



## **Best Available Techniques Assessment - Bespoke Installation Permit Application**

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### **Prepared on behalf of:**

Parkham Farms Cheese Factory, Higher Alminstone  
Farm, Woolsey, Bideford, EX39 5PX

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ETL928/2025

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## Version Control

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## Abbreviations

BAT	Best Available Techniques
BOD	Biochemical oxygen demand
BRCGS	Brand Reputation through Compliance Global Standard
BREF	BAT reference documents
CIRIA	Construction Industry Research and Information Association
dB(A)	A-weighted decibels
EA	Environment Agency
EMS	Environmental Management System
EN	European Standard
ETL	Earthcare Technical Limited
HDPE	High-density polyethylene
ISO	International Organisation for Standardization
KPI	Key Performance Indicator
MCERTS	Monitoring Certification Scheme (Environment Agency)
MCPD	Medium Combustion Plant Directive (2015)
MWh	Mega watt hour
MWth	Mega watt thermal (unit for net rated thermal input)
NMP	Noise Management Plan
OMP	Odour Management Plan
PFL	Parkham Farm's Ltd
RO	Reverse Osmosis
SOP	Standard operating procedure
TPA	Tonnes per annum
UF	Ultrafiltration
UKAS	United Kingdom Accreditation Service
VOC	Volatile Organic Compounds

# 1 Introduction

This Best Available Techniques (BAT) Assessment has been prepared by Earthcare Technical Ltd (ETL) on behalf of Parkham Farms Limited, the Operator, to support an application for a new bespoke installation permit for Parkham Farms Cheese Factory, Higher Alminstone Farm, Woolsery, Bideford, EX39 5PX. An installation permit is required for the following listed activity under Schedule 1 of the Environmental Permitting Regulations (England & Wales) 2016:

Section 6.8 Part A(1)(e) -Treating and processing milk, the quantity of milk received being more than 200 tonnes per day (average value on an annual basis), namely the production of cheese and cream from cheese production.

The Directly Associated Activities are detailed within the Permitted Activities document<sup>1</sup> which also supports this permit application. This document has been written by ETL in collaboration with the Operator.

This report comprises a review of the operation, activities, infrastructure, management systems, etc. for the site, in comparison to the requirements of indicative BAT as stated in the BAT Reference Document for the Food, Drink and Milk Industries<sup>2</sup> to ensure that all relevant areas are included.

The aim of this report is to provide confidence to the Environment Agency (EA) that the Operator has both considered the requirements of BAT and operates the site in compliance with the requirements of indicative BAT.

The report is structured in table format in the same order as set out in the BAT Reference Document for Food, Drink and Milk Industries to ensure a logically sequential review of the requirements of indicative BAT. Next to each relevant requirement there is a summary of the proposals and a comparison against indicative BAT.

In addition, the assessment considers the requirements of:

- The Medium Combustion Plant Directive (MCPD)<sup>3</sup>
- The EA guidance 'Appropriate measures for biological treatment'<sup>4</sup>
- BREF document 'Best Available Techniques Reference Document for Waste Treatment'<sup>5</sup>

The final section comprises conclusions and recommendations, in particular details of any BAT requirements that are not currently met.

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<sup>1</sup> Permitted Activities, Earthcare Technical, V1.0 (ETL928\_PFL\_Permitted Activities\_V1.0)

<sup>2</sup> Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries, European Commission, 2019

<sup>3</sup> Directive (EU) 2015/2193 of the European Parliament and of the Council of 25 November 2015 on the limitation of emissions of certain pollutants into the air from medium combustion plants

<sup>4</sup> Biological waste treatment: appropriate measures for permitted facilities, Environment Agency 21 September 2022, <https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities>

<sup>5</sup> Best Available Techniques (BAT) Reference Document for Waste Treatment, European IPPC Bureau, 2018

## 2 BAT Assessment for Parkham Farms Cheese Factory

### Environmental Management System

<b>BAT 1</b>	Implement an EMS that incorporates all of the following features:	
i)	commitment, leadership, and accountability of the management, including senior management, for the implementation of an effective EMS;	Senior management have committed to the further development of an Environmental Management System (EMS). The company holds an Environmental Policy ( <b>PFL-OD-02</b> ) in which it states that:  <i>‘Peter Willes (Company Director) ensures that all local legislative requirements are met and communicates on a regular basis with the Environment Agency to ensure that overall environmental impact is kept to a minimum Several investments have been made to reduce the overall usage of fossil fuels, recent investments include a heat recovery process (recycling heat from the whey to heat the raw milk at the beginning of the process) and installation of solar panels to generate electricity. The effective control of the standards is checked during routine GMP/Housekeeping Audits.’</i>
ii)	an analysis that includes the determination of the organisation’s context, the identification of the needs and expectations of interested parties, the identification of characteristics of the installation that are associated with possible risks for the environment (or human health) as well as of the applicable legal requirements relating to the environment;	The EMS provides organisational context and includes an Accident Management Plan ( <b>PFL-OD-04</b> ) which identifies aspects of the operation that could give rise to potential risks to the environment or human health. PFL’s legal obligations relating to the environment are captured within the EMS. The Quality Manual provides further detail on compliance with all aspects of food safety and quality including legal, accreditation and customer requirements.
iii)	development of an environmental policy that includes the continuous improvement of the environmental performance of the installation;	The Environmental Policy ( <b>PFL-OD-02</b> ) includes a commitment to continual improvement.
iv)	establishing objectives and performance indicators in relation to significant environmental aspects, including safeguarding compliance with applicable legal requirements;	The EMS includes environmental objectives and associated performance indicators for PFL. It is designed to ensure continual improvement and compliance with applicable environmental legislation and permit conditions. Operational Planning is described within section 11.3 of the EMS. Operational planning at the site is structured to ensure effective implementation, maintenance and continual improvement of the food safety and quality management systems, and the environmental management system. A Management Review Meeting is held

<b>BAT 1</b>	Implement an EMS that incorporates all of the following features:	
		twice yearly and serves as a formal platform for senior management to evaluate site performance and set direction. Decisions and actions are recorded with directors and due dates. Monthly management meetings track delivery of actions and objectives, review KPIs, and address emerging issues between the biannual reviews, with any material matters escalated to the next formal review.
v)	planning and implementing the necessary procedures and actions (including corrective and preventive actions where needed), to achieve the environmental objectives and avoid environmental risks;	PFL has a range of procedures and work instructions to ensure competence, awareness, effective process control and maintenance. All relevant members of staff are trained against the procedures and work instructions that as determined by their job role.
vi)	determination of structures, roles and responsibilities in relation to environmental aspects and objectives and provision of the financial and human resources needed;	The organisational structure is detailed in the Structure and Organisation Chart <b>(PFL-OD-05)</b> . Roles and responsibilities are defined within the procedures which have been developed to control environmental risks.
vii)	ensuring the necessary competence and awareness of staff whose work may affect the environmental performance of the installation (e.g. by providing information and training);	Through an induction programme, the company ensures that every new employee receives on the job training until the employee has reached the required performance standard. This training is carried out by, or under the direction of the Manager or Supervisor responsible for the activity.  Department Managers are responsible for identifying and implementing any ongoing training needs. Where appropriate, external training courses and meetings are attended by employees.  Skills, Competency and Training Records are retained and updated as necessary to conform to changing requirements. Records of training achievements and skills are shown on individual records for each employee or on the Company Staff Training Matrix.
viii)	internal and external communication;	<i>Internal communication</i> All staff are trained on relevant procedures. <i>External communication</i> Stakeholder communication includes communication with customers, audits by customers and buyer reviews.
ix)	fostering employee involvement in good environmental management practices;	See above for Internal Communication.

<b>BAT 1</b>	Implement an EMS that incorporates all of the following features:	
x)	Establishing and maintaining a management manual and written procedures to control activities with significant environmental impact as well as relevant records;	There is an Environmental Management System (EMS) Manual in place ( <b>PFL-OD-01</b> ) which references out to Standard Operating Procedures (SOPs) and the relevant record keeping documents.
xi)	effective operational planning and process control;	<p>Operational planning is described within BAT 1 iv).</p> <p>The Site holds in depth management review meetings every 6 months. As a minimum, the agenda includes a review of:</p> <ul style="list-style-type: none"> <li>• Previous management review / matters arising</li> <li>• HACCP and food defence</li> <li>• Changes in company structure</li> <li>• Training</li> <li>• Food Safety Culture</li> <li>• Whistleblowing</li> <li>• Process performance and product conformity</li> <li>• Factory Hygiene, GMP, Safety, Legality, Authenticity &amp; Quality</li> <li>• New Regulations</li> <li>• Customer complaints</li> <li>• Incidents – product withdrawals and product recalls</li> <li>• Results of internal, second party and/or third-party audits and compliance with BRCS</li> <li>• Review of objectives &amp; Key Performance Indicators (KPIs)</li> <li>• Any other points and responsibility for corrective actions</li> </ul> <p>Monthly management meetings track delivery of actions and objectives in between 6 monthly meetings.</p> <p>Process control is undertaken via daily, weekly and monthly monitoring, measurement, inspection and maintenance.</p>
xii)	implementation of appropriate maintenance programmes;	A documented Planned Preventative Maintenance (PPM) schedule ( <b>PFL-MP-01</b> ), maintained in Excel format, is in place for all plant and machinery across the site. The schedule is structured by month and clearly identifies the responsible party for each task, whether internal engineering staff or external contractors.

<b>BAT 1</b>	Implement an EMS that incorporates all of the following features:	
		<p>The plan covers all key equipment and systems, including routine servicing, inspections, and calibration of critical instruments. The date of completion is recorded directly within the maintenance planner to ensure traceability and accountability. There is a list of approved contractors which details the maintenance contractor for each piece of equipment for which servicing or maintenance activities are outsourced.</p> <p>To minimise operational downtime, a stock of critical spare parts is held on site. These are monitored and managed by the Head Cheesemaker, Peter Willes who is also a Company Director.</p>
xiii)	emergency preparedness and response protocols, including the prevention and/or mitigation of the adverse (environmental) impacts of emergency situations;	The site has an Accident Management Plan ( <b>PFL-OD-04</b> ) which forms part of the EMS. The Spill Control Procedure will be trained out to relevant personnel by an external training provider.
xiv)	when (re)designing a (new) installation or a part thereof, consideration of its environmental impacts throughout its life, which includes construction, maintenance, operation and decommissioning;	Environmental impacts are considered in any new site development project. Recent upgrades include a heat recovery process (recycling heat from the whey to heat the raw milk at the beginning of the process) and installation of solar panels to generate renewable electricity to run refrigeration units.
xv)	implementation of a monitoring and measurement programme, if necessary, information can be found in the Reference Report on Monitoring of Emissions to Air and Water from IED Installations;	<p>Relevant monitoring is included within the EMS. There is an Environmental Monitoring Procedure (<b>PFL-PROC-12</b>) which details the monitoring and reporting procedures for emissions from the process emissions to air.</p> <p>Emissions to water are limited to clean runoff and roof water.</p> <p>There is a separate permitted discharge consent for the onsite sewage treatment plant (SW/EPRBB3595WU) which serves the cheese factory.</p>
xvi)	application of sectoral benchmarking on a regular basis;	PFL strive for continual environmental improvement. This commitment is also included in the Environmental Policy ( <b>PFL-OD-02</b> ).
xvii)	periodic independent (as far as practicable) internal auditing and periodic independent external auditing in order to assess the environmental performance and to determine whether or not the EMS conforms to planned arrangements and has been properly implemented and maintained;	Internal auditing is in place for food quality on-site. There are annual external audits by organisations such as the Brand Reputation through Compliance Global Standard (BRCGS registered) Certification Body to ensure compliance however these are principally focussed on quality and food safety. In addition, unannounced supermarket product integrity audits are undertaken annually.

<b>BAT 1</b>	Implement an EMS that incorporates all of the following features:	
		PFL undertake biannual Management Review Meetings, which serves as a formal platform to evaluate site performance and identify areas for improvement. PFL plan to incorporate further auditing relating to environmental performance and EMS conformance in time.
xviii)	evaluation of causes of nonconformities, implementation of corrective actions in response to nonconformities, review of the effectiveness of corrective actions, and determination of whether similar nonconformities exist or could potentially occur;	This is in place for food quality on-site and will now be incorporated into the EMS. PFL will document all complaints and incidents and associated corrective actions using the relevant reporting forms; Accident and Incident Report Form ( <b>PFL-FT-01</b> ) Complaint Record Form ( <b>PFL-FT-03</b> ) and Odour Complaint Form ( <b>PFL-FT-04</b> ). These records will be reviewed periodically by Senior Management to confirm the effectiveness of corrective actions and to apply the lessons learnt to any other operations where a similar non-conformity could occur.
xix)	periodic review, by senior management, of the EMS and its continuing suitability, adequacy and effectiveness;	Senior management will undertake an annual review of the EMS to ensure continuing suitability, adequacy and effectiveness.
xx)	following and taking into account the development of cleaner techniques.	PFL follow research and development within the sector and will adopt cleaner techniques where possible.
BAT is also to incorporate the following features in the EMS:		
i)	noise management plan (see BAT 13);	Not currently required (see BAT 13)
ii)	odour management plan (see BAT 15);	An Odour Management Plan ( <b>PFL-OD-03</b> ) forms part of the EMS.
iii)	inventory of water, energy and raw materials consumption as well as of waste water and waste gas streams (see BAT 2);	<p>Water – There are two sources of water for site use; mains water which is metered and process water generated from Ultrafiltration (UF) and Reverse Osmosis (RO) treatment of the whey by-product. The majority of water used on site is the recycled water from the UF and RO processes. The recycled water is subject to continual process monitoring. Mains water is consumed at a rate of approximately 0.4m<sup>3</sup>/tonne cheese produced (figure for 2024). A biannual water quality check in place on the mains water.</p> <p>Energy – Electricity usage is metered and recorded monthly.</p> <p>Raw material usage is recorded. This incorporates all chemical usage as well as ingredients required for cheese manufacturing.</p> <p>Inventory of wastewater and waste gas streams (see BAT 2).</p>
iv)	energy efficiency plan (see BAT 6a).	See BAT 6a

### **Inventory of Waste Water and Waste Gas**

<b>BAT 2</b>	In order to increase resource efficiency and to reduce emissions, BAT is to establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
i	<p>Information about the food, drink and milk production processes, including:</p> <ul style="list-style-type: none"> <li>a) simplified process flow sheets that show the origin of the emissions;</li> <li>b) descriptions of process-integrated techniques and waste water/waste gas treatment techniques to prevent or reduce emissions, including their performance.</li> </ul>	<p>PFL's Permit Boundary &amp; Emission Point Plan (Appendix A) shows the origin of emissions to air and surface water emissions from the processes on site. Appendix B is PFL's Process Flow for cheese production.</p> <p><i>Emission Points to Water</i></p> <p>Emissions to water are limited to clean surface water from roofs and surfaces designated as clean from emission point W1.</p> <p><i>Emission Points to Air</i></p> <p>There is no treatment of waste gases.</p> <p>Emission points to air are:</p> <ul style="list-style-type: none"> <li>• 2 No. Kerosene Boilers (only 1 operating at any one time) (A1 and A2)</li> <li>• Standby Diesel Generator (used infrequently) (A3)</li> </ul> <p>Fugitive emissions may arise from:</p> <ul style="list-style-type: none"> <li>• Refrigerant units' losses of gas (losses are recorded); and</li> <li>• Waste water storage tanks, lagoon and processes.</li> </ul> <p>There is also loss of steam from:</p> <ul style="list-style-type: none"> <li>• Pressure Relief Valves on pasteurisers; and</li> <li>• Boiler blowdown (optimised to minimise excess energy loss)</li> </ul>
ii	Information about water consumption and usage (e.g. flow diagrams and water mass balances), and identification of actions to reduce water consumption and waste water volume (see BAT 7).	Water consumption is monitored via the site water meter, with usage recorded on a monthly basis and logged within a spreadsheet. Given the low volume of mains water used on site, sub-metering is not implemented. The site operates a ring main supplying water for rennet dilution and staff use. Monthly monitoring enables trends in water consumption to

<b>BAT 2</b>	In order to increase resource efficiency and to reduce emissions, BAT is to establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		<p>be reviewed and supports the identification of opportunities to minimise water use and wastewater generation.</p> <p>There are three available sources for clean water:</p> <ul style="list-style-type: none"> <li>• Recovered water from the cheese making process is used wherever possible. The recovery process includes the following steps:             <ul style="list-style-type: none"> <li>○ Whey produced as a by-product of cheese-making undergoes treatment via ultrafiltration (UF) which results in the production of whey protein concentrate (WPC) and a mixture of lactose, salts and water.</li> <li>○ The lactose mixture then undergoes reverse osmosis (RO) whereby the lactose is concentrated, and the water is removed.</li> <li>○ The resultant ‘water’ undergoes further treatment; it is dosed with chlorine and is used as ‘production water’ within the factory to reduce reliance on mains water supply.</li> </ul> </li> <li>• Borehole water is abstracted for the adjacent agricultural dairy under a permit (50-55 m<sup>3</sup> per day maximum); to provide drinking water for cows.</li> <li>• Mains water which is used in the process (when adding rennet), handwashing, drinking and for boilers.</li> </ul> <p>Water usage will be reported to the EA in accordance with any issued permit.</p>
iii	<p>Information about the quantity and characteristics of the waste water streams, such as:</p> <p>(a) average values and variability of flow, pH and temperature;</p> <p>(b) average concentration and load values of relevant pollutants/parameters (e.g. TOC or COD, nitrogen</p>	<p>Waste water consists of cheese factory wash water, drainage from external areas of the Site considered to be unsuitable for discharge to surface water and excess process water that cannot be used within the process. The cheese factory wash water is stored at the place of production in a purpose-built Dirty Water Lagoon.</p> <p>The waste is spread under and in accordance with Standard rules SR2010No4 Mobile plant permit for land spreading (land treatment resulting in benefit to agriculture or ecological</p>

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	species, phosphorus, chloride, conductivity) and their variability.	improvement) and relevant deployments for the land to be spread. PFL hold a Mobile Plant Permit, permit number EPR/ EB3335RW/A001.  The wastewater is tested at least once every 12 months to inform Agricultural benefit statements for landspreading deployment applications for pH, conductivity, dry matter levels, major and minor nutrients, potentially toxic elements, neutralising value, BOD, COD and Oils, Fats and Grease at a suitably accredited laboratory.																													
iv	<p>Information about the characteristics of the waste gas streams, such as:</p> <p>(a) average values and variability of flow and temperature;</p> <p>(b) average concentration and load values of relevant pollutants/parameters (e.g. dust, TVOC, CO, NOX, SOX) and their variability;</p> <p>(c) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, water vapour, dust).</p>	<p><i>Boilers</i></p> <p>There are combustion emissions from the 2 No. kerosene fired Boilers (one duty and one standby) which are used to generate steam. The Boiler operation is a proposed Directly Associated Activity. Combined thermal input of the boilers is 3.68 MWthi. Emissions to air from the boilers are already monitored once or twice a year.</p> <p>Information relating to Boiler emission parameters is detailed within the table below and with the H1 Assessment. <sup>6</sup></p> <table border="1" data-bbox="1021 887 1736 1294"> <thead> <tr> <th>Parameter</th> <th>Units</th> <th>Boiler 1</th> <th>Boiler 2</th> </tr> </thead> <tbody> <tr> <td>Location</td> <td>Easting, Northing</td> <td>235238, 120766</td> <td>235237, 120762</td> </tr> <tr> <td>Fuel</td> <td>-</td> <td>Kerosene</td> <td>Kerosene</td> </tr> <tr> <td>Economiser</td> <td>-</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>Hours of operation</td> <td>Hours/year</td> <td><b>3,468</b></td> <td><b>3,468</b></td> </tr> <tr> <td>Electrical output</td> <td>kWe</td> <td>n/a</td> <td>n/a</td> </tr> <tr> <td>Thermal input</td> <td>mWthi</td> <td>1.84</td> <td>1.84</td> </tr> </tbody> </table>		Parameter	Units	Boiler 1	Boiler 2	Location	Easting, Northing	235238, 120766	235237, 120762	Fuel	-	Kerosene	Kerosene	Economiser	-	Yes	Yes	Hours of operation	Hours/year	<b>3,468</b>	<b>3,468</b>	Electrical output	kWe	n/a	n/a	Thermal input	mWthi	1.84	1.84
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<sup>6</sup> H1 Assessment to Support a Bespoke Installation Permit Application: Parkham Cheese Factory, September 2025 (ETL928\_PFL\_H1\_V1.0)

<b>BAT 2</b>	In order to increase resource efficiency and to reduce emissions, BAT is to establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:		
Stack height	m	<b>11</b>	<b>11</b>
Eff. stack height	m	<b>0</b>	<b>0</b>
Internal diameter at exit	m	<b>0.355</b>	<b>0.355</b>
Volume flow rate (dry)	Nm <sup>3</sup> /s	<b>0.51</b>	<b>0.51</b>
Volume flow rate (wet)	Am <sup>3</sup> /s	<b>1.16</b>	<b>1.16</b>
Velocity	m/s	<b>11.7</b>	<b>11.7</b>
Temperature	°C	<b>244</b>	<b>244</b>
Exit concentration SO <sub>2</sub>	mg/Nm <sup>3</sup>	n/a	n/a
Exit concentration TVOC	mg/Nm <sup>3</sup>	n/a*	n/a*
Exit concentration NO <sub>x</sub>	mg/Nm <sup>3</sup>	<b>200</b>	<b>200</b>
Exit concentration CO	mg/Nm <sup>3</sup>	n/a*	n/a*
Emission rate SO <sub>2</sub>	g/s	n/a	n/a
Emission rate TVOC	g/s	n/a*	n/a*
Emission rate NO <sub>x</sub>	g/s	<b>0.10</b>	<b>0.10</b>
Emission rate CO	g/s	n/a*	n/a*
<p><b>Notes:</b>                      n/a = not applicable                      n/a * = not applicable under MCPD</p>			

<b>BAT 2</b>	In order to increase resource efficiency and to reduce emissions, BAT is to establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		<p>The Standby Diesel Generator is used infrequently.</p> <p><i>Refrigerant gases</i></p> <p>Refrigerant gas losses over the site are measured by an external party, KJ Refrigeration Limited (KJR) who also service the refrigerant gas equipment. KJR report on how much of each type of refrigerant gas has been lost over time and this is recorded centrally. Refrigerant usage data will be submitted to the EA in accordance with any issued environmental permit.</p>
v	Information about energy consumption and usage, the quantity of raw materials used, as well as the quantity and characteristics of residues generated, and identification of actions for continuous improvement of resource efficiency (see for example BAT 6 and BAT 10).	<p>Energy consumption is recorded. Mains electricity (grid) usage is metered and recorded monthly. Electricity production from solar (operated by PFL) is metered and recorded monthly. Energy use will be reported to the EA in accordance with any issued environmental permit.</p> <p>Raw material use is recorded along with all chemical usage and ingredients including:</p> <ul style="list-style-type: none"> <li>• Chemicals</li> <li>• Diesel and kerosene</li> <li>• Milk usage</li> <li>• Rennet</li> </ul> <p>A full list of raw materials and their storage locations can be found within the Raw Materials Inventory (document reference: ETL928_PFL_RawMaterials_V1.0) which is included within the permit application.</p> <p>Waste produced is recorded and tracked. In accordance with any issued environmental permit, the tonnage of waste produced per tonne of product will be reported to the EA.</p>
vi	Identification and implementation of an appropriate monitoring strategy with the aim of increasing resource efficiency, taking into account energy, water and raw	Energy, water and raw materials consumption is monitored routinely and compared against production volumes. The operator uses Key Performance Indicators (KPIs) during biannual management review meetings to increase resource efficiency.

<b>BAT 2</b>	In order to increase resource efficiency and to reduce emissions, BAT is to establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of wastewater and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:
	materials consumption. Monitoring can include direct measurements, calculations or recording with an appropriate frequency. The monitoring is broken down at the most appropriate level (e.g. at process or plant/installation level).

**Monitoring- process parameters for emissions to water**

<b>BAT 3</b>	Monitor key process parameters at key locations for emissions to water	
	For relevant emissions to water as identified by the inventory of waste water streams (see BAT 2), BAT is to monitor key process parameters (e.g. continuous monitoring of waste water flow, pH and temperature) at key locations (e.g. at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation).	N/A there are no wastewater emissions to water.

**Monitoring - emissions to water**

<b>BAT 4</b>	Monitor emissions to water to the required frequencies and standards																									
	<p>BAT is to monitor emissions to water with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</p> <table border="1" data-bbox="342 531 1144 986"> <thead> <tr> <th>Substance/parameter</th> <th>Standard(s)</th> <th>Minimum monitoring frequency (1)</th> <th>Monitoring associated with</th> </tr> </thead> <tbody> <tr> <td>Chemical oxygen demand (COD) (2) (3)</td> <td>No EN standard available</td> <td rowspan="4">Once every day (4)</td> <td rowspan="4">BAT 12</td> </tr> <tr> <td>Total nitrogen (TN) (2)</td> <td>Various EN standards available (e.g. EN 12260, EN ISO 11905-1)</td> </tr> <tr> <td>Total organic carbon (TOC) (2) (3)</td> <td>EN 1484</td> </tr> <tr> <td>Total phosphorus (TP) (2)</td> <td>Various EN standards available (e.g. EN ISO 6878, EN ISO 15681-1 and -2, EN ISO 11885)</td> </tr> <tr> <td>Total suspended solids (TSS) (2)</td> <td>EN 872</td> <td rowspan="2">Once every month</td> <td rowspan="2">—</td> </tr> <tr> <td>Biochemical oxygen demand (BOD<sub>5</sub>) (2)</td> <td>EN 1899-1</td> </tr> <tr> <td>Chloride (Cl)</td> <td>Various EN standards available (e.g. EN ISO 10304-1, EN ISO 15682)</td> <td>Once every month</td> <td>—</td> </tr> </tbody> </table> <p>(1) The monitoring only applies when the substance concerned is identified as relevant in the waste water stream based on the inventory mentioned in BAT 2.                  (2) The monitoring only applies in the case of a direct discharge to a receiving water body.                  (3) TOC monitoring and COD monitoring are alternatives. TOC monitoring is the preferred option because it does not rely on the use of very toxic compounds.                  (4) If the emission levels are proven to be sufficiently stable, a lower monitoring frequency can be adopted but in any case at least once every month.</p>	Substance/parameter	Standard(s)	Minimum monitoring frequency (1)	Monitoring associated with	Chemical oxygen demand (COD) (2) (3)	No EN standard available	Once every day (4)	BAT 12	Total nitrogen (TN) (2)	Various EN standards available (e.g. EN 12260, EN ISO 11905-1)	Total organic carbon (TOC) (2) (3)	EN 1484	Total phosphorus (TP) (2)	Various EN standards available (e.g. EN ISO 6878, EN ISO 15681-1 and -2, EN ISO 11885)	Total suspended solids (TSS) (2)	EN 872	Once every month	—	Biochemical oxygen demand (BOD <sub>5</sub> ) (2)	EN 1899-1	Chloride (Cl)	Various EN standards available (e.g. EN ISO 10304-1, EN ISO 15682)	Once every month	—	N/A there are no wastewater emissions to water.
Substance/parameter	Standard(s)	Minimum monitoring frequency (1)	Monitoring associated with																							
Chemical oxygen demand (COD) (2) (3)	No EN standard available	Once every day (4)	BAT 12																							
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Chloride (Cl)	Various EN standards available (e.g. EN ISO 10304-1, EN ISO 15682)	Once every month	—																							

**Monitoring - air emissions**

<b>BAT 5</b>	Monitor channelled emissions to air to the required frequencies and standards															
	<p>BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards.                  The table below shows the monitoring required for the dairy sector only:</p> <table border="1" data-bbox="416 466 1218 632"> <thead> <tr> <th data-bbox="416 466 573 561">Substance / parameter</th> <th data-bbox="582 466 734 561">Specific process</th> <th data-bbox="743 466 887 561">Standard</th> <th data-bbox="896 466 1048 561">Minimum monitoring frequency</th> <th data-bbox="1057 466 1218 561">Monitoring associated with</th> </tr> </thead> <tbody> <tr> <td data-bbox="416 568 573 632">Dust</td> <td data-bbox="582 568 734 632">Drying processes</td> <td data-bbox="743 568 887 632">EN 13284-1</td> <td data-bbox="896 568 1048 632">Once every year</td> <td data-bbox="1057 568 1218 632">BAT 23</td> </tr> </tbody> </table>					Substance / parameter	Specific process	Standard	Minimum monitoring frequency	Monitoring associated with	Dust	Drying processes	EN 13284-1	Once every year	BAT 23	Not applicable no drying.
Substance / parameter	Specific process	Standard	Minimum monitoring frequency	Monitoring associated with												
Dust	Drying processes	EN 13284-1	Once every year	BAT 23												

**Energy Efficiency**

<b>BAT 6</b>	In order to increase energy efficiency, BAT is to use BAT 6a and an appropriate combination of the common techniques listed in technique b below.		
a	Energy efficiency plan	<p>An energy efficiency plan, as part of the environmental management system (see BAT 1), entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example for the specific energy consumption) and planning periodic improvement targets and related actions. The plan is adapted to the specificities of the installation.</p>	<p>An energy efficiency plan (<b>PFL-OD-09</b>) forms part of the EMS. This includes the energy consumption of the cheese processing as a whole per kg / tonne of production. Energy KPIs will be reviewed at annually as part of management review meetings which will drive energy efficiencies.</p> <p>A proportion of the Site's electricity demand is met with solar generated renewable energy, from solar panels located on the building roofs at the east of the site and operated by PFL. This provides approximately 30 % of all electricity required to operate the Site (based on an annual average).</p> <p>It is understood that there will also be a permit requirement in any issued permit to report annually the energy consumption per tonne of total product (MWh energy / tonne product).</p>
b	Use of common techniques	<p>Common techniques include techniques such as:</p> <ul style="list-style-type: none"> <li>• burner regulation and control;</li> <li>• cogeneration;</li> <li>• energy-efficient motors;</li> <li>• heat recovery with heat exchangers and/or heat pumps (including mechanical vapour recompression);</li> <li>• lighting;</li> <li>• minimising blowdown from the boiler;</li> <li>• optimising steam distribution systems;</li> <li>• preheating feed water (including the use of economisers);</li> <li>• process control systems;</li> <li>• reducing compressed air system leaks;</li> </ul>	<p>The following techniques are employed to increase energy efficiency:</p> <ul style="list-style-type: none"> <li>• Boiler burner regulation and control carried out through emissions monitoring and tracking of data;</li> <li>• Economisers on Boilers;</li> <li>• Heat exchangers on pasteurisers;</li> <li>• Heat recovery system;</li> <li>• Boiler blowdown is limited where possible;</li> <li>• Steam distribution is manifolded with double isolations. Steam leaks reported and dealt with straightaway;</li> <li>• Manual process control systems;</li> </ul>

		<ul style="list-style-type: none"><li>• reducing heat losses by insulation;</li><li>• variable speed drives;</li><li>• multiple-effect evaporation;</li><li>• use of solar energy.</li></ul>	<ul style="list-style-type: none"><li>• Compressed air leaks checked daily;</li><li>• Compressor is captured on planned maintenance schedule;</li><li>• Pipework and buildings hot water ring main all insulated; and</li><li>• Renewable energy from solar generation on-site, which provides approximately 30% of the electricity required to operate the Site.</li></ul>
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**Water consumption and waste water discharge**

<b>BAT 7</b>		In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below.	
Technique		Description	Site specific information
Common techniques			
a	Water recycling and/or reuse	Recycling and/or reuse of water streams (preceded or not by water treatment), e.g. for cleaning, washing, cooling or for the process itself.	<p>Wherever feasible, recovered water from the cheese-making process is used in place of mains water to reduce overall water consumption. Whey, a by-product of cheese production, is treated via ultrafiltration and reverse osmosis, resulting in a high-quality water stream. This permeate water (RO water) is then dosed with chlorine to ensure it meets hygiene standards for reuse as process water on site. Uses for the process water include; equipment cleaning, CIP (Clean-in-Place) systems, and lorry washing. Certain elements of Site processes and cheese manufacture necessitate the use of mains water. These include:</p> <ul style="list-style-type: none"> <li>• Water used when adding rennet to the process;</li> <li>• Handwashing and drinking water; and</li> <li>• Boiler water</li> </ul> <p>Any surplus process water in excess of Site demands is temporarily stored within the Dirty Water Lagoon before being spread to land for agricultural benefit under deployment.</p>

<b>BAT 7</b>		In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below.	
b	Optimisation of water flow	Use of control devices, e.g. photocells, flow valves, thermostatic valves, to automatically adjust the water flow.	Mains water is metered. All hoses have spray guns and trigger controls.
c	Optimisation of water nozzles and hoses	Optimisation of water nozzles and hoses	As above
d	Segregation of water streams	Water streams that do not need treatment (e.g. uncontaminated cooling water or uncontaminated run-off water) are segregated from waste water that has to undergo treatment, thus enabling uncontaminated water recycling.	Segregated clean and dirty water drainage systems. Clean roof water is segregated and discharged to a tributary of the Dipple Water (emission point W1).
<b>Techniques related to cleaning operations</b>			
e	Dry cleaning	Removal of as much residual material as possible from raw materials and equipment before they are cleaned with liquids, e.g. by using compressed air, vacuum systems or catch pots with a mesh cover.	This technique is not used.
f	Pigging system for pipes	Use of a system made of launchers, catchers, compressed air equipment, and a projectile (also referred to as a 'pig', e.g. made of plastic or ice slurry) to clean out pipes. In-line valves are in place to allow the pig to pass through the pipeline system and to separate the product and the rinsing water.	This technique is not used.
g	High-pressure cleaning	Spraying of water onto the surface to be cleaned at pressures ranging from 15 bar to 150 bar.	Within the cheese factory, high pressure cleaning techniques (undertaken at 20 bar) are used for washing out vats, cleaning the cheese tables, entry points / jaws of the vertical cheese towers/ curd towers and the factory floors.  When silos and tanks are cleaned, spray balls are used to increase the water spraying pressure to the contact surface. Spray balls are also used within the CIP system allowing even distribution of

<b>BAT 7</b>		In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below.	
			cleaning fluids inside vessels and reaching internal surfaces that manual cleaning cannot.
h	Optimisation of chemical dosing and water use in cleaning-in-place (CIP)	Optimising the design of CIP and measuring turbidity, conductivity, temperature and/or pH to dose hot water and chemicals in optimised quantities	<p>CIP (Clean-in-Place) systems are fully optimised to ensure effective and resource-efficient cleaning. The following parameters are routinely monitored as part of the CIP process:</p> <ul style="list-style-type: none"> <li>• Conductivity</li> <li>• Temperature</li> <li>• Concentration of caustic or acid detergents (measured as a percentage)</li> <li>• Daily chemical usage</li> <li>• Number of wash cycles completed per day</li> <li>• Visual inspections of valves, pipework, and pumps to identify any defects or maintenance needs</li> </ul> <p>Automatic conductivity meters assess the concentration of cleaning chemicals in the CIP solution and indicate when chemical replenishment is required. Factory staff also perform manual conductivity tests to verify the accuracy of the automated readings.</p> <p>There are three dedicated CIP systems in operation:</p> <ul style="list-style-type: none"> <li>• <b>CIP 1</b> – for raw milk processing areas;</li> <li>• <b>CIP 2</b> – for the cheese room; and</li> </ul>

<b>BAT 7</b>		In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below.	
			<ul style="list-style-type: none"> <li>• <b>CIP 3</b> – for the whey room</li> </ul> <p>Monitoring results and visual inspections for each CIP system are recorded daily using manual logs. In addition, automated records (charts) are generated and retained for traceability. These charts record and confirm key process parameters, including:</p> <ul style="list-style-type: none"> <li>• The areas cleaned;</li> <li>• Cleaning solution temperature (required: 70 °C); and</li> <li>• Chemical strength</li> </ul>
i	Low-pressure foam and/or gel cleaning	Use of low-pressure foam and/or gel to clean walls, floors and/or equipment surfaces.	<p>Cleaning foams are used for the cleaning of open-top cheese tables where clean-in-place (CIP) systems are not suitable. In addition, external surfaces of factory equipment are periodically cleaned using foaming agents.</p> <p>An alkaline foaming cleaner (Acifoam) is used daily for the removal of residual fats and organic matter from cheese tables. An acid-based foaming cleaner is also applied on a periodic basis (typically every two weeks) to remove mineral deposits and prevent the build-up of scale and rust on equipment surfaces.</p>
j	Optimised design and construction of equipment and process areas	The equipment and process areas are designed and constructed in a way that facilitates cleaning.	The design and construction of equipment and process areas is optimised to assist cleaning where possible.

<b>BAT 7</b>		In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below.	
		When optimising the design and construction, hygiene requirements are taken into account.	
k	Cleaning of equipment as soon as possible	Cleaning is applied as soon as possible after use of equipment to prevent wastes hardening.	Cleaning of equipment is undertaken as soon as a possible after one production run ends and before the next production run begins. This prevents residues hardening. There is a cleaning schedule in place (Policy II Clean Down Procedures) which contains both the frequency of cleans per instrument and the cleaning procedures to be followed for each area.

**Harmful Substances**

<b>BAT 8</b>	In order to prevent or reduce the use of harmful substances, e.g. in cleaning and disinfection, BAT is to use one or a combination of the techniques given below.	
a	<p>Proper selection of cleaning chemicals and/or disinfectants                  Avoidance or minimisation of the use of cleaning chemicals and/or disinfectants that are harmful to the aquatic environment, in particular priority substances considered under the Water Framework Directive 2000/60/EC of the European Parliament and of the Council. When selecting the substances, hygiene and food safety requirements are taken into account.</p>	<p>The selection of cleaning chemicals is process specific and ensures optimum cleaning of plant. The types of chemicals used are determined through working with chemical suppliers to meet onsite requirements. The chemicals are essential to ensure cleanliness of the plant for food safety. Less harmful substances are used where possible.</p> <p>Kersia is the main chemical supplier for the cheese factory with specialist cleaning products for the whey plant provided by Diversey.</p> <p>Kerisa provide a number of the factory’s chlorinated products and advise that <i>‘All of our Chlorinated products and disinfectants carry the Dangerous to the Environment Hazard symbol in their neat form due to the biocidal nature of the products.’</i> Kersia has confirmed that all cleaning chemicals are used in diluted form and, at their in-use concentrations, are not classified as hazardous to the environment.</p> <p>Diversey have provided a statement regarding biodegradation of their cleaning products. Diversey’s state the following:</p> <p><i>“Cleaning products of Diversey fulfill the biodegradation requirements of the Detergent regulation 648/2004, which includes passing the criteria for ready biodegradability according to methods similar to OECD 301 for all surfactants in the products.”</i></p> <p>And;</p>

		<p><i>'When used according to the instructions listed on the product label and safety data sheet, Diversey products are not expected to pose unreasonable risk to human health and environment.'</i></p> <p>Furthermore, there is no discharge of cleaning solutions to surface water. Process water which may contain biodegradable detergents is reused with any surplus in excess of Site demands temporarily stored within the lagoon before being land spread for agricultural benefit under deployment. PFL hold a Mobile Plant Permit, permit number EPR/ EB3335RW/A001.</p>
b	Reuse of cleaning chemicals in cleaning-in-place (CIP). Collection and reuse of cleaning chemicals in CIP. When reusing cleaning chemicals, hygiene and food safety requirements are taken into account.	<p>PFL operates a Clean-in-Place (CIP) recovery loop that allows cleaning chemicals and detergents to be reused multiple times before being replenished.</p> <p>The cleaning solution is collected and stored in the Hot Water CIP Tank, which is maintained at 85 °C to ensure optimal cleaning performance, hygiene, and food safety. A conductivity meter, installed on the return line to the hot water tank, monitors the solution's condition. Conductivity readings are used to assess both detergent concentration and contamination levels. If conductivity remains within acceptable parameters, the solution is reused in subsequent CIP cycles.</p> <p>The cleaning solution is fully replaced every three weeks. The system operates on a chemical rotation schedule, using caustic detergent for three weeks, followed by a three-day acid cleaning cycle to maintain system integrity and effectiveness.</p>
c	Dry cleaning	Not applicable.
d	Optimised design and construction of equipment and process	See BAT 7j

<b>BAT 9</b>	In order to prevent emissions of ozone-depleting substances and of substances with a high global warming potential from cooling and freezing, BAT is to use refrigerants without ozone depletion potential and with a low global warming potential.																			
	Suitable refrigerants include water, carbon dioxide or ammonia	<p>PFL is committed to phasing out higher GWP refrigerants. Table 1 details the refrigerants used on site and the proposed replacement plan for each refrigerant.</p> <p><i>Table 1 – Refrigerant type and replacement review</i></p> <table border="1"> <thead> <tr> <th data-bbox="1070 459 1317 523">Refrigerant type</th> <th data-bbox="1317 459 1585 523">Location</th> <th data-bbox="1585 459 2020 523">Refrigerant Replacement Review</th> </tr> </thead> <tbody> <tr> <td data-bbox="1070 523 1317 922"><b>R407A</b></td> <td data-bbox="1317 523 1585 922">Cheese Store - Room 1 System 1 - compressor</td> <td data-bbox="1585 523 2020 922">Refrigeration equipment will be replaced at end of life with systems that utilise natural refrigerants (e.g. ammonia or CO<sub>2</sub>), where technically and economically feasible. The potential for retrofitting existing systems to accommodate lower-GWP refrigerants will be assessed as part of ongoing maintenance and upgrade planning.</td> </tr> <tr> <td data-bbox="1070 922 1317 1018"><b>R407A</b></td> <td data-bbox="1317 922 1585 1018">Cheese Store - Room 1 System 2 - compressor</td> <td data-bbox="1585 922 2020 1018">As above</td> </tr> <tr> <td data-bbox="1070 1018 1317 1114"><b>R407A</b></td> <td data-bbox="1317 1018 1585 1114">Cheese Store - Room 2 System 1 - compressor</td> <td data-bbox="1585 1018 2020 1114">As above</td> </tr> <tr> <td data-bbox="1070 1114 1317 1209"><b>R407A</b></td> <td data-bbox="1317 1114 1585 1209">Cheese Store - Room 2 System 1 - compressor</td> <td data-bbox="1585 1114 2020 1209">As above</td> </tr> <tr> <td data-bbox="1070 1209 1317 1305"><b>R449A</b></td> <td data-bbox="1317 1209 1585 1305">Cheese Store - Room 3 System 1 - compressor</td> <td data-bbox="1585 1209 2020 1305">As above</td> </tr> </tbody> </table>	Refrigerant type	Location	Refrigerant Replacement Review	<b>R407A</b>	Cheese Store - Room 1 System 1 - compressor	Refrigeration equipment will be replaced at end of life with systems that utilise natural refrigerants (e.g. ammonia or CO <sub>2</sub> ), where technically and economically feasible. The potential for retrofitting existing systems to accommodate lower-GWP refrigerants will be assessed as part of ongoing maintenance and upgrade planning.	<b>R407A</b>	Cheese Store - Room 1 System 2 - compressor	As above	<b>R407A</b>	Cheese Store - Room 2 System 1 - compressor	As above	<b>R407A</b>	Cheese Store - Room 2 System 1 - compressor	As above	<b>R449A</b>	Cheese Store - Room 3 System 1 - compressor	As above
Refrigerant type	Location	Refrigerant Replacement Review																		
<b>R407A</b>	Cheese Store - Room 1 System 1 - compressor	Refrigeration equipment will be replaced at end of life with systems that utilise natural refrigerants (e.g. ammonia or CO <sub>2</sub> ), where technically and economically feasible. The potential for retrofitting existing systems to accommodate lower-GWP refrigerants will be assessed as part of ongoing maintenance and upgrade planning.																		
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<b>R407A</b>	Cheese Store - Room 2 System 1 - compressor	As above																		
<b>R449A</b>	Cheese Store - Room 3 System 1 - compressor	As above																		

		<b>R404A</b>	Cheese Store - Room 3 System 2 - compressor	As above
		<b>R407F</b>	Cheese Store – Room 3 - HT4 Pack	As above
		<b>R449A</b>	Cheese Store - Room 3 Ext 2 - HT2 Pack	As above
		<b>R404A</b>	Cheese Factory - ICE Builder - compressor	As above
		<b>R404A</b>	Cheese Factory - ICE Builder - compressor	As above

**Resource Efficiency**

<b>BAT 10</b>	In order to increase resource efficiency, BAT is to use one or a combination of the techniques given below	
a	Anaerobic digestion	This technique is not used directly however, the Lactose separated from the whey byproduct through UF and RO is removed from Site to an Anaerobic Digestion (AD) plant for treatment and recovery.
b	Use of residues	Residues and by-products generated from the cheese production process are recovered and reused through the following pathways: <ul style="list-style-type: none"> <li>• Cream is directed to an external food manufacturing facility for incorporation into food products.</li> <li>• Whey protein concentrate is supplied to a food manufacturing plant to produce whey-based products intended for human consumption.</li> <li>• Lactose is either sent to an anaerobic digestion (AD) facility for treatment and energy recovery or used as an animal feed supplement.</li> <li>• Permeate / RO water (separated during whey and lactose processing) is reused as process water within the facility, contributing to a reduction in mains water usage.</li> </ul>
c	Separation of residues e.g. using accurately positioned splash protectors, screens, flaps, catchpots, drip trays and troughs	As described above, residues are collected, separated and reused.
d	Recovery and reuse of residues from the pasteuriser. Residues from the pasteuriser are fed back to the blending unit and are thereby reused as raw materials.	This technique is not used.
e	Phosphorus recovery as struvite (see BAT 12g)	Phosphorus recovery as struvite is not applicable; there is no waste wash water treatment plant on site and the phosphorus within the wash water is recovered as a nutrient for agricultural benefit. However, PFL utilise a CIP recovery loop, a resource-efficient cleaning system allowing cleaning chemicals (including phosphorus-based detergents) to be reused multiple times before being replaced.
f	Use of waste water for land spreading	All wastewater generated on site is utilised for landspreading. This includes: <ul style="list-style-type: none"> <li>• Surface water runoff from relevant external yard areas;</li> <li>• Dilute CIP flush water, discharged following the cleaning process once solutions are spent and no longer effective; and</li> </ul>

		<ul style="list-style-type: none"><li>• Surplus process water that exceeds the operational requirements of the site.</li></ul> <p>The waste is applied to land under the conditions of the Standard Rules Permit SR2010No4 for mobile plant landspreading, in line with the requirements for agricultural benefit or ecological improvement, and in accordance with the relevant deployment authorisations for each land parcel.</p>
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**Emissions to Water**

<b>BAT 11</b>	In order to prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for waste water.	
	<p>The appropriate buffer storage capacity is determined by a risk assessment (taking into account the nature of the pollutant(s), the effects of these pollutants on further waste water treatment, the receiving environment, etc.). The waste water from this buffer storage is discharged after appropriate measures are taken (e.g. monitoring, treatment, reuse).</p>	<p>There are no emissions of waste water to surface waters. All waste water is stored at the cheese factory in a purpose-built lagoon which comprises:</p> <ul style="list-style-type: none"> <li>• A permanent engineered structure;</li> <li>• A lined lagoon to protect ground and groundwater;</li> <li>• Constructed access routes for operational and maintenance purposes; and</li> <li>• Fencing and security measures to restrict unauthorised access</li> </ul> <p>The lagoon has a working capacity of 35,500m<sup>3</sup> which maintains a 750mm freeboard.</p> <p>Daily checks of the Lagoon and preventative maintenance must be carried out including:</p> <ul style="list-style-type: none"> <li>• Always maintaining a minimum freeboard of 750 mm within the lagoon and 300mm within the tanks; and</li> <li>• Verification of the structural integrity of both the dirty water tanks and the lagoon.</li> </ul>

<b>BAT 12</b>	In order to reduce emissions to water, BAT is to use an appropriate combination of the techniques given below.	
Preliminary, primary and general treatment		
a	Equalisation	NA there are no waste water emissions. Emissions to water are limited to clean runoff and roof water (emission point W1).
b	Neutralisation	As above
c	Physical separate (e.g. screens, sieves, primary settlement tanks etc.)	NA there are no waste water emissions. Emissions to water are limited to clean runoff and roof water (emission point W1).
Aerobic and/or anaerobic treatment (secondary treatment)		
d	Aerobic and/or anaerobic treatment (e.g. activated sludge, aerobic lagoon, upflow anaerobic sludge blanket (UASB) process, anaerobic contact process, membrane bioreactor.)	Not applicable
e	Nitrification and/or denitrification	Not applicable
f	Partial nitrification - anaerobic ammonium oxidation	Not applicable
Phosphorus recovery and/or removal		
g	Phosphorus recovery as struvite	Not applicable, no waste water treatment on Site.
h	Precipitation	Not applicable
i	Enhanced biological phosphorus removal	Not applicable
Final solids removal		
j	Coagulation and flocculation	Not applicable
k	Sedimentation	Not applicable
l	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)	Not applicable
m	Flotation	Not applicable

<b>BAT 12</b>	Associated emission levels (BAT-AELs) for direct emissions to a receiving water body		
	Parameter	BAT-AEL (daily average) (mg/l)	Comment
	Chemical oxygen demand <sup>1</sup>	25-100 <sup>2</sup>	NA there are no waste water emissions. Emissions to water are limited to clean runoff and roof water (emission point W1).
	Total suspended solids	4-50 <sup>3</sup>	As above
	Total nitrogen	2-20 <sup>45</sup>	As above
	Total phosphorus	0.2-2 <sup>6</sup>	As above.
(1) The BAT-AEL for COD may be replaced by a BAT-AEL for TOC. The correlation between COD and TOC is determined on a case-by-case basis. The BAT-AEL for TOC is the preferred option because TOC monitoring does not rely on the use of very toxic compounds.			
(2) The upper end of the range is 125mg/l for dairies as daily averages only if the abatement efficiency is ≥ 95 % as a yearly average or as an average over the production period.			
(3) The lower end of the range is typically achieved when using filtration (e.g. sand filtration, microfiltration, membrane bioreactor), while the upper end of the range is typically achieved when using sedimentation only.			
(4) The upper end of the range is 30 mg/l as a daily average only if the abatement efficiency is ≥ 80 % as a yearly average or as an average over the production period.			
(5) The BAT-AEL may not apply when the temperature of the waste water is low (e.g. below 12 °C) for prolonged periods.			
(6) The upper end of the range is 4 mg/l for dairies and starch installations producing modified and/or hydrolysed starch.			

**Noise**

<b>BAT 13</b>	In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to set up, implement and regularly review a noise management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:	
	A protocol containing appropriate actions and timelines;	Noise nuisance at sensitive receptors is not expected and has not been reported by receptors to date. Noise levels continue to be monitored and recorded on the Daily Checks sheet ( <b>PFL-MP-04</b> ).
	A protocol for conducting noise emissions monitoring;	As above.
	A protocol for response to identified noise events, e.g. complaints;	As above.
	A noise reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.	As above.

**BAT 13 is only applicable to cases where a noise nuisance at sensitive receptors is expected and/or has been substantiated.**

<b>BAT 14</b>	In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques given below.	
a	Appropriate location of equipment and buildings. Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances.	All equipment used within the cheese making process is located within the cheese factory building itself. The site layout ensures noisy plant is located away from site boundaries. A noise complaints procedure is in place, and any elevated noise levels are investigated and mitigated. The closest residential receptor not associated with the PFL is located 155m to the north (Arnolds Cottage) of the Site.  The Boilers and the Standby Generator are situated within buildings or containers.
b	Operational measures. This includes techniques such as: <ul style="list-style-type: none"> <li>• improved inspection and maintenance of equipment;</li> <li>• closing of doors and windows of enclosed areas, if possible;</li> <li>• equipment operation by experienced staff;</li> <li>• avoidance of noisy activities at night, if possible;</li> <li>• provisions for noise control during maintenance, traffic, handling and treatment activities.</li> </ul>	Operational measures to reduce noise emissions include: <ul style="list-style-type: none"> <li>• Planned preventative maintenance of plant and equipment.</li> <li>• Only trained staff permitted to operate equipment.</li> <li>• Vehicle speeds are controlled on site through site rules and operator awareness to minimise noise from vehicle movements.</li> <li>• Doors are kept closed on rooms with higher noise levels during normal operations to reduce external noise emissions.</li> <li>• Restricted delivery times to avoid high-noise operations during sensitive hours</li> </ul>
c	Low-noise equipment. This may include low-noise compressors, pumps and fans.	This technique is not currently employed.
d	Noise and vibration control equipment. This includes techniques such as: <ul style="list-style-type: none"> <li>• noise reducers;</li> <li>• acoustic and vibrational insulation of equipment;</li> <li>• enclosure of noisy equipment;</li> <li>• soundproofing of buildings.</li> </ul>	Noise emissions are minimised through the use of acoustic enclosures on refrigeration compressors and the enclosure of noise equipment within the cheese factory building. Where applicable, silencers and anti-vibration mounts are fitted to reduce equipment noise. The main production processes are entirely within buildings.
e	Noise abatement. Inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).	This technique is not currently employed.

**Odour**

<b>BAT 15</b>	In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:	
	A protocol containing appropriate actions and timelines;	An Odour Management Plan (OMP) ( <b>PFL-OD-03</b> ) is in place as part of the Environmental Management System and includes a protocol containing actions and timelines.
	A protocol for conducting odour monitoring. It may be complemented by measurement/estimation of odour exposure or estimation of odour impact.	The OMP contains a section on odour monitoring. Daily olfactory qualitative monitoring checks will be carried out in accordance with the Odour Monitoring Procedure ( <b>PFL-PROC-15</b> ) as part of daily checks and recorded within the Daily Checks ( <b>PFL-MP-04</b> ). If there are no odour issues detected, then this frequency may be reduced.
	A protocol for response to identified odour incidents, e.g. complaints;	The OMP contains a section detailing the protocol for responding to odour incidents including complaints.
	An odour prevention and reduction programme designed to identify the source(s); to measure/estimate odour exposure; to characterise the contributions of the sources; and to implement prevention and/or reduction measures.	The OMP includes an odour prevention and reduction programme designed to identify the source(s); to characterise the contributions of the sources; and to implement prevention and/or reduction measures.

### Energy Efficiency

<b>BAT 21</b>	In order to increase energy efficiency, BAT is to use an appropriate combination of the techniques specified in BAT 6 and of the techniques given below.	
a	Partial milk homogenisation	Not applicable.
b	Energy-efficient homogeniser	NA
c	Use of continuous pasteurisers	All pasteurisers are continuous.
d	Regenerative heat exchange in pasteurisation	<p>All pasteurisers on site utilise regenerative heat exchange during both the heating and cooling phases.</p> <p>The site operates two 90,000-litre water storage silos:</p> <ul style="list-style-type: none"> <li>• A cold water silo, maintained at 7 °C</li> <li>• A hot water silo, maintained at 40 °C</li> </ul> <p>During cheese production, whey separated from the curd typically exits at a temperature of 45 °C. It is cooled by circulating it alongside water from the cold water silo, which lowers the whey temperature to approximately 22 °C. In turn, the water is heated to around 40 °C and then returned to the hot water silo.</p> <p>Fresh milk used for cheese manufacturing is stored at 5 °C. Before pasteurisation, it is preheated using the hot water (at 40 °C) from the hot water silo, raising the milk temperature to approximately 33.5 °C. As a result, the water cools down to 7 °C and is returned to the cold water silo.</p> <p>This heat exchange system between milk and whey cooling/preheating processes significantly reduces energy demand. It is estimated to save approximately 1,500 litres of kerosene per day, by reducing the thermal load on the pasteurisers.</p>
e	Ultra-high-temperature (UHT) processing of milk without intermediate pasteurisation	Not applicable. UHT milk is not produced on site.

f	Multi-stage drying in powder production	Not applicable. There is no powder production.																								
g	Precooling of ice-water	Not applicable.																								
<p style="text-align: center;"><i>Table 8</i></p> <p style="text-align: center;"><b>Indicative environmental performance levels for specific energy consumption</b></p> <table border="1" data-bbox="226 459 1010 655"> <thead> <tr> <th>Main product (at least 80 % of the production)</th> <th>Unit</th> <th>Specific energy consumption (yearly average)</th> </tr> </thead> <tbody> <tr> <td>Market milk</td> <td rowspan="4" style="text-align: center;">MWh/tonne of raw materials</td> <td>0,1-0,6</td> </tr> <tr> <td>Cheese</td> <td>0,10-0,22 <sup>(1)</sup></td> </tr> <tr> <td>Powder</td> <td>0,2-0,5</td> </tr> <tr> <td>Fermented milk</td> <td>0,2-1,6</td> </tr> </tbody> </table> <p><sup>(1)</sup> The specific energy consumption level may not apply when raw materials other than milk are used.</p>		Main product (at least 80 % of the production)	Unit	Specific energy consumption (yearly average)	Market milk	MWh/tonne of raw materials	0,1-0,6	Cheese	0,10-0,22 <sup>(1)</sup>	Powder	0,2-0,5	Fermented milk	0,2-1,6	<p>It is understood that under any issued environmental permit PFL will be required to report annually the energy consumption per tonne of total product expressed as MWh energy / tonne product.</p> <p>The main product is cheddar cheese with byproducts consisting of cream, WPC and lactose. The maximum milk processing capacity is 408 tonnes per day, which produces the quantities of products and by-products detailed within Table 2 below.</p> <p><i>Table 2 Production figures</i></p> <table border="1" data-bbox="1043 667 2036 922"> <thead> <tr> <th>Product</th> <th>Tonnes</th> </tr> </thead> <tbody> <tr> <td>Cheese</td> <td>48.14</td> </tr> <tr> <td>RO Lactose concentrate</td> <td>121.77</td> </tr> <tr> <td>Whey Permeate concentrate (WPC)</td> <td>26.92</td> </tr> <tr> <td>Cream</td> <td>5.85</td> </tr> <tr> <td><b>Total Products</b></td> <td><b>202.68</b></td> </tr> </tbody> </table> <p>The Operator has an underlying climate change agreement with the EA. The energy performance level target set for 2024 was 217.914 kWh/tonne. The energy performance level for specific energy consumption documented for 2024 was 196.825 kWh/tonne which meets this target.</p>	Product	Tonnes	Cheese	48.14	RO Lactose concentrate	121.77	Whey Permeate concentrate (WPC)	26.92	Cream	5.85	<b>Total Products</b>	<b>202.68</b>
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**Waste**

<b>BAT 22</b>	In order to reduce the quantity of waste sent for disposal, BAT is to use one or a combination of the techniques given below.	
a	Techniques related to the use of centrifuges. Optimised operation of centrifuges	<p>A centrifugal separator is used on site to recover residual fat from whey generated during the Cheddar cheese production process. This enables efficient cream extraction, which is then pasteurised and stored for further use or off-site dispatch. The centrifuge is operated in accordance with manufacturer specifications to minimise the rejection of product.</p> <p>The separator is operated under optimised conditions. This includes:</p> <ul style="list-style-type: none"> <li>• Regular maintenance and cleaning to ensure consistent performance and hygiene,</li> <li>• Monitoring of flow rates, temperature, and backpressure to maintain separation efficiency,</li> <li>• Operating parameter checks based on product characteristics (e.g. temperature &amp; fat content (measured by customer)),</li> <li>• Routine inspection for wear or imbalance to prevent efficiency losses and mechanical failure.</li> </ul> <p>These measures ensure the separator operates efficiently and reliably, contributing to improved resource efficiency, reduced waste, and compliance with hygiene and product quality standards.</p>
b	Rinsing of the cream heater with skimmed milk or water (Technique related to butter production)	Not applicable – no butter production.
c	Continuous freezing of ice cream (Technique related to ice cream production)	Not applicable – no ice cream production.

d	Minimisation of the generation of acid whey (Techniques related to cheese production)	<p>The factory produces hard cheese (cheddar), which generates less whey per unit of cheese compared to soft or fresh cheese varieties. The coagulation process uses rennet rather than acid, resulting in the production of sweet whey by-product with higher reuse value and lower environmental impact.</p> <p>Whey is separated and recovered efficiently through ultrafiltration and used in food manufacturing at another food processing site.</p>
e	Recovery and use of whey (Techniques related to cheese production)	<p>Whey is separated and recovered efficiently through ultrafiltration and used in food manufacturing at another food processing site.</p>

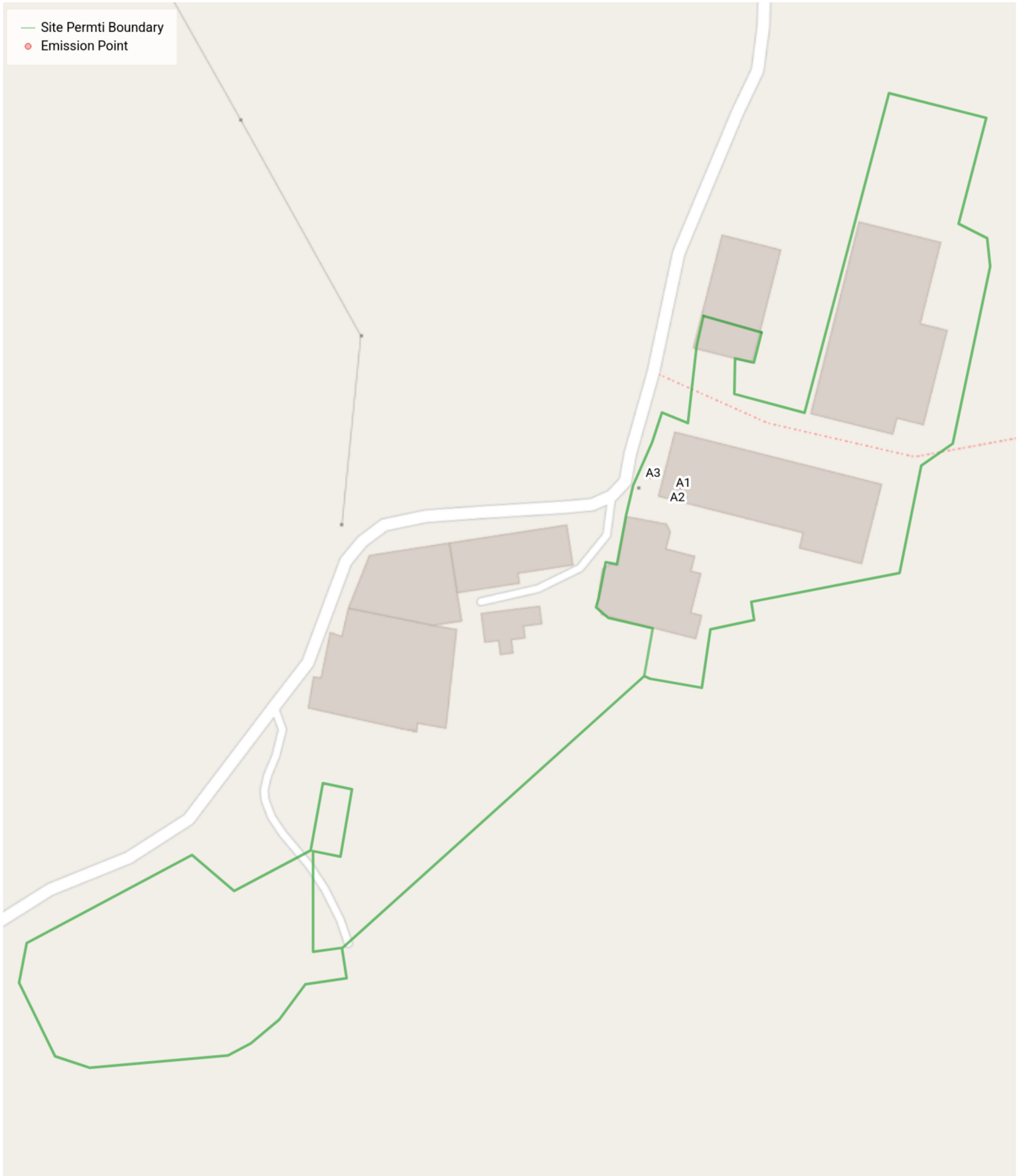
**Emissions to air**

<b>BAT 23</b>	In order to reduce channelled dust emissions to air from drying, BAT is to use one or a combination of the techniques given below.	
a	Bag filter	Not applicable
b	Cyclone	Not applicable
c	Wet scrubber	Not applicable
<i>Table 10</i>		
<b>BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from drying</b>		
	Parameter	Unit
	Dust	mg/Nm <sup>3</sup>
		BAT-AEL (average over the sampling period)
		< 2-10 <sup>(1)</sup>
<sup>(1)</sup> The upper end of the range is 20 mg/Nm <sup>3</sup> for drying of demineralised whey powder, casein and lactose.		

### **3 Conclusions and recommendations**

The BAT review has highlighted that the current and proposed operation at PFL's Dairy is generally compliant with indicative BAT as stated BAT Reference Document for the Food, Drink and Milk Industries<sup>2</sup>.

**Appendix A – Permit Boundary and Emission Point Plan**



## **Appendix B – Process Flow for Cheese Manufacture**

# Process Flow

## Key

- A Curd Unloader
- B Re-gussing system
- C Vacuum Packer
- D Metal Detector
- E Check Weigher
- F Labeller
- G Whey Separator
- H Cream Pasteuriser
- I WPC Cooler
- J Press (fines)
- K Wedge Wire Curd Screen

- - - Raw Milk
- - - Pasteurised Milk
- - - Curds & Whey
- - - Whey
- - - Whey Cream / Butter
- - - WPC
- - - Permeate Water
- - - Lactose Conc
- - - Cheese
- - - Fines Curd

