Ricardo
Energy & Environment

Bridge Road Food Factory: EP Variation

Operating Techniques and BAT Assessment

Report for Princes Limited
ED11556111

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Canning Excellence

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1 Introduction

Ricardo Energy & Environment (Ricardo) has been retained by Princes Ltd (Princes) to prepare an application to vary existing Environmental Permit reference EPR/RP3534FP/V003, which authorises the operation of a Part A Installation (falling within the scope of the Industrial Emissions Directive ("IED")) under the Environmental Permitting (England and Wales) Regulations 2016, at the Bridge Road Food Factory, Long Sutton, Lincolnshire PE12 9EQ.

The existing installation currently comprises a factory for the receipt and preparation of foods canned for human consumption and a biological treatment plant for the treatment of process effluent. The Long Sutton installation is Princes' largest food production site in the UK.

As part of this permit variation application (V004), a 'Best available techniques' (BAT) Assessment is required to address the changes proposed to the regulated facility. This report also includes a technical description of the proposed changes to plant, equipment and infrastructure and describes the operating techniques and management system that will be implemented at the installation to ensure continued compliance with the conditions of the environmental permit. This document has been prepared in conjunction with Princes.

1.1 Best Available Technique (BAT)

Under the IED, all appropriate preventative measures must be taken to protect against pollution, in particular 'Best available techniques' (BAT) must be used and no significant pollution must be caused.

BAT means the available techniques which are the best for preventing or minimising emissions and impacts on the environment. 'Techniques' include both the technology used and the way an installation is designed, built, maintained, operated and decommissioned. The European Commission produces best available technique reference documents or BREF notes. These documents contain BAT for installations.

The European Commission is currently in the process of updating the published BREF notes and the updated versions also include 'BAT conclusion documents'. BAT conclusions contain emission limits associated with BAT ('BAT AELs') which must be complied with unless certain criteria are met.

The existing permit reference EPR/RP3534FP/V003 requires the use of BAT or 'appropriate measures' to achieve environmental outcomes. The application process for variations to existing installation permits requires operators to demonstrate the application of BAT (or justify a suitable alternative technique) in relation to the changes proposed to the regulated facility.

Relevant Environment Agency (EA) guidance sets out indicative BAT for the regulated industry sectors subject to the requirements of IED. This includes sector guidance for the food and drink industry and waste treatment sectors, including specific guidance for Anaerobic Digestion (AD). The permit variation therefore requires an assessment and justification of proposals against relevant sector guidance notes and BREF standards.

The existing permitted activities already meet the previously adopted BAT and this has been demonstrated and assessed previously. The updated BREF allows timescales for existing permitted activities to comply. This document explains how, for the proposed changes to the regulated facility, Princes will follow the BAT conclusions and meet the BAT-associated emissions level (for BAT that are contained in BAT conclusions) for the updated BREF note published December 2019. These BAT conclusions also cover the combined treatment of wastewater from different origins provided that the main pollutant load originates from the activities specified in point 6.4 (b) or 6.4 (c) of Annex I to Directive 2010/75/EU and that the wastewater treatment is not covered by Council Directive 91/271/EEC.

The following sections of this report describe the measures and techniques that will be used by Princes to prevent or minimise emissions and impacts on the environment from the proposed changes to the regulated facility in accordance with the following relevant statutory and non-statutory European and UK guidance:

- Food and Drink Sector BAT Conclusions, published December 2019;
- Adopted Food and Drink Sector BREF, published update December 2019;
- Sector Guidance Note EPR6.10 – Guidance for the Food and Drink Sector;
- Adopted Waste Treatment Sector BREF (Chapter 4 biological treatment), published update October 2018;
- Waste Treatment Sector BAT Conclusions, published August 2018.
- Sector Guidance Note EPR5.06 – Guidance for the Recovery and Disposal of Hazardous and Non-Hazardous Waste;
- How to Comply with your Permit; additional guidance for AD Plant, November 2013;

1.2 Technical description of proposed changes to the regulated facility

A number of changes are proposed to site operations and infrastructure which are part of an ongoing programme of investment and modernisation of the site by Princes. The proposed changes are detailed below:

1.2.1 New Raw Materials Storage Area and Ingredients Processing Facility

The development of a proposed new raw materials storage and handling warehouse (RMW)y, directly to the east of the existing installation, resulting in an extension being required to the permit boundary in the north eastern corner of the site, as shown on Installation Boundary Plan, reference PLS1-00-01, dated January 2020 (see section 6 of this permit variation application).

The new RMW will accommodate incoming raw ingredients in both chilled/cold and ambient storage in a consolidated area of the site, to replace the existing raw materials storage areas which are currently dispersed across the existing site. The warehouse will include bulk ambient storage (5002 pallet spaces), chilled store (1164 pallet spaces), cold store (1920 pallet spaces), spice store (480 pallet spaces). The gross internal area of the proposed new building will be 18,410m^2 Dry areas of the warehouse will have impermeable flooring with sealed drainage to sumps. All process areas will have sealed drainage to the effluent treatment plant.

The new area will also include a loading bay with canopy, and service yard area.

1.2.2 Changes to Food Processing

<u>New Ingredients Processing Facility (IPF)</u>

The permit extension area will also accommodate a new kitchen facility for the storage and preparation of spices and the processing of other raw ingredients such as pulse mixing, frozen mixing, tomato paste decanting, de-boxing. All such ingredients processing currently takes place elsewhere within the existing installation. Sauce make up will take place within the new IPF, using combined mixing and cooking vessels, which will consist of jacketed pans with a slowly rotating paddle for mixing.

<u>New Canned Ready Meal (CRM) Line</u>

It is proposed that the existing pea processing plant (enclosed within a new building) will be relocated within the current installation boundary and the existing root crop equipment decommissioned and replaced with a new Canned Ready Meals (CRM) Line.

The CRM Line will be a purpose-built production line fed by solid and liquid ingredients systems that adds vegetables, meat, spices, tomato paste, cream, milk, oil, water, bulk powders and other minor ingredients from the ingredients processing kitchen into a hydrostatic steriliser (commercial scale cooker) as required by each recipe. Products vary from canned meat in sauces and chicken pie fillings to vegetarian dishes such as Bombay Potatoes, using pre-prepared vegetables. This new flexible filling line that has the capability to can the various products at a rate of up to 600 cans per minute.

The CRM line will also include a new Cleaning in Place (CiP) system, consisting of a three-tank recovery type CIP system including pre-rinse, detergent and final rinse tank.

The main CIP set will have three independent CIP supply and return circuits designated, A, B &C. These have variable speed supply pumps to provide the required pressure/flow. The system is designed so that circuit A, B & C can be used simultaneously. Each clean will have its individual procedure; however, a typical cleaning regime would consist of the following:

- A pre-rinse tank is used for washing down vessels and flushing mains with recovered rinse water prior to chemical cleaning. Returned rinse water is diverted to the effluent system. The tank will be maintained at 65°C max;
- A hot detergent tank is used for cleaning the vessels and mains with dilute detergent. solution maintained at 85°C max. Returned detergent solution will be recovered back to the hot detergent tank for re-use through a dedicated return strainer.
- A final rinse tank is used for washing down vessels and flushing mains with recovered rinse water following chemical cleaning, the tank will be maintained at 65°C max. Returned final rinse water is collected back to the pre rinse tank for re-use on the next clean.

A new hydrostatic steriliser (commercial scale cooker), including additional adiabatic cooling technology to reduce the risk of legionella, is proposed as part of the new CRM line and this new asset will completely replace the existing Mather and Platt (M&P) hydrostat. The new hydrostat includes improvements in control & programming technology, as well as being enclosed within a new structure. The new equipment will have improved environmental performance, providing a high level of water re-cycling and heat capture and regeneration. The new hydrostat will be located adjacent to the existing M&P hydrostat within the existing permit boundary.

Due to the expiry of the pressure system safety regulation certificate, the existing M&P Hydrostat has been isolated and removed from service 06 February 2020. The M&P hydrostat will be fully decommissioned to ensure that all sources of pollution risk are removed, prior to being dismantled and removed following the completion of the Canning Excellence Programme.

The process is illustrated in the Process Flow Diagram included in Section 6 of this permit variation application. Drawing 800005553, also included in Section 6, shows a detailed illustration of the CRM plant layout.

1.2.3 Removal of the Root Crop Equipment

To facilitate the installation of the new CRM line, the existing permitted root crop equipment has been decommissioned and removed from site, without causing pollution or harm, in line with the site's existing Closure Plan.

In summary, prior to removal, any associated root crop raw materials have been removed from site. Where possible, they will be returned to the supplier under sale or return, or reused at another facility. Any other waste arisings will be managed in accordance with Duty of Care and the waste hierarchy.

All pipelines and vessels have been flushed out and completely emptied of residual contents. The resulting effluent disposed of to the onsite effluent treatment plant. All containers, screens and feeds etc were cleaned prior to cutting up. The cleaning process involved the high-pressure application of water and disinfectant. Where possible, all equipment has been reused or recycled.

1.2.4 Increased Production Capacity

The replacement of the existing root crop equipment with the new CRM line will result in an increase in the overall production capacity at the installation, in particular for finished products containing animal raw materials (combined products). The installation does not and will not produce any animal raw material only products.

Following the proposed changes, the maximum daily production capacity of the installation for products containing both animal and vegetable raw materials (combined products) will be 372 tonnes/day. The maximum daily production capacity for products containing only vegetable raw materials will be 538.94 tonnes/day.

The above tonnage figures reflect the maximum daily production capacity of the installation line based on 100% efficiency 24 hours a day. More typical daily production tonnages are reflected in the annual

production tonnages of 76,947.15 tonnes/year for vegetable only products and 9,343.61 tonnes/year for combined products. The manufacturing process typically operates continuously from Monday to Friday.

The treatment and processing of animal and vegetable raw materials in combined and separate products will therefore exceed both the Schedule 1 thresholds of 75 and 300 tonnes/day under Section 6.8 A(1)(d)(iii) and therefore the current directly associated activity for treating and processing materials intended for the production of food products from animal raw materials will need to become a listed activity in its own right. The proportion of animal raw material in percent of weight of finished product production capacity in tonnes per day will be greater than 10%, once all the changes have been introduced.

1.2.5 Replacement of Anaerobic Digestion (AD) plant and safety flare

It is proposed that the existing Upflow Anaerobic Sludge Blanket (UASB) digestion plant, which forms part of the currently permitted effluent Treatment Plant (ETP) will be replaced with a new generation anaerobic digester, including a new auxiliary biogas safety flare which will be used during plant maintenance or to safeguard the plant. The new Veolia technology (3rd Generation UASB) 280819 VWT plant has been selected based on a BAT assessment and will operate alongside the new asset during commissioning until the old asset is decommissioned once no longer required. The full technical specification of the new Veolia technology (3rd Generation UASB) 280819 is included in Appendix BAT2.

The incoming water will be pre-treated (course screened), in the existing system. A new buffer tank will be installed to transfer flow into the new pre-conditioning tank. The design incorporates a hot water heat exchanger installed in the mixing loop line of the conditioning tank.

The selected plant has been chosen because it can accommodate frequent daily peaks of total suspended solids (TSS) in the process effluent of 1,000mg/l in addition to the soluble chemical oxygen demand (COD) conversion requirement. The selected plant operates as a sealed, slightly pressurised unit with a pressure relief system upstream of the gas cleaning equipment, thus minimising fugitive emissions to air, including odour.

Caustic is used to scrub out H_2S in the first stage of gas cleaning equipment. The selected plant discharges the scrubber effluent into the flash tank for disposal, utilising its residual caustic nature. The system is fully contained and there are no emissions to air.

The new AD plant will be located within the existing permit boundary, adjacent to the existing effluent treatment plant on the southern installation boundary, as shown on Site Layout and Emission Points Plan, reference PLS1-00-01, dated 15 January 2020 (see section 6 of this permit variation application). This area of the site benefits from concrete impermeable surfacing and all tanks not draining directly to the effluent treatment plant will be provided with secondary containment.

The new advanced UASB reactor has a design capacity of 4000m^3/day, in line with current permitted discharge limits, which will not change following the proposed variation, as current flow rates are already well within these limits. This offers significant robustness to biological shock/process changes in the influent on the bioreactor.

The selected plant demonstrates an optimum methane generation and energy recovery rate in the combustion plant engine (currently boiler 5). The selected technology also operates at lower temperatures which may have some energy savings. An influent/effluent heat exchanger is also included to optimise energy efficiency.

1.2.6 Removal of redundant emission points and boiler equipment

A number of the emission point references currently listed in Table S3.1 of the existing permit and shown on Schedule 7 Site Plan are no longer used or have been relocated within the site, as shown on updated

Emission Points Plan reference PLS1-00-01 15 December 2020 (see section 6 of this variation application) as follows:

- Replacement and eventual decommissioning of the existing ETP biogas flare (emission point reference A7) with the new flare mentioned in 1.3.4 above (new emission point A15); and
- Removal of the decommissioned boiler 7 and removal of the associated emission point reference A12 from Table S3.1 of the permit.

Boiler 7 has been dismantled and removed from site, following decommissioning to ensure that all sources of pollution risk had been removed.

2 Management

2.1 Environmental Management System (EMS)

BAT 1 of Food, Drink and Milk Industry BAT Conclusions, published December 2019, requires an EMS to be implemented and adhered to that addresses overall environmental performance.

Condition 1.1 of the environmental permit already requires the operator to have a management system. This set of written procedures describes what will be done to minimise the risk of pollution from the installation and includes a level of detail proportionate the risks and complexity of the site.

Princes currently has its own management system which complies with the minimum requirements of EA guidance - Develop a Management System: environmental permits[1] and is currently working towards the certification of this system under ISO14001 accreditation. The EMS is under continual review, at least annually and in response to any changes to the site, operations or equipment (including permit variations), or any accident, complaint or breach of the permit. The EMS is currently in the process of being reviewed and updated to address the changes to the regulated facility proposed as part of this permit variation application (V004). The environmental risk assessment forms the core of the EMS and is the basis of all associated policies and procedures.

The structure of Princes EMS is set out in Section 8 of this application. In summary, it includes the following key elements as required by the EA Guidance[1]:

- Site infrastructure plan, showing the locations of the following:
  - ✓ buildings, and other main constructions/plant;
  - ✓ storage facilities for hazardous materials, including chemicals and waste;
  - ✓ items for use in accidents and emergencies, e.g. spill kits;
  - ✓ entrances and exits that can be used by emergency services;
  - ✓ inspection or monitoring points;
  - ✓ effluent treatment plant;
  - ✓ effluent discharge points;
  - ✓ any contaminated land;
  - ✓ sensitive receptors in the vicinity of the site, including surface and ground water;
  - ✓ site surfacing and drainage, including rainwater attenuation; and
  - ✓ utilities;
- A detailed breakdown of site operations and the associated risk management measures for each stage/activity;
- Process flow diagram;
- Waste storage and treatment plan for effluent treatment;
- Site and equipment maintenance plan;
- Contingency plans to cover breakdowns, enforced shutdowns and other changes in normal operations, e.g. due to flooding or other extreme weather;
- Accident prevention and management plan (see section 2.2 below);
- Online security (protection against online security threats);
- Climate change;

[1] https://www.gov.uk/guidance/develop-a-management-system-environmental-permits

- Complaints procedures;
- Staff roles and responsibilities and competence/training records;
- Record keeping;
- Compliance audit against environmental permit; and
- EMS review and update.

In addition, Princes EMS features the following in order to meet the requirements of BAT 1 for the waste treatment sector.

- Commitment of the management, including senior management;
- An environmental policy which features continuous improvement of environmental performance;
- Planning and establishment of procedures, objectives and targets, in conjunction with financial planning and investment;
- Implementation of relevant procedures;
- Checking performance and taking corrective action;
- Review by senior management;
- Following the development of cleaner development;
- Consideration of the environmental impact of the eventual decommissioning plant;
- Regular application of sectoral benchmarking;
- Waste Stream Management (BAT 2) see Section 2.3 below;
- An inventory of waste water and waste gas streams;
- Residues Management Plan;
- Accident Management Plan;
- Odour Management Plan (BAT 12);
- Noise and Vibration Management Plan (BAT 17);

2.2 Management Structure and Responsibilities

The Factory General Manager is responsible for day to day operations and for compliance with the environmental permit.

In accordance with condition 1.1.1 of the existing permit, the site is managed using sufficient competent persons and resources to ensure that the site operates efficiently in accordance with site rules and operating procedures and that conditions of the environmental permit are met.

2.3 Accident Management

In accordance with EPR6.10 Guidance for the Food and Drink Sector, indicative BAT measures are in place to reduce the likelihood of accidents. Automatic process controls are backed up by manual supervision by trained staff. The purpose of such controls is both to minimise the frequency of emergency situations and to maintain control during emergency situations.

The following BAT instrumentation is employed in process control to minimise the likelihood of accidents:

- microprocessor control;
- trips and process interlocks;

- coupled with independent level;
- temperature, flow and pressure metering and high or low alarms.

The following BAT techniques and procedures are employed to prevent overfilling of tanks used for the storage of any liquid or powder raw materials:

- level measurement displayed both locally and at the central control point
- Independent high-level alarms;
- High level cut-off; and
- Batch metering.

The following BAT measures are used to detect variation in effluent composition:

- Monitoring of pH, temperature;
- FOG analysis;
- COD analysis.

Forward flow would be prevented to isolate if particularly high pH or temperature are detected. Gross fat, oil and grease (FOG) from the new raw materials area and CRM line is prevented from entering the effluent treatment plant by an interceptor.

The plant has a total of 2,000m3 effluent buffer storage, which can prevent spills (in particular those with high organic strength) from reaching the Effluent Treatment Plant.

A qualitative Environmental Risk Assessment (ERA) has been carried out in support of the permit variation application which has considered the impact of the proposed changes to the regulated facility on the following accident scenarios:

- Release of unburnt biogas from new AD plant;
- Accidental explosion of biogas from new AD plant;
- Flooding, leading to contamination of flood waters;
- Leakage of digestate from new AD plant;
- Fire;
- Arson and / or vandalism causing the release of polluting materials to air (smoke or fumes), water or land;
- Security/unauthorised access; and
- Spillage of chemicals, raw materials or product.

The ERA is presented in Section 4 of this permit variation application. A standalone accident management plan is maintained for the site as part of the Environmental Management System (EMS).

In accordance with BAT 21 of Waste Treatment Sector BAT Conclusions, published August 2018, the following measures are in place to provide protection from accidents and incidents.

- Site security measures, including the following:
    - Perimeter security fencing;
    - 24 hour onsite security patrol;
    - CCTV;
    - Visitor sign in system;
    - Contractor controls/permit to work system.

- Measures for the prevention, detection and suppression of fire and explosion, including the following:
    - Automated fire detection and suppression system throughout high risk areas of the site, including label storage area and pack room;
    - DSEAR appropriately managed areas;
    - AD plant safety flare;
    - Staff training;
- Incident/accident registration and assessment system.

2.4 Energy Efficiency

In accordance with BAT conclusion 6 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019 and EPR6.10 Guidance for the Food and Drink Sector, indicative BAT measures are employed at the site to ensure efficient use of energy within the installation. Energy use is routinely monitored and recorded continuously through automated systems, or at least daily. As equipment is replaced and upgraded, new equipment is sourced and chosen to be as energy efficient as possible.

The proposed new hydrostatic steriliser (JBT hydromatic® sterilizer) will use regenerative heating and cooling systems. Whereby the heat taken from the cooling of the cans is recovered and transferred to the pre-heat section of the cooker. The new hydrostatic steriliser also uses a closed loop cooling circuit which allows the separation of the machine cooling water with the external cooling circuit

The cooking process is also continuous, therefore ensuring heat efficiency when compared to other types of cooker available. The full technical specification for the proposed new JBT hydromatic® sterilizer is enclosed as Appendix BAT1.

The proposed dual temperature refrigeration system for the new raw materials handling and storage area has been selected to maximise energy efficiency (up to 30% reduction anticipated) and will be operated in the most energy efficient mode possible throughout most of the year, controlled via the Ethos Energy Management System. It will also use EC gas cooler fans, with built in inverter as standard. Visibility of energy usage and energy saving insights will also be available through a live management web portal.

In accordance with EPR6.10 Guidance for the Food and Drink Sector, opportunities for reuse and recycling of water have been considered, taking into consideration hygiene issues as well as practical constraints. Water is used sequentially, in two or more operations prior to disposal. The following BAT measures are also employed in the new areas of the site:

- Heat recovery from refrigeration to heat the underfloor heater mat;
- An influent/effluent heat exchanger is included in the new AD plant design to optimise energy efficiency in the new AD plant;
- Cross flow heat exchange system for the spice storage area; and
- LED Lighting throughout

In accordance with BAT 6 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019, the site will have an energy efficiency plan and will maintain an energy balance record.

2.5 Efficient use of raw materials and water

In accordance with EPR6.10 Guidance for the Food and Drink Sector, and BAT 2 and 10 indicative BAT measures are employed at the site to ensure the efficient use of raw materials and water.

The selection of primary raw material (foodstuff ingredients) is fixed by the requirements of the food products.

The potential environmental impact of auxiliary raw materials, such as cleaning products, has been considered, with appropriate substitutions being made where required. An accordance with BAT 8 and 9 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019 A full inventory of raw materials used at the site following the permit variation is included as Appendix BAT3.

In accordance with BAT 2 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019 an inventory of waste water and waste gas streams is to be established and maintained as part of Princes EMS.

In accordance with BAT 24 of Waste Treatment Sector BAT Conclusions, published August 2018, and BAT 10 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019, the reuse of packaging is maximised in order to reduce the quantity of waste sent for disposal. Where possible, pallets are reused and where this is not possible, they are recycled offsite by an appropriately permitted waste management contractor.

In accordance with BAT 19 of Waste Treatment Sector BAT Conclusions, published August 2018, and BAT 7 the Food, Drink and Milk Industry BAT Conclusions, published December 2019water consumption within the installation is optimised to reduce the volume of wastewater generated by installation via the implementation of the following measures:

- Establishment of water efficiency objectives;
- Optimised use of washing water;
- Water used in sterilisers, boilers and cooling towers, is recirculated and re-used within the system several times prior to disposal in the ETP.

2.6 Avoidance, recovery and disposal of wastes

In accordance with BAT conclusion 6 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019 and EPR6.10 Guidance for the Food and Drink Sector, indicative BAT measures are employed at the site to ensure the avoidance, recovery and disposal of waste represents the best environmental option.

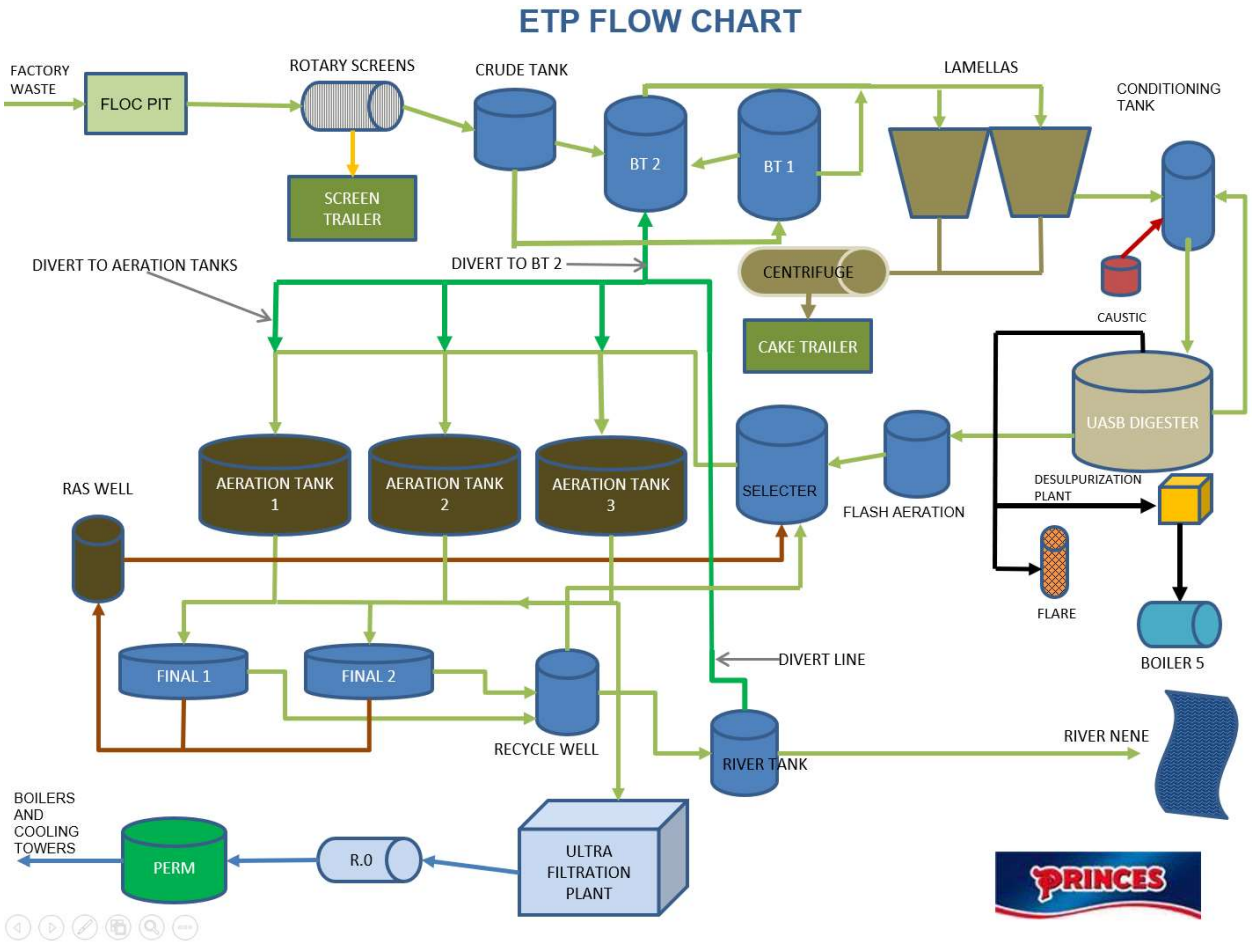
- Production is scheduled to minimise product change overs and clean down.
- Packing line efficiency is optimised via Princes Optimisation and Sustainability Policy.
- Refrigeration equipment will have a temperature monitoring and alarm system.

In accordance with BAT 10 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019, storage times for perishable materials are minimised. A full inventory of wastes produced by the installation following the proposed changes to the regulated activities is included as Appendix BAT4, including consideration of the waste hierarchy to promote reuse or recovery options to ensure the best environmental option is used in each case. All options for recycling waste products back into the process have been explored.

In accordance with BAT 40 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019 and BAT 20 of Waste Treatment Sector BAT Conclusions, published August 2018, and BAT 40 Food, Drink and Milk Industry BAT Conclusions, published December 2019, waste water (site effluent)

is treated in the onsite effluent treatment plant using an appropriate combination of treatments, as illustrated in Figure 2.

Figure 2 – Effluent Treatment Plant Flow Diagram



3 Operations

3.1 Operating Techniques

The installation comprises a factory for the receipt and preparation of foods canned for human consumption and a biological treatment plant for the treatment of process effluent.

The product range of the facility comprises mainly cans of beans in tomato sauce, pulses and peas, fruit, pasta products, vegetables, ready meal products, sauces, rice pudding and canned meat products. Some processing operations (for example peas) are seasonal to reflect availability of feedstock. The new CRM line will introduce a range of new products including canned meat in sauces and chicken pie fillings to vegetarian dishes such as Bombay Potatoes. The CRM line will be connected to a new flexible filling line that has the capability to can the various products at a rate of up to 600 cans per minute. It will also include a new Cleaning in Place (CiP) system.

The installation does not, and will not following the permit variation, produce any animal raw material only products.

Process effluent from the food processing activities is treated at the onsite effluent treatment plant (ETP) which consists of a collection pit, screen, balancing tank, primary clarifiers, conditioning tank, anaerobic digester (AD) with flare stack, aeration tanks, secondary clarifiers and odour filters, prior to discharge to the River Nene at emission point W4 at a maximum permitted rate of 4000m^3/day. Table S3.1 of the existing permit, Point Source Emissions to Air, also includes emissions from the boiler stack associated with the AD Plant and a number of other boiler stacks .

Following the permit variation, the maximum daily production capacity of the installation for products containing both animal and vegetable raw materials (combined products) will be 372 tonnes/day. The maximum daily production capacity for products containing only vegetable raw materials will be 538.94 tonnes/day.

The above tonnage figures reflect the maximum daily production capacity of the installation line based on 100% efficiency 24 hours a day. More typical daily production tonnages are reflected in the annual production tonnages of 76,947.15 tonnes/year for vegetable only products and 9,343.61 tonnes/year for combined products. The manufacturing process typically operates continuously from Monday to Friday.

The treatment and processing of animal and vegetable raw materials in combined and separate products will therefore exceed both the Schedule 1 thresholds of 75 and 300 tonnes/day under Section 6.8 A(1)(d)(iii) and therefore the current directly associated activity for treating and processing materials intended for the production of food products from animal raw materials will need to become a listed activity in its own right. The proportion of animal raw material in percent of weight of finished product production capacity in tonnes per day will be greater than 10%, once all the changes have been introduced.

3.1.1 Process Description

The prescribed process can be broken down into the following activities:

- Materials delivery, handling, unpacking and storage (including refrigeration);
- Raw material preparation (including cleaning/vegetable washing and de-stoning, soaking, rehydration, sorting, screening, grading, peeling, blanching and steam sterilisation);
- Size reduction (mincing and dicing);
- Canning;
- Cooking/sterilisation using either continuous rotary sterilisers or hydrostat towers, depending on the product;
- Cleaning and sanitation;

- Packaging;
- Management of waste;
- Treatment and discharge of process effluent; and
- Burning of the resulting biogas from the effluent treatment plant in an onsite boiler.

The above process will not fundamentally change as a result of the proposed changes associated with the permit variation. The process flow diagram in Section 6 of the permit variation application illustrates how the various processes interact with each other.

3.1.2 Permitted Activities

Following the proposed permit variation, the following listed and directly associated activities will be carried out at the site:

Activity Listed in Schedule 1 of the EP Regulations	Description of the specified activity and WFD annex I and II operations	Limits of specified activity and waste types
Section 6.8 A(1)(d)(iii)(aa)	The treatment of animal and vegetable matter and food industries Treatment and processing, other than exclusively packaging, of the following raw materials, whether previously processed or unprocessed, intended for the production of food or feed (where the weight of the finished product excludes packaging) animal and vegetable raw materials (other than milk only), both in combined and separate products, with a finished product production capacity in tonnes per day: greater than 75 tonnes/day if A is equal to 10 or more. where 'A' is the portion of animal material in percent of weight of the finished product production capacity.	Receipt of raw materials to despatch of finished product, incorporating the activities below
Section 5.4 A(1)(a)(i)	disposal of non-hazardous waste in a facility with a capacity exceeding 50 tonnes per day biological treatment (D8).	Collection, primary treatment and secondary treatment of process effluent from the Installation prior to discharge to controlled waters.
Directly Associated Activity	Clean in place system	A three-tank recovery type CIP system with pre-rinse, detergent and final rinse tank to serve the CRM line
Directly Associated activity	Auxiliary flare for the burning of biogas resulting from the biological treatment of process effluent in the AD plant	only for short periods of breakdown or maintenance of the facility
Directly Associated Activity	Operation of site systems for the supply of utilities and services such as electricity, water,	Site utility and service systems as far as the installation boundary

	steam, process cooling, compressed air and refrigeration.	
Directly Associated Activity	Burning of biogas in a boiler and the use of pressure release valves to protect the integrity of the effluent treatment plant	Biogas resulting from the biological treatment of process effluent only

3.1.3 Site Infrastructure and Equipment

The existing and proposed new site infrastructure and equipment is shown on the Site Layout and Emission Points Plan, reference PLS1-00-01, dated 15 January 2020 (see section 6 of this permit variation application).

The process flow diagram in Section 6 of the application also illustrates how the various stages of the production process link together, and how new processes and plant link with the existing infrastructure.

Following the permit variation, the installation will include the following new infrastructure and equipment within the extension area. However it should be noted that the storage and processing of animal and vegetable raw materials is already permitted and currently takes place elsewhere within the existing installation.

Raw Material Storage Area (proposed)

- Ambient storage area (racked out area);
- Bean mixing room (Industrial mixer for mixed bean product line).
- Spice storage area (mezzanine above processing area. Racking sealed bags on pallets);
- Chilled storage (+4 degrees);
- Cold storage (-19 degrees) and
- Spice decanting area (LEV bays where spices are weighed out and bagged up in batches).

Meat raw materials are delivered to the site chilled or frozen. Chicken is usually defrosted offsite and is delivered just in time for production/processing. Beef may be delivered frozen for storage in the cold store, in accordance with the requirement of BAT 44, to thaw meat in air.

Raw Materials Processing Kitchen (proposed)

- sauce cooking vessels x4 (jacketed pans with a slowly rotating paddle for mixing)
- Slurry mixing vessels x2;
- Fat melter;
- Bin lifts;
- Eurobins;
- Tomato paste decanter; and
- spice entrainment system (air purge system where bags of spice are tipped into a dish/feed pot and pulled through using air. system is sealed and airtight)

Select ingredients (whole milk, cream and yogurt) are delivered to site within IBCs. Four stations hold the IBCs while in use, these have been segregated into two lines. A flexible hose is used to connect the IBC to the supply line. Each line has a dedicated pump to supply ingredients to either of the slurry tanks.

An existing tank will be used to store rapeseed oil, this will have its own dedicated line and pump which can be connected to either slurry tanks or cooking vessels.

Both slurry tanks have a working volume of 1500L, in order to cater for a range of slurry sizes and to accommodate the largest slurry requirement. The slurries are created via an external emulsifier.

Powders are added to the slurry tanks via an entrainment system. A series of three hopper are used to mix the powder into liquid before entry into the slurry tank. The first hopper is for liquid with the subsequent two hoppers containing the powder, the entrained powder is circulated into the slurry tank. In accordance with BAT 44 spices and other solid ingredients are dosed from bulk containers.

IBC ingredients and rapeseed oil are supplied to the slurry vessels via a distribution manifold. Other ingredients are added to the slurry tank via a dedicated bin hoist with a 300L bin capacity. The bins will be pre-filled with a known mass of ingredients before the process starts then loaded into the hoist. The bin is lifted to a set height then tipped to the slurry tank via a chute. After the ingredients have being discharged a known volume of water is spayed via a spray ball to ensure the bin is empty. The mass of ingredient addition will be measured by the slurry tank load cells and checked against the expected ingredient mass. There will be an independent fat melt system to provide fat directly to the cookers.

The slurry is discharged from the slurry tanks into the cooking vessel via a dedicated slurry transfer pump and emulsifier (with a bypass) This is inline on a recirculation line back into the slurry tank for multiple passes if required. This can be operated in parallel with other slurry tank operations.

The IBC dosing lines have been hygienically designed with the capability for water flush/purge by removal of the IBC flex hose and reconnection to a CIP supply. Additionally, a full CIP line clean is conducted through the flex hose and IBC line.

The slurry vessels, surrounding equipment and associated pipework have been hygienically designed with the capability for water flush/purge and full CIP line clean. Spray heads are used to clean the slurry tanks.

Effluent Treatment Plant

- Floc/Reception Pit
- Buffer Tank (on AD plant before condition tank).
- Balance Tanks;
- Conditioning Tank
- New AD plant (technical specification included as Appendix BAT2)
- Biogas safety flare

CRM Line

- Hydrostatic steriliser (technical specification included as Appendix BAT1)
- Canning line; and
- Clean in Place.

3.2 Process Controls

In accordance with EPR6.10 Guidance for the Food and Drink Sector and indicative BAT, all new plant, listed in section 3.1 above are designed, installed, calibrated and will be operated in order to not interfere with hygiene conditions in the production process and thus lead to product loss and waste.

The following process monitoring and control equipment will be employed within the new plant.

Technique	Application	Outcome
Temperature measurement	Continuous monitoring of chilled and ambient storage vessels in the raw materials storage area from a food	Reduce deterioration of ingredients and out of spec products

	quality assessment point of view and for control of refrigeration Hydrostatic steriliser.	
Flow measurement	Transfer lines Steam supply Cleaning systems	Accurate addition of materials to processing vessels Maintain correct operating temperature and minimise waste from over or under heated products Control and optimise water use and minimise effluent
Pressure measurement	Indirect control of other parameters	Minimise waste
Level	Storage and processing vessels	Prevent overflow from storage or processing tanks
Flow control	Constant flow valves Flow regulators	Control flow rate to water ring and vacuum pumps Control process water flow rates

In addition to the measurement of the above parameters, the following indicative BAT, as set out in EPR6.10 Guidance for the Food and Drink Sector, is used at the installation:

- Product loss is assessed against benchmarks;
- effluent monitoring is set up to provide baseline information on waste water loadings;
- high loss areas are investigated;
- Improvement targets are set based on baseline information;
- Performance is regularly monitored and reviewed;

3.3 Raw materials preparation

3.3.1 Materials Delivery, Handling and Storage

The development of a proposed new raw materials storage and handling warehouse (RMW) and kitchen facility, directly to the east of the existing installation, resulting in an extension being required to the permit boundary in the north eastern corner of the site, as shown on Installation Boundary Plan, reference PLS1-00-01, dated January 2020 (see section 6 of this permit variation application).

The new RMW will accommodate incoming raw ingredients in both chilled/cold and ambient storage in a consolidated area of the site, rather than dispersed across the site as currently the case.

The permit extension area will also accommodate a new kitchen area for the storage of spices and the processing of other raw ingredients such as pulse mixing, frozen mixing, tomato paste decanting, de-boxing. All of which currently take place elsewhere within the existing installation. The new area will also include, a loading bay with canopy, and service yard area.

All materials are delivered to the site by road and are controlled by specific delivery procedures to ensure their correct and safe delivery. Bulk storage containers used for liquids are contained with the area draining to the effluent treatment plant. All powders arrive on-site in sealed 25kg bags.

Raw materials may be unloaded directly into the process or may be placed in storage for processing later. Storage may be ambient, chilled or chilled.

3.3.2 Raw Material Preparation

All raw material preparation will take place within the existing permitted area, using existing plant. No raw material preparation will take place within the extension area. The initial steps of the operation involve the preparation of raw materials using various methods including feedstock cleaning and de-stoning, soaking, sorting, screening and grading. Water is reused/recycled for as long as practicable and air emissions/odour are minimised by passing the exhaust mixture through an expansion/cooling vessel prior to release to the environment. Any reject waste material is collected in the designated waste management area before being taken for recycling off site. In accordance with indicative BAT, as set out in EPR6.10 Guidance for the Food and Drink Sector, techniques for raw material preparation used at the installation take into account efficiency of water, energy and product loss.

3.3.3 Size Reduction and mixing

The only size reduction activity that will take place within the permit extension area is chicken dicing, with new DuraKut 6000 equipment utilising a spiral knife with a hinged cover and integrated discharge conveyor to maximise yield and minimise waste. No other size reduction will take place in the permit extension area as it will take place within the existing permitted area, using existing plant. Industry standard mincers and dicers are operated on the site for size reduction of ingredients, (e.g. fruit, vegetables and meat). Mixing is undertaken at ambient temperatures with no releases to the environment. Mixing vessels are covered with lids, which are closed during blending processing using a slow rotational paddle.

3.4 Heat processing using steam or water

There will be no blanching in the extension area and this process applies to existing product only.

Blanching and sterilising steps involve the use of heat provided by steam from gas-fired boilers. Blanching involves the direct injection of steam into the raw material/product mix. Blanching water is reused for as long as practicable prior to being collected for treatment in the effluent treatment plant.

Sterilisation is undertaken using either continuous rotary sterilisers or hydrostat towers depending on the product. The new hydrostatic steriliser proposed as part of the new CRM line will eventually replace the existing M&P hydrostat and will include improvements in control & programming technology, as well as being insulated with blankets and corrugated panels and will be enclosed within a new structure. The new equipment will have improved environmental performance, providing a high level of water re-cycling and heat capture and regeneration. The maximum sterilisation temperature will be 128oc and will have a sterilisation time will be between 20-100 minutes.

The start-up sequence is fully automated by the selection of a recipe. The machine will automatically be filed to the required levels. Steam is injected through control valves for precise control of the set point temperatures and pressure in every section of the machine. The shut-down process is also completely automated. If an error occurs, the location of the alarm will be marked on the HMI to allow a quick fix.

The proposed new hydrostatic steriliser (JBT hydromatic® sterilizer) will use regenerative heating and cooling systems. Whereby the heat taken from the cooling of the cans is recovered and transferred to the pre-heat section of the cooker. The new hydrostatic steriliser also uses a closed loop cooling circuit which allows the separation of the machine cooling water with the external cooling circuit.

The cooking process is also continuous, therefore ensuring heat efficiency when compared to other types of cooker available. The full technical specification for the proposed new JBT hydromatic® sterilizer is enclosed as Appendix BAT1.

In accordance with indicative BAT, as set out in EPR6.10 Guidance for the Food and Drink Sector, the new hydrostatic steriliser reduces energy consumption by reusing heat in regenerative heat exchangers and uses recirculation systems to recycle water.

3.5 Cooling and chilling

In accordance with indicative BAT, as set out in EPR6.10 Guidance for the Food and Drink Sector, all cooling and chilling at the installation takes into account efficiency of water, energy and product loss. There will be no freezing of products.

Refrigeration of chilled and cold raw materials within the new RMW will use a dual temperature Envifreeze DX system, supplied by Star Refrigeration. In accordance with BAT 8 and 9, this 2-stage package unit uses natural CO_2 (in place of traditional HFCs and so has lower global warming potential) and is specifically engineered for industrial applications. The use of CO_2 in the new system also avoids the need for refrigerant ammonia to be used on site, reducing the use of dangerous substances in accordance with BAT 8 and 9.

The efficiency of the new refrigeration system will be effectively monitored and controlled via the Ethos energy management system.

Recirculation systems are used to recycle water and there are no once through cooling systems used.

Drainage arrangements in chilled storage areas benefit from impermeable pavement with sealed drainage to the effluent treatment plant (or sealed sumps) to ensure that any leakages cannot be discharged directly to surface water.

3.6 Cleaning and sanitation

It is proposed that a new Clean in Place (CiP) system is introduced as part of the new CRM line and This has been designed and used with due consideration to waste water minimisation. The new system will consist of a three-tank recovery type CIP system including pre-rinse, detergent and final rinse tank. All 3 tanks will be heated.

The main CIP set has three independent CIP supply and return circuits designated, A, B & C. These have variable speed supply pumps to provide the required pressure/flow. The system is designed so that circuit A, B & C can be used simultaneously.

Each clean shall have its individual procedure but below details a typical cleaning regime individual procedure but below details a typical cleaning regime. A pre-rinse tank is used for washing down vessels and flushing mains with recovered rinse water prior to chemical cleaning. Returned rinse water is diverted to the effluent system.

The tank will be maintained at 65°C max. A hot detergent tank is used for cleaning the vessels and mains with dilute detergent solution maintained at 85°C max. Returned detergent solution is recovered back to the hot detergent tank for re-use through a dedicated return strainer.

A final rinse tank is used for washing down vessels and flushing mains with recovered rinse water following chemical cleaning, the tank will be maintained at 65°C max. Returned final rinse water is collected back to the pre rinse tank for re-use on the next clean.

In accordance with EPR6.10 Guidance for the Food and Drink Sector, the following indicative BAT measures are employed:

- the new CRM line and materials and plant used in the new raw material storage and preparation area plant have been selected for ease of cleaning;
- Dry clean up procedures are used to remove as much residual material as possible before vessels and equipment are washed;
- Drains are fitted with catchpots which are put in place during cleaning;
- Water pressure is optimised at jets, nozzles and orifices;

- Automatic water supply shut offs are used.

For the new CIP system the following indicative BAT measures are employed in accordance with EPR6.10 Guidance for the Food and Drink Sector:

- Dry product is removed prior to the start of the was cycle;
- Pre-rinsing enables product to be recovered;
- Turbidity detector is used to maximise product recovery;
- Optimal CIP programme is selected for the size of plant/vessel and type of soiling;
- Frequency and duration of rinses is optimised to reduce water use;
- Automatic dosing is used to ensure correct concentrations of cleaning chemicals are used;
- Water and chemicals are recycled internally;
- Continuous cleaning of recirculated solutions; and
- Water efficient spray devices are used;

3.7 Recovery and Disposal of Hazardous and Non-hazardous Wastes

3.8 Waste Acceptance

BAT 2 of Waste Treatment Sector BAT Conclusions, published August 2018, requires waste stream management, including waste acceptance criteria and procedures for waste treated by the effluent treatment plant. The permitted effluent treatment plant, including the new AD plant, is only permitted to treat effluent arising from the installation, therefore no waste is brought into site for treatment from elsewhere and waste acceptance procedures are limited to the following in order to meet BAT 2.

As the effluent arising from the installation is relatively homogeneous, BAT associated with waste segregation, waste tracking systems and inventory, compatibility and the sorting solid waste are not applicable in this case.

The effluent collection and drainage system will have a greater diameter to cope with the current discharge flows and future flows from the new Hydrostat cooker etc. The new effluent drainage will be installed in 316 stainless steel as per the prince's specification under buildings and appropriate chemical resistant pipes such as Thermachem or Pipex in areas outside the building footprint. The aim is to reduce the number of pumping chambers on site. To achieve the reduction in pumping chambers the inverts and gradients will also be changed to meet current building regulations and to allow the discharged water flow via gravity towards the proposed balance tanks.

The system will have chemical and heat resistant seals to prevent the seals failing. New inspection chambers will be positioned outside of the building to allow inspection and maintenance to take place without the need to enter the factory with CCTV equipment.

The waste will then be pumped from the balance tanks above ground to the current screen building. The works will be carried out over approx. 4 phases to limit the impact of the factory and are expected to complete at the end of 2020.

3.8.1 Waste characterisation procedures

Effluent arising from the installation is characterised prior to treatment in the effluent treatment plant to ensure that is suitable for treatment prior to reaching the first stage of effluent treatment process (floc pit). Basic characterisation includes monitoring of pH, ORP temp, to ensure that the effluent is suitable for treatment prior to reaching treatment main stage of treatment.

3.8.2 Waste acceptance procedure

3.8.3 Output quality management system

Treated effluent is monitored in accordance with the conditions of the existing permit prior to discharge to the River Nee via discharge point W4. Treated effluent is continuously monitored for volume and temperature and further daily spot samples for the following parameters are taken in accordance with appropriate British Standards to ensure that permitted limits are not exceeded:

- Biological Oxygen Demand (BOD);
- Chemical Oxygen Demand (COD);
- Ammoniacal nitrogen; and
- oil and grease

3.9 Anaerobic Digester (AD) Plant

Process effluent from cleaning, washing, blanching etc is recirculated as far as possible before being collected and treated at the on-site effluent treatment plant (ETP) which operates continuously. The ETP consists of a collection pit, screen, balancing tank, primary clarifiers, conditioning tank UASB digester (Upflow Anaerobic Sludge Blanket) with flare stack, aeration tanks, secondary clarifiers and odour filters. Treated water is discharged to the River Nene in accordance with the permit at a maximum permitted rate of 4000m^3/24hours. As part of planned improvements to the installation, the Anaerobic Digestion (AD) plant (UASB digester) will be replaced with a newer model. Veolia technology (3rd Generation UASB reactor) 280819 VWT, to be located within the existing permit boundary adjacent to the existing AD plant, which will subsequently be decommissioned. The advanced UASB reactor has a design capacity of 4000m^3/day, in line with permitted discharge limits.

The design of the new Biothane Advanced UASB reactor is based on the long-term operation of the existing UASB, waste water from the food processing facility will be buffered and equalised to a variation of less than 20% on a daily basis for both flow and composition, before it is fed to the anaerobic process. Effluent will be pre-treated (course screening) in the existing system. A new buffer tank will be installed to transfer flow into the new conditioning tank. Full technical details of the new AD plant are included in Appendix BAT2.

In accordance with BAT 38 of Waste Treatment Sector BAT Conclusions, published August 2018, BAT conclusions for the anaerobic treatment of waste, the new AD plant will benefit from the following:

- a manual and automatic monitoring system to:
    - ensure a stable digester operation;
    - minimise operational difficulties which may lead to odour emissions;
    - provide sufficient early warning of system failures;
- The following key waste and process parameters are monitored and controlled;
    - pH and alkalinity of the digester feed;
    - digester operating temperature;
    - hydraulic and organic loading rates of the digester feed;
    - concentration of volatile fatty acids (VFAs) and ammonia within the digester;
    - biogas quality, composition and pressure; and
    - liquid and foam levels in the digester.

4 Emissions and Monitoring

4.1 Point source emissions

4.1.1 land

There are no deposits or point source emissions to land or soil from the installation and this will not change as a result of the proposed changes to the regulated facility as described in Section 1.3.

4.1.2 air

The only new emission point to air will be a new biogas safety flare associated with the proposed new AD plant. This new emission point, reference A15, will need to be added to Table S3.1 of the varied permit, however in accordance with BAT 15 of Waste Treatment Sector BAT Conclusions, published August 2018, this auxiliary safety flare will not be used routinely and would only be used during plant maintenance or to safeguard the plant. As such emissions to atmosphere from this auxiliary flare are not considered to require assessment.

There are no other point source emissions to air associated with the proposed changes to the regulated facility.

4.1.3 surface water

Process effluent from all food processing activities is currently treated at the onsite effluent treatment plant (ETP) which consists of a collection pit, screen, balancing tank, primary clarifiers, conditioning tank, anaerobic digester with flare stack, aeration tanks, secondary clarifiers and odour filters, prior to discharge to the River Nene at emission point W4.

In accordance with BAT 11 and 12 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019 and EPR6.10 Guidance for the Food and Drink Sector, the following indicative BAT measures are employed:

- Emissions are controlled to avoid breach of emission limits to water in the permit;
- Raw materials and product are kept out of the waste water system;
- Grease traps and fat separators are used to prevent blockage of drains;
- A balancing tank with a retention time of 6-12 hours is used to improve effluent treatment;
- Contingency measures (divert facility and additional clarification capacity via Ultra Filtration System if required) are in place to prevent accidental discharges from overloading or damaging treatment plant; and
- Wastewater is monitored upstream of the treatment plant to allow automatic diversion as required;

In accordance with BAT 19 of Waste Treatment Sector BAT Conclusions, published August 2018, the following BAT measures are used:

- water consumption is optimised through the use of a site water saving plan;
- use of washing water is optimised;
- water streams are recirculated within the plant;
- water treatment areas of the site are provide with impermeable surfacing;
- overflow detectors are employed on all tanks and vessels used for storage of high risk liquids;
- over flow pipes are directed to relevant secondary containment;
- valves are used to isolate tanks, vessels and secondary containment as required;

- adequate drainage infrastructure (impermeable surfacing) is provided within the effluent treatment area;
- above ground components are used in order to more easily detect any leaks from the new AD plant; and
- appropriate buffer storage capacity is provided by the balance tanks in the new AD plant.

An H1 assessment was completed for the installation previously in 2005, to assess the impact of the existing discharge from the effluent treatment plant. The volume and quality of the treated process effluent that will be discharged following the proposed changes to the regulated facility have been reviewed against the previous assessment H1 assessment to consider whether there is any increased risk from hazardous or sanitary pollutants resulting from the proposed permit variation.

This assessment, included in Section 4 of this variation application, concluded that flow to the ETP will remain below the previously assessed 4,000m^3/day following the changes to the plant. The concentration of substances going to the treatment plant also remains below the previously assessed values. Whilst it is noted that several new substances have been identified that could potentially enter the effluent waste stream following the proposed changes, these are likely to be in very small quantities, and none of these substances are identified as priority or hazardous substances within the EA H1 assessments. As such they have no specific limits on their concentration in a receiving watercourse. It is therefore concluded that an updated H1 assessment is not required in support of this permit variation application.

Clean surface water runoff from roofs and uncontaminated yard areas within the installation will continue to be managed separately and will discharged via the existing emission points W1, W2 and W3 following the changes to the regulated facility. There are currently no volume limits or monitoring requirements related to these surface water discharge points in the permit.

A surface water drainage strategy and assessment of flood risk, dated August 2018, was completed in support of the planning application associated with the expansion of the site and development of the New Raw Materials Handling Area and Kitchen Facility. This report concluded that the development of the proposed new storage and kitchen buildings in the eastern expansion area will not increase the hardstanding area (as it relates to an existing staff car parking area outside the current installation boundary) and therefore surface water flows from this area will continue to route offsite via the existing SuDs drainage system and the surface water discharge points already included in the permit, as mentioned above.

4.1.4 groundwater

There are no point source emissions to groundwater from the installation and this will not change as a result of the proposed changes to the regulated facility as described in Section 1.3.

4.2 Fugitive emissions

In accordance with EPR6.10 Guidance for the Food and Drink Sector, the following indicative BAT measures will be employed in the new chilled raw materials storage area:

- Refrigeration of chilled and cold raw materials within the new RMW will use a dual temperature Envifreeze DX system. This unit uses natural CO_2 (in place of traditional HFCs) and is specifically engineered for industrial applications. The use of CO_2 in the new system also avoids the need for refrigerant ammonia to be used on site.
- Pipe joints, shaft seals and gaskets in refrigeration plant are regularly inspected using propriety leak detection equipment;
- A system log book is used to record
    - quantity of refrigerant and oil added to (or removed from) the system;

- Leakage testing results;
- Location and details of specific leakage incidents;

4.3 Odour

Regulated activities at the installation will be managed in accordance with a site-specific odour management plan, as required by permit condition 3.3 of the environmental permit and BAT 15 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019. The odour management plan is included in Section 8 of this application.

In accordance with EPR6.10 Guidance for the Food and Drink Sector, the following indicative BAT measures are employed:

- The effluent treatment plant is adequately sized and maintained;
- Site wastewater drains are regularly inspected to ensure that the do not become blocked;
- Aeration tanks are mixed at all times, except where shutdown is required;
- Alternative operational arrangements are in place during shut down to avoid odour issues, including lines left in a clean shut down condition to ensure odour is minimised. The building is fully enclosed and roof extract fans are switched off.
- Odour abatement is designed and operated to cope with maximum volumes and loadings;
- Extraction from odorous activities is designed to minimise airflows to the abatement.

4.4 Noise

In accordance with BAT 13 and 14 of the Food, Drink and Milk Industry BAT Conclusions, published December 2019 and BAT 17 of Waste Treatment Sector BAT Conclusions, published August 2018, where noise and vibration nuisance is expected and/or has been substantiated at sensitive receptors, a Noise Management Plan is required to be established implemented and reviewed.

As there has not been a substantiated noise issue at the site previously and the site-specific risk assessment prepared in support of this permit variation application has not identified that noise nuisance will be a significant issue following the variation, a noise management plan is not required.

In accordance with BAT 18 of Waste Treatment Sector BAT Conclusions, published August 2018, the site will implement the following BAT measures to prevent or reduce noise and vibration emissions from the prosed changes to the regulated activities.

- Buildings are used as noise screens and building entrances and exits are appropriately located;
- Equipment is appropriately enclosed;
- Doors and windows of enclosed areas are routinely kept closed;
- Equipment is appropriately inspected and maintained;
- Equipment is operated by experienced staff;
- Low noise equipment has been selected where possible, including drive motors and compressors;
- Noise attenuation is provided in the form of boundary treatments (3.5m high acoustic grade service yard fence and 2.5 metre high acoustic grade eastern boundary fence with car park); and
- Noisy activities are avoided at night as far as possible.

4.5 Monitoring

4.5.1 Emissions to Air Monitoring

There will be no change to emissions to air as a result of the proposed variation, other than the addition of new emission point A15 for the new auxiliary flare.

In accordance with the existing environmental permit, monitoring of point source emissions to air will continue to be carried out at emission point references A1 – A6.

In accordance with BAT 16 of Waste Treatment Sector BAT Conclusions, published August 2018, the volume of gas sent to the new flare will be continuously monitored. Duration and number of events will also be recorded.

4.5.2 Surface Water Monitoring

Treated effluent is currently monitored in accordance with the conditions of the existing permit prior to discharge to the River Nene, via discharge point W4. Treated effluent is continuously monitored for volume and temperature and further daily spot samples for the following parameters are taken in accordance with appropriate British Standards to ensure that permitted limits are not exceeded for the following parameters:

- Biological Oxygen Demand (BOD);
- Chemical Oxygen Demand (COD);
- Ammoniacal nitrogen; and
- oil and grease

The Food, Drink and Milk Industry BAT Conclusions, published December 2019 specifies new BAT AEL's (associated emission limits) for discharges of treated effluent to surface water, however a screening assessment of the validity of the existing H1 assessment (see ERA in Section 4 of this application) has concluded that there will be no change to the permitted discharge as a result of this permit variation and therefore the permit will be separately varied due course to address the updated consent limits to reflect those in the updated BREF and BAT conclusions for the food and drink sector.

Princes are aware that they will have to comply with these stricter limits in future. They are also aware that they will need to reduce sources of nitrogen and phosphorous in the effluent or retrofit reduction measures in the new AD plant in order to meet these new limits, following publication of the updated Food and drink sector BREF and subsequent variation of their permit.

4.5.3 Other Monitoring

In accordance with BAT 10, of Waste Treatment Sector BAT Conclusions, published August 2018, odour from the effluent treatment plant will be monitored periodically, as set out in the odour management plan (see section 7 of the permit variation application).

5 Appendices

Appendix BAT1 Technical Specification Hydrostatic Steriliser
Appendix BAT2 Technical Specification AD Plant
Appendix BAT3 Raw Materials Inventory
Appendix BAT4 Inventory of Waste Arisings

Appendix BAT1 – Technical Specification Hydrostatic Steriliser

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