the generation of sludge. This ETP upgrade will also increase operational safety and provide additional resilience in treatment capacity.

The proposed changes will include the installation of four Anaerobic Reactors, a BGTS (including coarse BSR, biogas storage and a flare) and chemical storage.

The new installations will be built within the existing site boundary, directly neighbouring the existing aeration tanks. The Anaerobic Reactors and the biogas treatment and processing will be located on the northeast side of Aerobic Tank 4, as shown in Appendix B. There is sufficient space for the new development to be built whilst the ETP remains fully operational. The general layout and the design details of the development are illustrated in the Appendix B.

4.3.2 ANAEROBIC REACTORS

Four new Anaerobic Reactors, each with a volume of 1004m³, will be installed upstream of the aeration tanks. In the machine house, a break will be introduced in the existing effluent water pipeline (downstream of the heat exchangers) to divert flow toward the new Anaerobic Reactors. During the anaerobic treatment stage, the majority of organic substrate in the effluent will be biologically converted to biogas and digestate. An EGSB process will be used due to its high volumetric loading rate and its well-established use for wastewater treatment in the paper industry. The reactor is gas-tight so that no escape of biogas or odour will occur.

Following this, the partially treated effluent will be returned to the original pipe, to continue its course towards the distribution shaft for aerobic treatment. Please see Appendix B for the process flow diagram of the upgraded ETP. When the Anaerobic Reactors are operational, the aeration tanks will be operated as a low-load final stage, before releasing final-stage effluent directly into the Great Ouse as is currently performed. Despite being operated at a reduced load, the full capacity of the aerobic treatment stage will remain in place to accommodate emergency needs.

Given that the anaerobic treatment stage will be an interception of the existing water flow path, no changes in the water consumption or release patterns will be observed. A small volume of additional wastewater will be generated from anaerobic stage cleaning operations and condensation from biogas drying. This will be directed to the existing aerobic units for treatment as part of the final effluent. Therefore, there should be no significant effect on the overall effluent quality or quantity of the ETP.

4.3.3 BGTS – COARSE BSR, BIOGAS STORAGE AND FLARE

Biogas produced during anaerobic treatment will be fed, via a gas pipe, to a coarse desulphurization system for the removal of hydrogen sulfide, which reacts to form sodium hydrosulfide as it is passed through a packed column of caustic soda. This wash water is then fed into a BSR reactor for conversion to elemental sulfur. The sulfur is sedimented by separators and pumped into the aeration tanks, before being discharged with waste activated sludge. Some caustic soda is recovered through biological oxidation to elemental sulfur in the BSR process. For operational range flexibility and safety, the BSR will be installed as a 2x50% system.

Following the desulphurization stage, the resulting biomethane will be routed to the papermill, via the existing medium bridge, where it will be injected into the low-pressure gas grid for use on site. There will also be a biogas buffer storage tank of 500m³ for operational control. The operating pressure will be 50-60 mbar. Biogas is generated continuously, even during periods of irregular operation where the anaerobic stage may need to be bypassed. If the BGTS is unable to process the biogas, either because it is out of operation or unable to achieve adequate biomethane standard, it must be safely combusted using the controlled flare system. The flare would also be activated in the event of a

malfunction in the biological desulphurisation reactors, as the following stages of the BGTS are not designed to process high concentrations of hydrogen sulphide. This risk is mitigated by the installation of two desulphurisation lines.

4.3.4 CHEMICAL AND SUBSTANCE STORAGE AND DOSING

Small amounts of chemicals and substances will be stored at the ETP to facilitate operation of the Anaerobic Reactors and BGTS. These will include:

- **Caustic soda (NaOH):** NaOH will be used to adjust the pH in the anaerobic tanks as well as to replenish the consumed NaOH within the BSR washing column. A small tank, approximately 5 m³, will be installed to serve as a buffer for the dosing pumps. The tank will be installed inside the existing machine house and will be filled daily from the existing NaOH storage on the mill's side.
- **Nutrients for the BSR:** The biological reactor for desulphurization requires specific nutrient blends to function optimally. These are typically minute amounts and as such the delivery lines need to be very short. Approximately 200L of the specific nutrients will be stored directly inside the container of the BSR and will be coupled with the required dosing system.
- **Operating materials for the BGTS:** Materials such as oils and test gases will also be stored on site in small amounts (a few liters). These materials will be brought onto site as required for scheduled maintenance and stored in appropriate containers in the relevant storage areas on hard standing. The predicted low annual consumption volume and/or the non-hazardous nature of these materials are such that they do not present a risk of adverse environmental impacts during normal or abnormal operations.
- **Waste sludge for seeding the AD plant:** a quantity of sludge from another paper mill AD plant will be imported to seed (or in future, re-seed) the AD Plant. This will need to be added to the permit as 03 03 11 – sludges from on-site effluent treatment other than those mentioned in 03 03 10.

5 EMISSIONS AND MONITORING

5.1 OVERVIEW AND MONITORING ARRANGEMENTS

The proposed changes will introduce additional point source emissions which will require monitoring.

Existing monitoring activities will be maintained and expanded to cover the new emission points, applying the same standards currently in use. No changes to the emission limit values in the existing permit are anticipated. As there are no alterations to point source emissions to water, the current water monitoring programme is expected to remain unchanged.

Alongside this permit variation, Palm Paper is also requesting the removal of the requirement to monitor Total Organic Carbon (TOC) at emission point A4 (as specified in Table S3.1 of the permit). Continued operation, replacement and maintenance of this monitoring equipment is costly, and Palm Paper considers the requirement a disproportionate cost for a parameter that does not require reporting or have an emission limit value. COD is monitored periodically in line with the permit and additionally it is monitored continuously as part of the management of the ETP discharge compliance.

Table 5-1 - Appropriate Measures for Emissions Monitoring and Limits (11.2)

Appropriate Measures	Current or Proposed Arrangements	Appropriate Measures?
1. Where you are required to monitor emissions to comply with the requirements of your Environmental Permit you must follow our monitoring guidance .	Any imposed limits as a result of this permit variation will be adhered to and monitoring completed as required.	Yes
2. For relevant emissions to water or sewer identified by the emissions inventory, you must monitor key process parameters (for example, waste water flow, pH, temperature, conductivity, or BOD) at key locations. For example, these could either be at the: - inlet or outlet (or both) of the pre treatment - inlet to the final treatment - point where the emission leaves the facility boundary	Any imposed limits as a result of this permit variation will be adhered to and monitoring completed as required.	Yes

5.2 POINT SOURCE EMISSIONS TO AIR

Existing point source emissions to air are detailed in Schedule 3, Table S3.1 of the current Environmental Permit and comprise:

- A1 – Standby diesel generator exhaust *and* standby diesel sprinkler pump exhaust
- A3 – LCP No. 257 (boiler plant fired on natural gas)
- A4 – Sludge combustor
- A5 – LCP No. 422 (gas turbine fired on natural gas)
- A6 – Calendar heating gas boiler stack

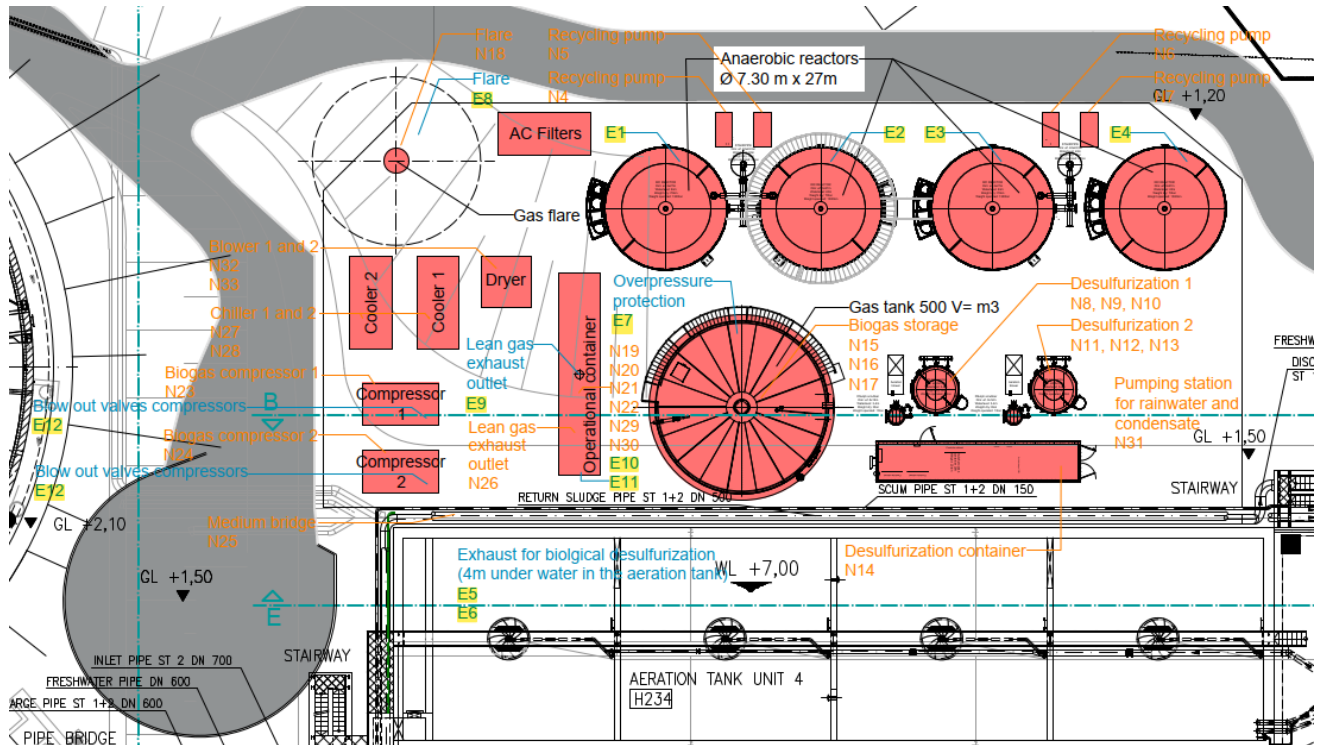
Twelve new point source emissions to air will be introduced as a result of this permit variation application, including eight overpressure release valves. Table 5-2 below provides details of these new point source emissions to air and Figure 5-1 shows their location. To see the full drawing shown in Figure 5-1, please see Appendix B.

Table 5-2 – New Point Source Emissions to Air

Emission Number	Unit	Relevant Emissions	Emission Point Permit Reference
E1	Anaerobic Reactor 1	None under normal conditions	A10
E2	Anaerobic Reactor 2	None under normal conditions	A11
E3	Anaerobic Reactor 3	None under normal conditions	A12
E4	Anaerobic Reactor 4	None under normal conditions	A13
E5	Desulphurisation 1 (emitted via aeration lane in aerobic treatment stage)	Low H ₂ S and trace Mercaptan, Dimethylsulfide and Dimethyl disulfide	A14
E6	Desulphurisation 2 (emitted via aeration lane in aerobic treatment stage)	Low H ₂ S and trace Mercaptan, Dimethylsulfide and Dimethyl disulfide	A15
E7	Biogas Storage Overpressure Protection	None under normal conditions	A16
E8	Flare	NO _x - 350mg/Nm ³ SO _x - 20mg/Nm ³	A7
E9	Lean Gas Exhaust Outlet	CO ₂ – 1954.49 g/Nm ³ CH ₄ – 9.29 g/Nm ³ SO _x – 5.27 mg/Nm ³	A8
E10	BGTS Blow Out Valve	None under normal conditions	A17
E11	Overpressure Protection BGTS	None under normal conditions	A18

E12	Compressor Blow Out Valve	None under normal conditions	A19
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Figure 5-1 - Location of New Point Source Emissions to Air (E1 to E12)



The biological desulphurisation emission points, E5 and E6, will release biogas that has been treated using a heated activated carbon filter to remove odorous compounds. The treated biogas will then be directed into the aerobic treatment basin, where the gases will dissolve or disperse along with the incoming air supply. This process will ensure that only very low concentrations of sulphur compounds are released to the atmosphere. The exhaust temperature will be 35°C and the gas will be injected into the basin at a flow rate of 450m³/h.

Emission point E8 (A7) is an enclosed flare in which biogas will be combusted if there is no available transfer to biogas processing or biogas feed-in (and biogas storage is full) or biogas quality is not of the required specification for use in the gas network. This may be required as biogas production in the Anaerobic Reactors temporarily continues, even without wastewater charging. The emissions from the flare will contain less than 350mg/Nm³ of NO_x and 20mg/Nm³ of SO_x substances and will be released at 13.3 m/s and from a height of 7.9m, with an exhaust emission temperature of 850°C.

Emission point E9 (A8) is a lean gas exhaust outlet, which will continuously release small volumes of lean gas containing predominantly CO₂ (1954.49 g/Nm³), with small volumes of methane (9.29 g/Nm³) and trace levels of SO_x (5.27 mg/Nm³). This emission will be released from a 6m high exhaust outlet and is anticipated to be operational for 8,760 hours per annum.

An air quality assessment was undertaken by Fichtner to determine the air quality impact of the flare. This is included in Appendix E and further discussed in Section 6.3.

Figure 5-2 below shows the current and future point source emissions using the permit references for clarity (full site layout plan shown in Appendix B). For more information on the environmental impact of the new point source emissions to air, please see Section 6.3.

Figure 5-2 - Updated Point source emissions layout plan

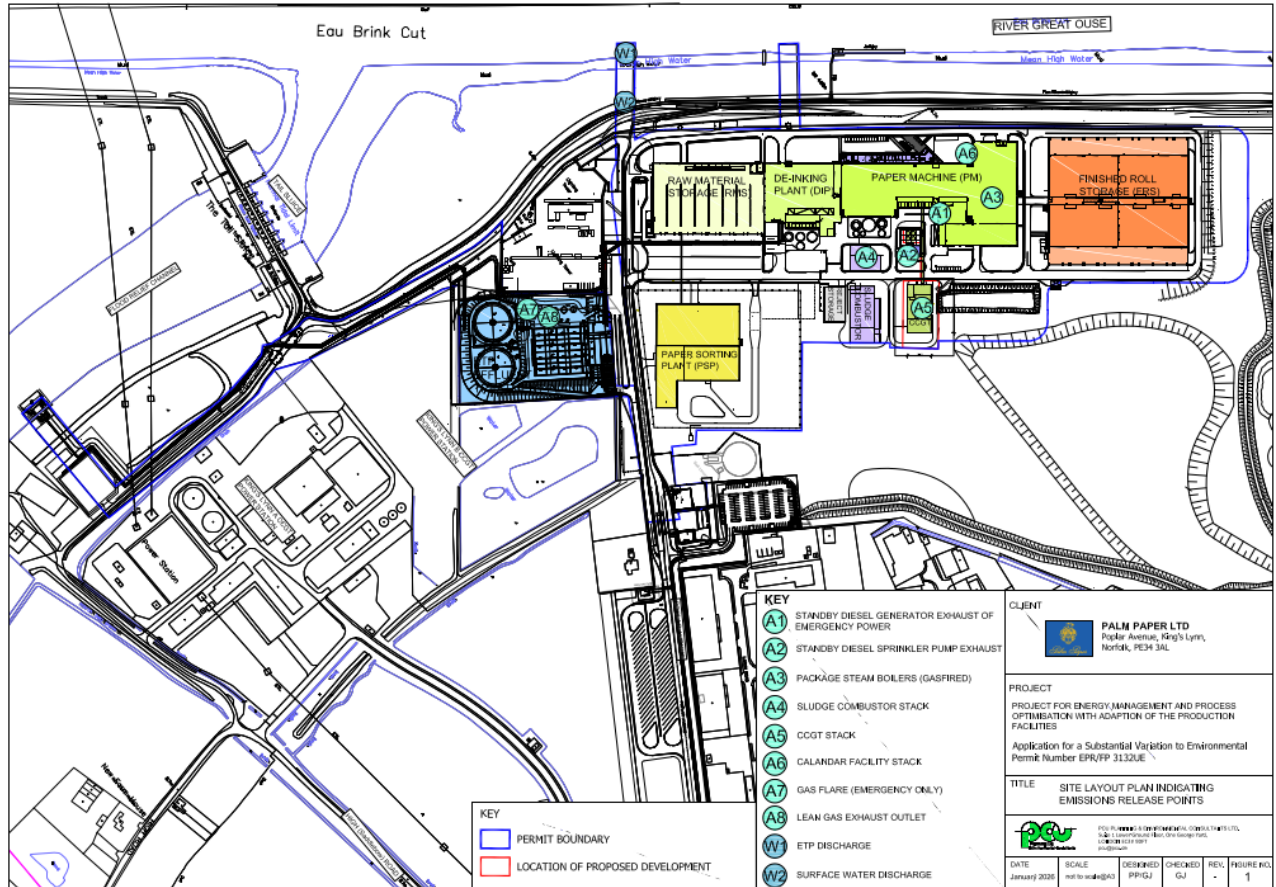


Table 5-3 - Appropriate Measures for Point Source Emissions to Air

Appropriate Measures	Current or Proposed Arrangements	Appropriate Measures?
1. To reduce point source emissions to air (for example ammonia, dust, organic compounds and odorous compounds) from your biological treatment process, you must use one or more of the relevant abatement techniques, such as: • bio filtration, bio trickling or bio scrubbing • scrubbing (for example wet or chemical) • adsorption, for example activated carbon • thermal oxidation • fabric filter – for mechanical biological treatment to remove dust	The biological desulphurisation process will treat biogas to remove odorous compounds using a heated activated carbon filter prior to emission from desulphurisation 1, desulphurisation 2 and the lean gas exhaust outlet.	Yes

2. You must assess the fate and impact of the substances emitted to air, following the Environment Agency's air emissions risk assessment methodology.	The impacts to air from the new equipment have been considered not significant, see Section 6.3 of this report for more information.	Yes
3. To make sure the abatement system is effective in treating odorous and other emissions you must monitor and maintain your abatement to achieve optimum conditions at all times. To demonstrate effective control, monitoring and assessment may include the following parameters: • gas flow or loading rate • bacterial viability (applicable to bio-oxidisation treatment systems) • pH • acid growth (indicated by pH) • gas temperature • pollutant removal efficiency rate • chemical injection (redox potential – applies to chemical scrubbing and bio-oxidisation systems) • spent solutions (for waste recovery or disposal) • humidity or moisture content • back-pressure • thatching and compaction of media in biofilters (thatching is forming a natural barrier to prevent the ingress of additional water to the surface layer) • channelling (preferential pathways for gas flow) and vegetation growth in biofilters • ammonia, hydrogen sulphide and odour concentrations (in both input and exhaust gas streams) • energy requirements for providing adequate and continuous airflow	The odour abatement system will be operated, monitored and maintained in line with the manufacturer's design and instruction. Parameters monitored will include gas temperature and gas flow.	Yes
4. You must observe trends and changes over time which could indicate that additional maintenance or replacement is needed.	Efficiency of odour abatement will be monitored in line with manufacturer's recommendations and used to support decisions on maintenance of plant, alongside carbon filtration	Yes

	material being replaced as needed.	
5. You must have: - procedures to deal with a loss in abatement efficiency due to toxic compounds - a program of filter media replacement which is informed by performance and condition - a program to replenish chemical reagents in abatement scrubbers - procedures for commissioning new filter media or abatement	Procedures will be developed to deal with a loss of abatement efficiency. A programme is in place for the replacement of filter media. A procedure will be developed for the replenishing of chemical reagents in abatement scrubbers and the commissioning of new filter media.	Yes
6. At least once a year, you must carry out an efficiency assessment of your abatement system.	An efficiency assessment will be carried out at least once a year.	Yes
7. You must use a filter bed material that is suitable for maintaining bacterial communities and that will hold its structure integrity.	Activated carbon is to be used as the filter bed material. This is commonly used in odour abatement systems and retains structural integrity.	Yes
8. You must consider water retention capacity, bulk density, porosity, surface area, nutrient viability and particle size.	Water retention capacity, bulk density, porosity, surface area, nutrient viability and particle size have been considered in the design of the desulphurisation plant.	Yes
9. The biofilter must be connected to a suitable ventilation and air circulation system. It must provide uniform waste gas distribution through the bed and enough residence time to make sure treatment takes place.	N/A	N/A
10. You may need to pre-treat the waste gas before it enters the biofilter, for example, with a water, acid or alkaline scrubber. You must make sure you pre-treat the waste gas if chemicals in	N/A	N/A

untreated gas can poison the biofilter, for example ammonia.		
11. You should design biofilters on a modular basis so they can keep operating during staged refurbishment.	N/A	N/A
12. You must drain any liquid which accumulates in the base of the biofilter to an appropriate leachate collection or treatment system.	N/A	N/A
13. The pipework to the biofilter must be made from corrosion resistant materials. It must incorporate low drain points to prevent the build-up of condensate, corrosion and loss in efficiency.	N/A	N/A
14. You must monitor your biofilter for the following: • gas inlet temperature (inlet and outlet on closed systems) • gas inlet flow rate (inlet and outlet on closed systems) • filter media moisture • thatching and compaction using back-pressure measurement • pH (this should be monitored from the biofilter drainage effluent) • gas inlet humidity • gas inlet and outlet concentrations for ammonia, hydrogen sulphide and odour • bacterial viability	N/A	N/A
15. You must visually monitor your biofilter for: • vegetation, moss and fungus – the media must be in good condition and clear of vegetation, you can use a photographic record of the media bed to see how it changes over time • media depth to identify decomposition and compaction over time – you can do this using vertical rulers located in the biofilter bed • surface condition – to identify any channelling, gaps or signs that the biofilter bed is shrinking • irrigation – to identify wet and dry spots and the uniformity of any sprinkler systems	N/A	N/A

16. You must maintain your biofilter with a vigorous and healthy microbial community operated at optimum designed values. You should periodically review: - media health, for example bacterial viability, particle size distribution and depth - volumetric air flow or surface air flow distribution in open biofilters - emission removal efficiency, for example odour removal Calculate removal efficiency using the concentrations sampled from the biofilter inlet and outlet.	N/A	N/A
17. You must carry out periodic sampling to make sure your abatement system is functioning as designed and is able to treat and mitigate emissions.	Periodic sampling and monitoring will be carried out to test the efficiency of the abatement systems including activated carbon filtration system.	Yes
18. You must re-mix or replace biofilter media, either during planned routine maintenance or more frequently if your monitoring assessment identifies it is needed.	N/A	N/A
19. You must select the most appropriate aqueous absorbing solutions for treating pollutants in the waste gas stream. Where you have identified a mix of pollutants you may require a multi-stage process. Flow rates must allow for sufficient gas residence time and minimise carry-over of scrubbing solution into the waste gas stream.	Coarse caustic soda will be used followed by activated carbon. No aqueous absorption solution will be used.	Yes
20. You must monitor your abatement scrubber for the following: - gas temperature and flow rate, inlet and outlet - moisture content or humidity - back-pressure, for packing scrubbers - pH of scrubber solution - chemical injection rate (redox potential)	N/A	N/A
21. You must continuously monitor the scrubber solution for:	N/A	N/A

• flow rate • pressure • temperature • pH You should periodically measure the inlet and outlet of the scrubber for: • ammonia • hydrogen sulphide • odour.		
22. You must monitor your activated carbon filter for the following parameters: • inlet and outlet gas temperature and flow rate by continuous monitoring • inlet moisture content or humidity • back-pressure • carbon bed temperature • ammonia • hydrogen sulphide • odour	The activated carbon filter will be monitored for flow rate and abatement performance. The carbon filter replaced when performance of the carbon filter does not meet the required standard.	Yes
23. You must make sure you either replace or regenerate the carbon before saturation.	Plans are in place to replace activated carbon before saturation.	Yes
24. You must make sure the concentrations of volatile organic compounds within the gas stream are below their lower explosive limit.	Activated carbon will be used to remove VOCs before further treatment or emission.	Yes
25. You must make sure you follow the manufacturers' recommended maximum operating temperature.	Equipment will be maintained within the operating temperature recommended by the manufacturer.	Yes
26. You must use a cooling system if you exceed the upper temperature limit.	Refrigerant gases will be used for cooling.	Yes
27. You must minimise particulates in the waste gases before they reach the carbon filter.	Particulates will not be contained within the gas from AD.	Yes
28. You must not allow exothermic reactions when maintaining activated carbon filters.	Activated carbon filters will be stored and used in line with the manufacturer's	Yes

	recommendations to prevent exothermic reactions.	
29. You must store activated carbon safely to prevent spontaneous combustion. You must store it following supplier or manufacturers' recommendations.	Activated carbon filters will be stored and used in line with the manufacturer's recommendations to prevent spontaneous combustion.	Yes
30. Stack or stack and vents must release at an appropriate height, temperature and velocity to make sure the emissions disperse well. You must use dispersion modelling to demonstrate the emissions do not impact on sensitive receptors.	See Section 6.3 Emissions to Air	Yes
31. You must install a suitable monitoring point on stacks and vents with appropriate safe access.	As part of the design monitoring points will be installed on the flare stack and vents with appropriate safe access.	Yes
32. You must monitor emissions following the Environment Agency guidance on monitoring stack emissions .	Emissions monitoring will take place in line with the Environment Agency guidance on monitoring stack emissions. Palm Paper are experienced in following this guidance for other emission points on site.	Yes

5.3 POINT SOURCE EMISSIONS TO WATER

Existing point source emissions to air are detailed in Schedule 3, Table S3.1 of the current Environmental Permit and comprise:

- W1 – Treated effluent from the ETP; and
- W2 – Uncontaminated surface water from drainage system.

As the treated effluent from the new AD process will be directed back to the original effluent pathway and undergo aerobic digestion as previous, there will be no new point source emissions to water introduced as a result of the permit variation application. There will be a small increase in volume of treated effluent which will be discharged from emission point W1, as water from anaerobic stage cleaning operations and condensation from biogas drying will be incorporated into the process effluent. This will amount to a few litres per day.

There are no proposed changes to the monitoring points or programme for point source emissions to water as a result of this permit variation application.

5.4 EMISSIONS OF SUBSTANCES NOT CONTROLLED BY EMISSION LIMITS

5.4.1 FUGITIVE EMISSIONS TO AIR

Fugitive emissions to air from the site are negligible due to the proposed changes on site being made. This includes an enclosed process and is unlikely to impact or affect the environment beyond the site boundary. The proposed changes as part of this permit variation application will not result in any increased impacts in terms of fugitive emissions to air.

Where there is new pipe work in place, for the conveyance of biogas and emissions to the lean gas emission point or flare, these will be covered by preventative maintenance regimes. A Leak Detection and Repair (LDAR) plan will be produced to cover all areas within the AD plant.

Table 5-4 - Appropriate Measures for Fugitive (diffuse) Emissions to Air (11.8)

Appropriate Measures	Current or Proposed Arrangements	Appropriate Measures?
1. You must use appropriate measures to prevent emissions of odour, ammonia, dust, bioaerosols and particulates, mud and litter .	The design of the plant and changes will ensure appropriate measures mitigate and prevent emissions of odour, ammonia, dust, bioaerosols and particulates, mud or litter. Existing emission control measures will continue to be implemented on site.	Yes
2. You must design, operate and maintain plant in a way that prevents or minimises fugitive emissions to air, for example by: - limiting drop heights - using wind barriers - using gravity transfer rather than pumps This also applies to associated equipment such as: - screeners - shredders - conveyors - skips or containers - building fabric, including doors and windows - pipework and ducting	The new plant and its operation will be designed and operated in a way that minimises fugitive emissions, including to air. The new flare is for emergency use only, and the AD plant is enclosed. All other existing emission controls will remain in place across the plant at the site.	Yes

3. You must use high integrity components, for example seals or gaskets or leak test certificated PVRVs.	High integrity components will be used within the construction of the AD plant and associated infrastructure.	Yes
4. You must have a programme of work that covers the maintenance of all plant and equipment. This must also include protective equipment such as curtains and fast action doors used to prevent and contain fugitive releases.	Maintenance requirements will be reviewed and included in the EMS for the new equipment, and frequencies adhered to.	Yes
5. You must identify the frequency of maintenance in your management system. As a minimum you must follow manufacturers' recommendations.	Maintenance requirements will be reviewed and included in the EMS for the new equipment, and frequencies adhered to.	Yes
6. To identify and manage wastes that could cause, or are causing fugitive emissions to air, you must do: • pre-acceptance checks • waste acceptance checks • site inspections	Current procedures will continue to be implemented, and no changes are expected to be required as a result of this permit variation.	Yes
7. When you identify any such wastes you must: • take appropriate risk-assessed measures to prevent and control emissions • prioritise their treatment or transfer	Emission control measures for wastes will continue to be implemented across the site.	Yes
8. Where necessary you must use a combination of one or more of the following measures: • cover any conveyers, hoppers, container that are outside • store and handle the waste within a suitably enclosed area (for example bays), a building or enclosed building • keep doors closed except when access is needed • use an appropriate abated air circulation or extraction system to keep enclosed buildings and equipment under adequate negative pressure, locating air extraction points close to potential emission sources • use fast-acting or 'airlock' doors that default to closed	Emission control measures for wastes will continue to be implemented across the site. All new plant as part of the proposed variation will be installed by qualified engineers to design and install systems and make sure relevant standards are applied. The Anaerobic System will be enclosed to prevent fugitive emissions to air. Air will be extracted and treated by the Aerobic Reactors. Conveyors, hoppers and containers will be covered	Yes

use suitable covers (these can include textile sheeting, synthetic membranes and organic materials such as straw and woodchip) – the choice of cover depends on the risk to receptors You should install localised containment, for example air extraction over a waste shredder, to minimise and treat air. You should install ventilation to BS EN 13779:2007 or follow the HSE Exhaust Ventilation Guide. You must use suitably qualified engineers to design and install systems and make sure relevant standards are applied. The HSE provides guidance on selecting, using and maintaining local exhaust ventilation (LEV) correctly.	to reduce fugitive emissions to air.	
9. You must review the integrity and containment effectiveness of any building, covers and contained air systems during commissioning. You must then do this periodically following manufacturers guidelines, or at least every 2 years.	Safety and Inspection procedures detailed in the existing EMS will continue to be implemented.	Yes
10. You must carry out assessments to recognised standards, for example BS EN ISO 9972:2015. You can use a smoke test to identify emission leaks from buildings. This may show where you need to make improvements before you carry out a more thorough survey.	An LDAR plan will be developed and implemented for the AD plant operations.	Yes
11. You must replace or repair damaged building, containers covers as soon as possible.	Safety and Inspection procedures detailed in the existing EMS will continue to be implemented.	Yes
12. You must stop using any vessel or tanks immediately if their integrity is compromised.	Safety and Inspection procedures detailed in the existing EMS will continue to be implemented. Faulty infrastructure and/or plant will not be used where integrity is compromised or function limited.	Yes
13. You must regularly inspect and clean all waste storage and treatment areas and equipment, including conveyor belts. You must identify the frequency of inspection and cleaning in your management system.	Inspection and cleaning procedures detailed in the existing EMS will continue to be implemented.	Yes

14. You must take measures to prevent plant and equipment, conveyors and pipes corroding. This includes using appropriate construction materials, corrosion inhibitors and regularly inspecting and maintaining plant.	Inspection and maintenance procedures detailed in the existing EMS will continue to be implemented.	Yes
15. You must consider dampening potential sources of fugitive dust emissions with water or fog, for example when turning open windrows or on areas where traffic moves.	There are no fugitive dust emissions associated with the new equipment.	Yes
16. You must prevent or minimise litter.	Existing litter control procedures will continue to be implemented in line with the EMS.	Yes
17. You must stop outdoor processing activities, for example waste shredding or windrow turning when weather conditions may either: • increase the risk of impact on local receptors • cause wind-blown litter, dust, odour or bioaerosols If you need a dust management plan, you must develop and implement it following our guidance.	There are no outdoor processing activities associated with the new equipment.	Yes

Table 5-5 - Appropriate Measures for Leak Detection and Repair (LDAR) (11.9) – applies to AD only

Appropriate Measures	Current or Proposed Arrangements	Appropriate Measures?
1. You must implement a leak detection and repair (LDAR) plan. It must link to your regular monitoring, maintenance and Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) plan. You must use it to quickly identify and carry out repairs, or to replace plant and equipment.	A LDAR plan will be developed and implemented for operation and will incorporate existing measures for leak detection and repair procedures.	Yes
2. The LDAR plan must include: • a map of the site and an inventory that identifies locations (point and area sources) for potential emissions • a method for locating unknown emission sources • estimates of the type and volume of release from each leak location	A LDAR plan will be developed and implemented for operation and will incorporate existing measures for leak detection and repair procedures. The plan will include all necessary components.	Yes

• prioritised locations (from highest risk to lowest risk) based on the potential quantity of release, its environmental impact, and DSEAR • your monitoring methods and frequency to quantify significant emissions • mitigation measures		
3. You must consider all potential sources of leakage within your LDAR plan, for example: • double membrane roofs (air blower vent) • roof and cover fixings • pressure relief valves and vents • feeding and digestate separation units • gas pipes • conveyors and presses • compressor • combined heat and power plant (methane slippage) • gas upgrading plant • grid injection • reception storage • digestate storage • pits and sumps, for example condensate pits • building containment	A LDAR plan will be developed and implemented for operation and will incorporate existing measures for LDAR procedures. All potential sources will be considered where not already.	Yes
4. You must identify and reduce emissions of volatile organic compounds and other substances to air. Methods for identifying leaks include: • sniffing using organic compound analysers and bag sampling, carried out to the requirements of EN15446 standards and the US Environmental Protection Agency (EPA) Protocol for Equipment Leak Emission Estimates referenced within this international standard • optical gas imaging (OGI) using hand-held cameras to enable visualisation of gas leaks Methods for quantifying emissions include:	In development of the LDAR plan, existing methods of leak detection will be reviewed and assessed.	Yes

• solar occultation flux (SOF) • differential absorption light detection and ranging (DIAL) EN 17628 provides guidance on using multiple monitoring techniques for LDAR programmes. Information on methane leakage from AD plants is available in: • the Department of Business, Energy and Industrial Strategy's Methodology to assess methane leakage from anaerobic digestion plants • the International Energy Agency's Methane emissions from biogas plants		
5. You must include the following LDAR survey details in your LDAR plan. Details of the site where the LDAR survey was carried out, conditions at the time of the survey, and measurement objectives, including: • site name • operator name • permit number • site processes (under normal operating conditions) • date of the survey • site operation on the date of the survey (for example, operating at full capacity or reduced load due to X and Y) • weather conditions (including temperature, wind speed and wind direction) • measurement objectives (for example, targeted processes, site areas) Details of the organisation and personnel carrying out the LDAR survey, including: • name and address of the monitoring organisation • names, experience and qualifications of the personnel carrying out the monitoring • accreditation status of the monitoring organisation • documented procedures used for the LDAR campaign and reporting • quality assurance or quality control criteria	A LDAR plan will be developed and implemented for operation and will incorporate existing measures for leak detection and repair procedures. The plan will include all necessary components.	Yes

• name of the person approving the report for the monitoring organisation • the signature of the person approving the report Details of the detection equipment used for the survey, including: • make, model and serial number of the detection equipment used for the survey • methane detection limit of the detection equipment (for example, $\leq 60\text{g/hr}$ (OGI cameras), $< 10\text{ppm}$ (sniffer devices)) • if an OGI camera is used, the spectral range of the camera (μm) • certification or verification status of the OGI camera (for example, to US EPA OOOOa specifications) • calibration certificates for the equipment (if applicable) Details of the survey carried out, including: • areas of the site that were surveyed • areas of the site that were not surveyed – including a reason why those areas were not surveyed • leak definition used for the survey (for example, 500ppm, or detectable by the specified OGI camera at X_m) • distance from which components were surveyed • duration of measurements, at individual components and specified site areas Details of result monitoring, including: • list of leaks identified during the survey • annotated plan of site (or piping and instrumentation diagram) showing the precise locations of the identified leaks • time when each leak was identified • a description of each leaking component identified (for example, valve, flange and so on) – include the component reference number where available • a photograph of the leaking component showing the leak location		
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• severity of the leak – the measured methane concentration or leak rate, or the risk posed due to the component type and location (or both) • emission estimate in kg/h for each component surveyed • total site emission rate in kg/h, including uncertainty • any non-conformities against the quality assurance or quality control procedures The repair schedule must include a proposed timescale for repairing the identified leaks, with justification (based on the severity of the leak or potential risk).		
6. You must produce the LDAR plan using the techniques included in the following standards: • BS EN 15446:2008, Fugitive and diffuse emissions of common concern to industry sectors – Measurement of fugitive emission of vapours generating from equipment and piping leaks • BS EN 17628:2022, Fugitive and diffuse emissions of common concern to industry sectors – Standard method to determine diffuse emissions of volatile organic compounds into the atmosphere. • BS ISO 15259:2023, Air Quality – Measurement of stationary source emissions – Requirements for measurement sections and sites and for the measurement objective, plan and report	A LDAR plan will be developed and implemented for operation and will incorporate existing measures for leak detection and repair procedures. The plan will ensure techniques comply with the relevant standards.	Yes

5.4.2 FUGITIVE EMISSIONS TO WATER

Fugitive emissions to water are often reviewed under four headings, as follows:

- Sub-surface structures and sumps;
- Surfacing;
- Bunds / secondary containment; and
- Storage areas for IBCs, drums and bags etc

Sub-surface structures and sumps;

All subsurface structures and sumps will be incorporated into the scheduled preventative maintenance system to enable inspection of the condition of the site infrastructure and timely detection of leakage. The use of sub-surface structures, sumps and pipework will be minimised as far as is practicable.

Surfacing

Two separate concrete surfaces will be installed at the ETP, adjacent to Aerobic Tank 1, to house the new structures relating to these changes. One foundation will house the four EGSB reactors, while the other will support the biogas system, including the BSR, BGTS and associated storage, and the flare. The concrete foundations have a combined surface area of approximately 1000 m² and a gradient of 1.5% towards the road, where there is existing surface water drainage infrastructure. The concrete surface is 10 cm higher than the adjacent terrain in order to prevent possible water inflow from the green areas. The concrete surface is also surrounded by a trough for the interception of surface water from these areas, which will drain into a ditch. The technical installations are raised by an additional 10 to 20 cm above the concrete surface, providing further protection against surface water.

In order to make room for the new EGSB bioreactors near the aerobic tanks, the existing road must be removed and rerouted around the new systems. The new road will be approximately 4m in width and will connect back to the existing one after the second foundation slab. The opposite side of the new road will be bordered with a raised kerb (10-12 cm high) for water drainage and side boundaries.

The terrain at the new site is relatively flat and will not require major modification to its heights to fit the new foundation slabs and road. However, to prevent water from the surrounding areas getting onto the concrete slabs, the terrain around the concrete surfaces is adjusted so that it is at least 10 cm lower than the concrete surfaces. After the interception trough, the terrain is adjusted to the existing terrain.

Bunds / secondary containment

All materials are stored with adequate secondary and tertiary containment as described below in Table 5-6.

Table 5-6 – Substance Containment on Site

Vessel/ Tank	Description	Tank Capacity (litres)	Primary Containment	Secondary Containment	Tertiary Containment
Chemical Inventory for the new components					
Sodium Hydroxide	IC reactors and desulfurization	5,200	Double walled polymer tank	This area is provided with hardstanding and curbing to provide tertiary containment.	
Nutrients mix for biology	Desulphurization	200	Storage tank	Drip tray	
Biogas Treatment System					
Lubricating oil compressors	Compressors BGTS	500 (preliminary)			

Vessel/ Tank	Description	Tank Capacity (litres)	Primary Containment	Secondary Containment	Tertiary Containment
Refrigerant chiller	Refrigerant in Chiller	60 (preliminary)	Not stored, part of the machine		
Cooling medium	Coolant in cooling water circuit	1,000 (preliminary)			
Activated carbon	Desulphurization (BGTS)	16,000	Inside a stainless-steel container	This area is provided with hardstanding and curbing to provide tertiary containment.	

Storage areas for IBCs, drums and bags etc

New substances stored on site are either stored at Chem. Storage 1 or Chem. Storage 2 locations, in containers compliant with manufacturers specifications. All liquids are stored on top of a drip tray to reduce potential spills. The Chem. Storage areas are built on areas of hardstanding.

Table 5-7 - Appropriate Measures for Fugitive Emissions to Land and Water

Appropriate Measures	Current or Proposed Arrangements	Appropriate Measures?
1. You must use appropriate measures to control potential fugitive emissions to land and water and make sure they do not cause pollution.	Appropriate containment is in place and will be added to any new process areas.	Yes
2. You must have the following measures in place in operational areas: - an impermeable surface - spill containment kerbs - sealed construction joints - connection to a contained drainage system	All containment measures will be in place around the process area.	Yes
3. You must collect and treat separately each water stream generated at the facility, for example, surface run off water or process water. Base how you separate it on the pollutant content and the treatment needed.	Water streams will continue to be appropriately segregated and treated.	Yes
4. You must make sure that you segregate uncontaminated water streams from those that need treatment.	Water streams will continue to be appropriately segregated and treated.	Yes

5. You must use suitable drainage infrastructure to collect surface drainage from areas of the facility where you store, handle and treat waste. You must also collect wash waters and any spillages. Depending on the pollutant content, you must either recirculate what you have collected or send it for further treatment.	Appropriate containment and drainage infrastructure is present across the site and will allow for the continued and correct reuse, treatment or disposal.	Yes
6. You must take measures to prevent emissions from washing and cleaning activities, including: - directing liquid effluent and wash waters to foul sewer, or collecting them in a contained system for off site disposal – you must not discharge them to surface or storm drains - using biodegradable and non corrosive washing and cleaning products - storing all detergents, emulsifiers and other cleaning agents in suitable bunded or containment facilities within a locked storage area, or in a building away from any surface water drains - preparing working strength cleaning or disinfection solutions in contained areas of the site and never in areas that drain to the surface water or groundwater	Liquid from washing and cleaning activities will be directed to the ETP. Biodegradable and non-corrosive washing products will be used. Cleaning products will be stored within existing site storage arrangements.	Yes
7. Container washing equipment must be purpose built, located in a designated area of the facility provided with self-contained drainage.	N/A	N/A
8. You must design the container wash to collect and contain all wash waters, including any spray.	N/A	N/A
9. You must use trained staff to operate the container wash and you must inspect and maintain it regularly.	Staff are trained appropriately to operate equipment on site.	Yes
10. You must have measures to prevent pollution from the on-site storage, handling and use of oil and fuel.	Containment measures are in place in storage areas.	Yes
11. You must produce and implement a spillage response plan and train staff to follow it and test it.	The Emergency Action Plan contains details of spill response procedures. Training is provided to staff including spill drill activities.	Yes

12. You must have procedures and associated training in place to make sure that you deal with spillages immediately.	Spill response kits are present on site with appropriate training for staff should they need to be used. The Emergency Action Plan contains details of spill response procedures.	Yes
13. You must locate spill kits close to areas where spillages could occur and make sure relevant staff know how to use them. You must replenish the kits after use.	Spill response kits are present on site with appropriate training for staff should they need to be used.	Yes
14. You must stop spillages from entering drains, channels, gullies, watercourses and unmade ground. You must have the following available, to use when needed: • proprietary sorbent materials • sand • booms or drain mats (or both)	Spill response kits are present on site with appropriate training for staff should they need to be used.	Yes
15. You must make sure your spillage response plan includes information about how to recover, handle and correctly dispose of all waste produced from a spillage.	The EMS contains a detailed response plan in how to recover, handle and dispose of all waste produced from a spill. The EMS will be updated to incorporate the additional raw materials being brought onto site.	Yes
16. For subsurface structures, you must: • establish and record the routes of all site drains and subsurface pipework • identify all sub surface sumps and storage vessels • engineer systems to minimise leaks from pipes and make sure you can detect them quickly if they do occur, particularly for hazardous substances • provide secondary containment and leakage detection for sub surface pipework, sumps and storage vessels • establish an inspection and maintenance programme for all subsurface structures, for	All subsurface structures and sumps will be incorporated into the scheduled preventative maintenance system to enable inspection of the condition of the site infrastructure and timely detection of leakage.	Yes

example, pressure tests, leak tests, material thickness checks or CCTV		
17. You must design appropriate surfaces and containment or drainage facilities for all operational areas, taking into account: • collection capacities • surface thicknesses • strength and reinforcement • falls (of the land) • materials of construction • permeability • resistance to chemical attack • inspection and maintenance procedures • available relevant standards of construction	All containment measures at the site are appropriate and sufficient for their respective purpose.	Yes
18. You must have a documented inspection and maintenance programme to review the integrity of impermeable surfaces and water containment facilities. This must consider the plant and equipment manufacturers' recommended maintenance practices.	Maintenance and inspection procedures are documented within the EMS and will be reviewed to include the new plant.	Yes

5.4.3 DUST, MUD, LITTER AND PESTS

Nuisance issues from the site are negligible and unlikely to occur beyond the site boundary. The proposed changes as part of this permit variation application will not result in any increased impacts in terms of dust, mud, litter and / or pests, or impact on the site's arrangements with regards to these matters.

5.5 ODOUR

The Anaerobic Reactors are closed systems. Possible odour emissions from the flare are largely reduced due to the combustion-related oxidation of sulphur-containing compounds. Emissions from the lean gas exhaust outlet will contain trace levels of sulphur containing compounds and will be released in small volumes from a height of 6m to minimise odour on site. As discussed in the Muller-BBM statement, Appendix E, 'Upgrading of The Operational Wastewater Treatment Plant by means of an Anaerobic Stage, Expert Opinion on the Exhaust Gas Discharge Conditions of The Emission Source E9 Lean Gas Outlet', which states that:

"An odour contamination of the lean gas can result primarily from the sulphur compounds (in particular hydrogen sulphide, mercaptans, etc.) still contained in it even after fine desulfurization. Assuming that the sulphur specified as sulphur dioxide is completely present in reduced form as hydrogen sulphide (as a representative of odour-active sulphur compounds) and only a small portion in an even more odour-relevant form, e.g. as mercaptans, a rough estimate of the odour concentration in the lean gas can be obtained, taking into account a lower odour threshold for

hydrogen sulphide of 0.01 ppm (corresponds to approx. 0.0157 mg/m³), thus resulting in an odour concentration of the lean gas of a few hundred odour units / m³ (approx. 500 OU/m³). In connection with the volume flow of 280 m³/h, odour loads of 0.1 to 0.3 106 OU/h would be expected, which would mean that the corresponding smells would be noticeable on the company premises. However, in comparison with the odour emissions from the existing open basins, no changes are to be expected from the operation of the source under consideration that would have an odour impact in the area of the nearest neighbours.

If higher proportions of mercaptans or other more strongly odour-active compounds in the emissions of sulphur-containing compounds result in a significantly greater odour relevance in actual operation (can be verified by appropriate odour emission measurements), an RTO may need to be retrofitted as a lean gas treatment.”

There have been no previous odour complaints at the site. The nearest receptor with human exposure (residential) is a standalone house approximately 480m away and the nearest relevant area for nature conservation is located around 800m from site (the River Nar). Odour levels are not expected to deteriorate beyond the site boundary, and therefore there will be no resulting impacts on local receptors. Improvements can be expected in the area of the aerobic stages of the ETP due to the upstream anaerobic reaction of the effluent, reducing the COD load at this stage. Please refer to Appendix E for the full air quality report.

Table 5-8 - BAT Requirements for Odour from Waste Treatment BREF (August 2018)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 12: In order to prevent, or reduce, odour emissions, BAT is to set up, implement and regularly review an odour management plan as part of the EMS.	There is no anticipated impact on odour emissions as a result of this permit variation, as the Anaerobic Reactors are closed systems. It is therefore not deemed necessary to produce an Odour Management Plan for the site.	Yes
BAT 13: In order to prevent, or reduce, odour emissions, BAT is to use one or a combination of the following techniques: a. Minimising residence times b. Using chemical treatment c. Optimising aerobic treatment	Aerobic treatment is optimised using a number of techniques, including aeration, removal of sludge in tanks and frequent maintenance of the aeration system.	Yes
BAT 14: In order to prevent, or reduce, diffuse emissions to air (including dust, organic compounds and odour), BAT is to use an appropriate combination of the techniques below: a. Minimising the number of potential diffuse emission sources	The anaerobic treatment process is a closed system which eliminates the potential for fugitive emissions. Regular maintenance and cleaning procedures will be implemented and documented	Yes

b. Selection and use of high-integrity equipment c. Corrosion prevention d. Containment, collection and treatment of diffuse emissions e. Dampening f. Maintenance g. Cleaning of waste treatment and storage areas h. Leak detection and repair (LDAR) programme	within the EMS, along side inclusion of relevant LDAR measures.	
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Table 5-9 - Appropriate Measures for Emissions of Odour

Appropriate Measures	Current or Proposed Arrangements	Appropriate Measures?
1. You must develop and implement an odour management plan .	There is no anticipated impact on odour emissions as a result of this permit variation, as the Anaerobic Reactors are closed systems. It is therefore not deemed necessary to produce an Odour Management Plan for the site.	Yes
2. Where you expect odour pollution at a sensitive receptor, or it has been substantiated, you must monitor: • using dynamic olfactometry following EN 13725 to determine the odour concentration • to EN 16841 1 or 2 to determine the odour exposure • to an alternative ISO, national or other international standards	There is no anticipated impact on odour emissions as a result of this permit variation, as the Anaerobic Reactors are closed systems.	Yes
3. You must review your odour management plan as part of your environmental management system. It must include all of the following elements: • actions and timelines to address any issues • a procedure for doing odour monitoring • a procedure for responding to identified odour incidents, for example, complaints • an odour prevention and reduction programme designed to identify the source(s), to characterise the contributions	There is no anticipated impact on odour emissions as a result of this permit variation, as the Anaerobic Reactors are closed systems. It is therefore not deemed necessary to produce an Odour Management Plan for the site.	Yes

of the sources and to implement prevention and reduction measures	A Complaints Procedure is implemented at the site as part of Palm Paper's EMS, and is owned by the Compliance Manager, who is responsible for the investigation of any environmental complaints, as well as any remedial actions and preventative measures. The complaints procedure is not expected to be affected by the changes proposed as part of this permit variation application and will continue to be implemented at the site.	
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5.6 NOISE

A noise assessment has been undertaken to assess the anticipated increase in noise levels as a result of the planned changes to the ETP on site. The anticipated noise levels were calculated using a digital three-dimensional calculation model in accordance with the standardised international procedure described in ISO 9613-2. The anticipated specific noise rating levels were calculated at the four nearest noise sensitive receptors (NSRs), as well as the surrounding area.

The assessment concluded that resultant rating levels do not exceed the identified background sound levels at all assessment locations during typical on-site operations. BS 4142 indicates that, where the rating level does not exceed the background sound level, the impact of the specific sound level is likely to be low. Therefore, during typical operation, the calculated rating levels are unlikely to result in impacts at the nearby residential receptors. During emergency overpressure scenarios, the sound levels may exceed the background but, with consideration to the limited frequency of occurrences, it is unlikely that this operation would give rise to significant adverse impacts.

No vibration or noise impacts are expected from the construction phase, as there will be no piling works or heavy construction traffic. As vibrations from earth works will be controlled following best practice, they would be considered insignificant.

A further acoustic assessment will be carried out in accordance with the normative requirements of British Standard 4142:2014 at a later stage during this project. For the full noise assessment, please see Appendix G.

Table 5-10 - BAT Requirements for Noise from Waste Treatment BREF (August 2018)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 17: In order to prevent or, where that is not practicable, reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and	A screening has been undertaken using the Noise Advisory Tool (v1.4) which concluded that a noise impact	Yes

vibration management plan as part of the EMS (see BAT 1).	assessment and management plan are not required in relation to the changes proposed in this permit variation.	
BAT 18: In order to prevent or, where that is not practicable, reduce noise and vibration emissions, BAT is to use one or a combination of the following techniques: a. Appropriate location of equipment and buildings; b. Operational measures; c. Low-noise equipment; d. Noise and vibration control equipment; e. Noise abatement.	The Anaerobic Reactors and BGTS will be enclosed, reducing the potential for noise impact.	Yes

Table 5-11 - BAT Requirements for Noise from Production of Paper, Pulp and Board BREF (September 2014)

BREF Requirements	Current / Proposed Arrangements	BAT?
BAT 17: In order to reduce the emissions of noise from pulp and paper manufacturing, BAT is to use a combination of the techniques given below. a) Noise reduction programme b) Strategic planning of the location of equipment, units and buildings c) Operational and management techniques in buildings containing noisy equipment d) Enclosing noisy equipment and units e) Use of low-noise equipment and noise-reducers on equipment and ducts f) Vibration insulation g) Soundproofing of buildings h) Noise Abatement i) Use of larger wood-handling machines to reduce lifting and transport times and noise from logs falling onto log piles or the feed table. j) Improved ways of working,	A screening has been undertaken using the Noise Advisory Tool (v1.4) which concluded that a noise impact assessment and management plan are not required in relation to the changes proposed in this permit variation. The Anaerobic Reactors and BGTS will be enclosed, reducing the potential for noise impact. A noise assessment has been undertaken to assess the anticipated increase in noise levels as a result of the planned changes to the ETP on site, which concluded that resultant rating levels do not exceed the identified background sound levels at all assessment locations during typical on-site operations.	Yes

Table 5-12 - Appropriate Measures for Emissions of Noise and Vibration

Appropriate Measures	Current or Proposed Arrangements	Appropriate Measures?
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1. You must locate buildings, walls, and embankments so they act as noise screens.	The anaerobic reaction stage and BGTS will be enclosed, reducing the potential for noise impact.	Yes
2. You must use measures to control noise, including: - maintaining plant or equipment parts which may become more noisy as they wear out (for example, bearings, air handling plant, the building fabric, and specific noise attenuation kit associated with plant or machinery) - closing doors and windows to prevent noise breakthrough - avoiding noisy activities at night or early in the morning - minimising drop heights and the movement of waste and containers - using white noise reversing alarms and enforcing the on site speed limit - using low noise rated equipment (for example, drive motors, fans, compressors, pumps) - adequately training and supervising staff - providing additional noise and vibration control equipment for specific noise sources (for example, noise reducers or attenuators, insulation or sound proof enclosures)	Regular inspections and maintenance of equipment and plant will be employed in line with procedures included in the EMS. The anaerobic reaction stage and BGTS will be enclosed, reducing the potential for noise impact.	Yes
3. You should have a noise and vibration management plan . This must be part of the environmental management system and must include: - actions and timelines to address any issues - a procedure for doing noise and vibration monitoring - a procedure for responding to identified noise and vibration events, for example, complaints	A screening has been undertaken using the Noise Advisory Tool (v1.4) which concluded that a noise impact assessment and management plan are not required in relation to the changes proposed in this permit variation.	Yes

Provided by the EA, the Noise Advisory Tool (NAT) has been used to reach the decision that a Noise Impact Assessment (NIA) and a Noise Management Plan (NMP) will not be required to support this permit variation application.



Based on the nature of the noise that is expected to be generated by the new anaerobic treatment stage and associated equipment, it is not thought that there will be any additional noise nuisance for receptors, compared to existing operations. The NAT has confirmed this and screened out the need for an NIA. Figure 5-1 below shows the NAT inputs and conclusion.



Figure 5-3 – Screenshot from EA’s Noise Advisory Tool

Step 1: To be completed for all applications

input details of the site AFTER the variation is complete

	Select from the drop-down lists	Evidence your decision here
1. Activity Type	Anaerobic digestion / Waste Water Treatment Works	Waste water treatment works with anaerobic and aerobic digestion
2. Activity Containment	External operations with processing and storage	Equipment located at effluent treatment plant, externally. System and equipment is enclosed.
3. Operation at night	Yes	24 hour operations
4. Operation Size	large	The installation comprises an integrated recovered paper facility which receives around 630,000 tonnes of recycled newspaper and magazines and produces approximately 550,000 tonnes per annum of newsprint for sale into wholesale paper distributors and commercial outlets.
5. Input distance from site to the nearest (or proposed) noise sensitive receptor (m)	401-500	The closest sensitive odour receptor to the Palm Paper facility is The Elms residential property, located approximately 480 m to the north-west of the site boundary.
6. Residential receptor Location	rural	The nearest residential receptor is a standalone property, surrounded by large open areas.
7. Residential receptor proximity to other major noise source (m) e.g. busy road, other industrial activities, etc.	>200	King's Lynn Power Station is located approximately 400m away from the receptor.

The result will automatically update when the values are selected from the drop down menus

Evaluation	New bespoke application: Submit an NIA & NMP Variation application: Go to step 2
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*The Environment Agency reserves the right to request the submission of an NIA or NMP independent of the outcome of noise advisory tool

Step 2: Variation applications only

	Select from the drop-down lists	Evidence your decision here
8. Has a NIA or NMP been previously requested by the EA?	No	
9. Will new noise generating sources/activities be introduced?	Yes	New noise generating equipment will include anaerobic digestion units, a biogas treatment system, biological desulfurisation unit and the emergency flare.
10. Will annual throughput increase?	0-25%	No change to overall process flow - only the additional of anaerobic digestion stage
11. Will the time operations occur change?	No	No change to overall process flow - only the additional of anaerobic digestion stage
12. Will the variation change how activities are enclosed?	No change	The anaerobic digestion stage and BGTS will be enclosed.

The result will automatically update when the values are selected from the drop down menus

Evaluation	NIA and NMP are not required*
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*The Environment Agency reserves the right to request the submission of an NIA or NMP independent of the outcome of noise advisory tool

6 ENVIRONMENTAL RISK ASSESSMENT (IMPACTS)

6.1 ENVIRONMENTAL RISK ASSESSMENT

An assessment of the risks posed by the proposed changes on site has been undertaken. In accordance with the EA's requirements for risk assessments (from GOV.UK guidance), the proposed changes have been assessed with regards to their potential to generate significant environmental consequences. A copy of the environmental risk assessment is provided in Appendix D, which:

- Identifies and considers the risks for the site (as a result of the proposed changes) and the sources of risks;
- Identifies the receptors at risk from the site;
- Identifies the possible pathways from the sources of the risks to the receptors;
- Identifies appropriate risk management techniques to control the risks, as necessary; and
- Assesses the overall risk to determine if they can be screened out as insignificant.

Based on the risk assessment provided in Appendix D, it can be seen that all risks associated with the proposed changes on site are deemed to be acceptable when considered in line with the intended risk management techniques.

The guidance also specifies that there are additional risk assessment requirements depending on:

- The activity the bespoke permit relates to; and
- Where substances are released or discharged into the environment.

The sections below discuss where additional risk assessments were identified as necessary to support this permit variation application.

6.2 EMISSIONS TO WATER

There are no additional emissions to water, and therefore, this has not been considered within the environmental risk assessment.

6.3 EMISSIONS TO AIR

An air quality assessment was undertaken by Fichtner to determine the air quality impact of the flare. The flare will be utilised in emergency scenarios only, either if desulphurisation equipment is out of service (in which case raw biogas would be flared with a hydrogen sulphide (H₂S) concentration of up to 10,000 ppmv), if the BGTS is out of service but the desulphurisation process is still running (in which case clean biogas would be flared with a H₂S concentration of up to 100 ppmv), or if the BGTS is in operation but failing to reach adequate biomethane quality for use in the boilers (in which case clean biogas would be flared with a very low H₂S content).

The EA's H1 Tool can be used to assess emissions to air; however, it does not account for the temperature and velocity of release or vicinity to sensitive receptors which in the case of the flare, are key factors in the dispersion and buoyancy of the plume. The release temperature of the flare is very high (~850°C) and therefore the flare plume would be very buoyant and disperse effectively.

Proximity to sensitive receptors is also a key factor to consider, with the closest receptor 200m south (King's Lynn Power Station), and the closest residential (sensitive) receptor being 650m south of the proposed flare. These receptors are not considered close enough to be impacted by the emergency operation of the flare.

Emissions from the flare are expected to comply with the emission standards for enclosed gas flares as set out in the Guidance for monitoring enclosed landfill gas flares (LFTGN 05). [Monitoring enclosed landfill gas flares: LFTGN 05 - GOV.UK](#)

Given the emergency nature of the flare operation, alongside the buoyancy of the plume and distance from receptors, it is considered unlikely that the operation of the flare would have a significant impact on local air quality.

For the full assessment refer to Appendix E.

6.4 HAZID STUDY

A HAZID study was completed to identify safety, environmental, and asset hazards and safeguards associated with the operation of the new AD plant. The existing facility was not considered except for impacts from the new plant and infrastructure. A total of 52 hazard scenarios were risk ranked:

- No scenarios were found to be intolerable.
- 29 scenarios were categorized as Tolerable if ALARP.
- 23 scenarios were Broadly Acceptable.

Thirty-three actions were recommended to Palm Paper or suppliers to maintain or improve safety. A key recommended action included the development of operating and maintenance procedures for the new AD plant, including PPE, personal gas detection, and access control. This was deemed applicable to a range of hazard scenarios. For the full HAZID report please see Appendix F.

7 PROPOSED IMPROVEMENT CONDITIONS

Palm Paper propose the following improvement conditions. As the design progresses, additional information and finalisation of the design, will be communicated and shared with the Environment Agency as required.

FIRE PREVENTION PLAN

As the design is to be completed and a DSEAR designation made for the Anaerobic Reactors, a future update to the Fire Prevention Plan will be made, and we propose an Improvement Condition, or similar is included in the permit variation.

Appendix A

ENVIRONMENTAL PERMIT VARIATION APPLICATION FORMS



Appendix B

PLANS AND DRAWINGS



Appendix C

SITE CONDITION REPORT



Appendix C.1

APPLICATION SITE CONDITION REPORT



Appendix C.2

ADDENDUM TO APPLICATION SITE CONDITION REPORT



Appendix D

ENVIRONMENTAL RISK ASSESSMENT



Appendix E

AIR QUALITY ASSESSMENT



Appendix E.1

AIR QUALITY IMPACT OF FLARE ASSESSMENT



Appendix E.2

AIR QUALITY IMPACT OF LEAN GAS ASSESSMENT



Appendix F

ANAEROBIC DIGESTER PLANT HAZID REPORT



Appendix G

NOISE ASSESSMENT



Appendix H

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATION





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