Best Available Techniques Assessment - Bespoke Installation Permit Application: Pattemore's Dairy, Mosterton Road, Misterton, Crewkerne, Somerset, TA18 8NT

Prepared on behalf of: Pattemore's Transport (Crewkerne) Limited

ETL886/2024

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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
DAF	Dissolved air flotation
EA	Environment Agency
EMS	Environmental Management System
EN	European Standard
ETL	Earthcare Technical Limited
ETP	Effluent Treatment Plant
HDPE	High-density polyethylene
ISO	International Organisation for Standardization
KPI	Key Performance Indicator
MCERTS	Monitoring Certification Scheme (Environment Agency)
MBR	Membrane Bio Reactor
MCPD	Medium Combustion Plant Directive (2015)
MLSS	Mixed liquor suspended solids
MWh	Mega watt hour
MWth	Mega watt thermal (unit for net rated thermal input)
NMP	Noise Management Plan
OMP	Odour Management Plan
PAC	Poly Aluminium Chloride
REA	Renewable Energy Association
SOP	Standard operating procedure
TPA	Tonnes per annum
UKAS	United Kingdom Accreditation Service
VOC	Volatile Organic Compounds

1 Introduction

A Best Available Techniques (BAT) Assessment has been prepared by Earthcare Technical Ltd (ETL) on behalf of Pattemore's Transport (Crewkerne) Limited, the Operator, to support an application for a new bespoke installation permit for Pattemore's Dairy at Mosterton Road, Misterton, Crewkerne, Somerset, TA18 8NT. An installation permit is required for the following listed activities 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 pasteurised milk, cream and concentrated skimmed milk from cream production.
- Section 5.4 Part A (1) (a) (i) - Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving biological treatment, namely the primary and secondary treatment of effluent produced on site with the treated effluent being discharged into a tributary of the River Parrett.

The Directly Associated Activities are detailed within the Permitted Activities document[1] 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 Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries[2] to ensure that all relevant areas are included.

The aim of this report is to provide confidence to the Environment Agency 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 Best Available Techniques (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)[3]
- The Environment Agency (EA) guidance 'Appropriate measures for biological treatment'[4]
- BREF document 'Best Available Techniques Reference Document for Waste Treatment'[5]

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

[1] Permitted Activities, Earthcare Technical, V1.0 November 24 (ETL886/Pattemores)
[2] Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries, European Commission, 2019
[3] 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
[4] 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
[5] Best Available Techniques (BAT) Reference Document for Waste Treatment, European IPPC Bureau, 2018

2 BAT Assessment for Pattemore's Dairy

Environmental Management System

BAT 1	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 **(PAT-OD-02)** in which it states that: • The management are committed to continuous improvements in environmental performance and the prevention of pollution. • We will implement our policies through guidelines and training. • The policy statement will be included in training and notice boards and other associated meetings.
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 (**PAT-OD-04**) which identifies aspects of the operation that could give rise to potential risks to the environment or human health. Pattemore'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 **(PAT-OD-02)** 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;	Objectives and performance indicators are not currently in place. However, the environmental risks and appropriate control measures associated with the operation are identified within the Environmental Risk Assessment.[6] Pattemore's is committed to the continual betterment of the EMS and these requirements will be incorporated.
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;	The production facility 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.

[6] Environmental Risks at Pattemore's Site, Pattemore's Transport (Crewkerne) Limited, 28th December 2023

BAT 1	Implement an EMS that incorporates all of the following features:	
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 Staff Organogram **(PAT-OD-05)**. 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. A Training Matrix is in place and updated as necessary to conform to changing requirements. Records of training achievements and skills are shown on individual records for each employee.
viii)	internal and external communication;	*Internal communication* All staff are trained on relevant procedures. *External communication* Stakeholder communication includes communication with customers, audits by customers and buyer reviews. The Environmental Policy **(PAT-OD-02)** is on the company website.
ix)	fostering employee involvement in good environmental management practices;	See above for Internal Communication.
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 **(PAT-OD-01)** which references out to Standard Operating Procedures (SOPs) and the relevant record keeping documents.
xi)	effective operational planning and process control;	Operational planning includes weekly management review meetings. Process control via daily, weekly and monthly monitoring, measurement, inspection and maintenance.
xii)	implementation of appropriate maintenance programmes;	A documented (paper based) preventative maintenance program for plant and machinery is in place. There is an annual service plan broken down into months. This covers all plant and equipment except items under contract. The relevant supervisor signs off on the completion of maintenance tasks. Planned and

BAT 1	Implement an EMS that incorporates all of the following features:	
		preventative maintenance is issued to the site engineers. Critical spares are held on site and are managed by the Engineering Manager.
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 **(PAT-OD-04)** which forms part of the EMS. The Spill Control Procedure has been trained out to staff 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. A new Maintenance Workshop / Warehouse is under construction, located easterly adjacent to the 'top yard'. The surrounding yard is to be concreted with rainfall directed to a series of Settlement Ponds to remove solids prior to the discharge of clean water via both the existing consent (emission point A2 – proposed to be W2) and via a soakaway. New effluent and process water storage is also proposed and will be constructed to the relevant industry standard. The proposed effluent storage will allow additional buffer storage for waste water prior to treatment within the Effluent Treatment Plant (ETP). This will offer significant operational and environmental benefits, providing contingency storage should there be issues or breakdowns within the ETP.
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;	Relevant monitoring is included within the EMS. Monitoring of process parameters of emissions to water is carried out in accordance with BAT 3. Monitoring of emissions to water is carried out largely in accordance with BAT 4 with a commitment in place to meet BAT requirements.
xvi)	application of sectoral benchmarking on a regular basis;	Pattemore's strive for continual environmental improvement. This commitment is also included in the Environmental Policy **(PAT-OD-02**).
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 mainly quality, and health and safety based. Pattemore's are looking to incorporate further auditing relating to environmental performance and EMS conformance in time.

BAT 1	Implement an EMS that incorporates all of the following features:	
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. Pattemore's will document all complaints and incidents and associated corrective actions using the relevant reporting forms; Accident and Incident Report Form (**PAT-FT-01**) Complaint Record Form (**PAT-FT-03**) and Odour Monitoring Form (**PAT-FT-04**). 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.	Pattemore's 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 **(PAT-OD-03)** is 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);	Water - Sub-metering across site recorded daily. For borehole water, there is an - annual water quality check and a flow meter is in place to measure consumption. Energy – Electricity usage is metered and recorded monthly. Raw materials use is recorded. This incorporates all chemical usage as well as ingredients. Inventory of waste water and waste gas streams (see BAT 2).
iv)	energy efficiency plan (see BAT 6a).	See BAT 6a

Inventory of Waste Water and Waste Gas

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
i	Information about the food, drink and milk production processes, including: a) simplified process flow sheets that show the origin of the emissions; b) descriptions of process-integrated techniques and waste water/waste gas treatment techniques to prevent or reduce emissions, including their performance.	Pattemore's Permit Boundary & Emission Point Plan (Appendix A) shows the origin of emissions to air and waste water emissions from the processes on site including production and the Effluent Treatment Plant. Appendix B is the ETP Pipe Plan Layout Diagram and C is Pattemore's Process flow for cream, homogenised cream, stabilised cream. *Emission Points to Water* There are two emission points to water: • W1 – Treated effluent from Effluent Treatment Plant (Ref A1 under current discharge consent) • W2 – Settled surface water (Ref A2 under current discharge consent) Effluent Treatment Process Flow (Appendix B) details effluent and sludge treatment and may be read in conjunction with the written Overview of the Effluent Treatment Plant (ETP) (Appendix D). Inputs into the ETP comprise; CIP (Clean in Place) systems which serve production lines and equipment and the Tanker and Box Wash Stations; as well as the water from the first stage evaporation process and yard run off water. Any spillages within the dairy itself are also directed to the ETP, via the to 6 No. Back Tanks (each with a capacity of 60m^3). This temporary buffer storage allows the controlled input of concentrated spills into ETP, at a rate that would not adversely impact its operation.

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		Effluent streams entering the ETP are treated by Dissolved Air Flotation (DAF) within the DAF Tank and then undergo secondary treatment within either the Membrane Bioreactor or the BIO (Biomass) DAF. Within the DAF Tank, most solids are removed through a combination of adding Poly Aluminium Chloride (PAC), Sulphuric Acid and Polymer in conjunction with the white-water system and paddles to scrape off the sludge that has risen to the surface. The partially treated liquid component of the effluent is directed to the Anoxic Tank and subsequently the Activated sludge and Aerobic Tank (AS Tank) before undergoing secondary treatment within either the Membrane Bio Reactor (MRB) Tank or the BIO DAF. Within the MBR tank, 400 filter screens allow the flow of liquid across the membranes to filter out the Mixed Liquor Suspended Solids (MLSS) which are directed to the Anoxic Tank, with the clean water then discharged to the ponds. The BIO DAF system operates in parallel to the MBR tank, receiving liquid MLSS from the Activate Sludge and Aerobic Tank (AS Tank) and by adding Polymer in conjunction to the white water system, separating the MLSS from the liquid. The clean liquid can then be discharged to the Ponds and the majority of the MLSS sent back to the AS tank. The Sludge Tank receives the sludge from the Main DAF but also a percentage of the Bio DAF scrapings. Material from the Sludge Tank is sent to the Screw Press where by adding Polymer and then forcing it through a helicoid rotating screw and pressing it against the filter plates, the liquid is removed from the solid. The liquid is in turn fed into the Main DAF tanks under controlled conditions (as slowly as possible) and the solids are sent to an Anaerobic Digestion (AD) plant for treatment and recovery. There is approximately one tanker of waste water per week that is sent off-site for landspreading. This consists of

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		concentrated effluent. i.e. predominantly milk, which might otherwise overwhelm the ETP. *Emission Points to Air* There is no treatment of waste gases. Emission points to air are: • 4 No. Kerosene Boilers (only 3 operating at any one time) (A1, A2, A3 and A4) • Standby Diesel Generator (used infrequently) (A5) Fugitive emissions may arise from: • Refrigerant units losses of gas (losses are recorded). • Effluent Treatment Plant tanks, lagoon and processes. There is also loss of steam from: • Pressure Relief Valves; and • Cooling Towers.
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).	Sub-metering is recorded across site and water usage recorded daily onto a spreadsheet. There are three available sources for clean water: • Mains water which is used in the process. • Borehole water which can be abstracted under a permit (50- 55 m^3 per day maximum). • Recovered water (condensate) which comes from the Evaporator and is used for cleaning down and mixing with polymers for the Dissolved Air Flotation (DAF) Plant. The recovered water is stored in the 'Evap Reclaim Water Tank' (26 m^3) and the water storage tank prior to use.

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		Water usage will be reported to the Environment Agency in accordance with any issued permit.
iii	Information about the quantity and characteristics of the waste water streams, such as: (a) average values and variability of flow, pH and temperature; (b) average concentration and load values of relevant pollutants/parameters (e.g. TOC or COD, nitrogen species, phosphorus, chloride, conductivity) and their variability.	(a) Maximum flows of combined sewage effluent and trade effluent under the existing discharge consent, via emission point A1 (proposed emission point W1) are: • 613.5m^3 per day • 15 litres per second There is no proposal to increase these limits. The flow rate at the V-Notch and before the DAF plant are monitored continuously. The V-Notch flow rate sensors are calibrated every 6 months by Siris and are MCERTS certified. pH is each measured at the outlets to the ponds and from the ETP. The average flow rate for the year 2024 to date is 3.6 litres per second. Daily monitoring is undertaken at various points within the ETP process, including: • the outfall of the DAF; • the outfall of the MBR; • the outfall of the BIO DAF; • the outfall of the ETP, and, • the outfall from the V-Notch This data informs the ETP Manager and team on the performance of the ETP. The contents of the Balance Tank and is also monitored daily to provide information on the characteristics of the waste inputs into the ETP. Contingencies are in place to protect the functionality of the ETP, such that if high volumes of concentrated

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		water requires treatment, any quantities above which the ETP can process is diverted to appropriate contractors for landspreading for agricultural benefits. Samples are analysed daily within the on-site laboratory using Hach test cuvettes. Parameters tested include: • pH • Total Suspended Solids • Ammonium • Total nitrogen • COD • Phosphate In accordance with BAT requirements, the Hach test cuvette for Chloride has just been purchased and Chloride will be tested monthly going forwards. Average values for discharge from the V-Notch Emission Point W1 (emission point A1 under the current discharge consent) for the current year to date are as follows, all in mg/l: • pH – 8 • Total Suspended Solids -18 • Ammonia - 2.92 • Total Nitrogen – 57.26 • COD - 63.87 • Phosphate – 0.744 • Chloride – new parameter – no data.

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		The highest values for the settlement ponds prior to the V-Notch Emission Point W1 (emission point A1 under the current discharge consent) for the current year to date are as follows, all in mg/l: • pH – 8.44 • Total Suspended Solids – 258 (following heavy rain and flooding of the receiving watercourse). • Ammonium– 15.1 • Total nitrogen – 255 • COD – 340 • Phosphate – 16.9 Monthly sampling at Eurofins Laboratories is undertaken for the outlet of the MBR ETP discharge and at the V-Notch itself. Samples are analysed for: • pH • Total Suspended Solids • Ammonium as N • Ammonium as NH_4 • Total Phosphorus • Visible fats, oils and grease. All sampling results are documented on the ETP Water Dailys Sheet. The flow rate at emission point W2 (A2 under current discharge consent) is monitored at the V-Notch. The flow rate sensors are calibrated every 6 months by Siris and are MCERTS certified.
iv	Information about the characteristics of the waste gas streams, such as:	*Boilers* There are combustion emissions from the 4 No. kerosene fired Boilers (three duty and one standby) which are used to generate steam. The Boiler operation is a

BAT 2

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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:

(a) average values and variability of flow and temperature;

(b) average concentration and load values of relevant pollutants/parameters (e.g. dust, TVOC, CO, NOX, SOX) and their variability;

(c) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, water vapour, dust).

proposed Directly Associated Activity. Combined thermal input of the boilers is 10.66 MWthi. Emissions to air from the boilers are monitored once or twice a year.

Information relating to Boiler emission parameters is detailed within the table below and with the H1 Assessment. [7] The Appendices referenced within the 'Notes' section can all be found within the H1 Assessment.

Parameter	**Units**	**Boiler 1** [1]	**Boiler 2** [2]	**Boiler 3** [3]	**Boiler 4** [4]
Location	Easting, Northing	346014, 107167	346004, 107176	345938, 107180	345999, 107191
Fuel	-	Gas oil	Gas oil	Gas oil	Gas oil
Economiser	-	No	Yes	No	No
Hours of operation	Hours/year	8,400 (96%)	8,400 (96%)	8,400 (96%)	744 (8.5%)
Electrical output	kWe	n/a	n/a	n/a	n/a
Thermal input	kWthi	3,340	3,330	720	3,266
Stack height	m	7.7	8.2	3.2	4.6
Eff. stack height	m	0	0	0	0
Internal diameter at exit	m	0.48	0.60	0.16	0.52
Volume flow rate (dry)	Nm^3/s	0.92	0.98	0.20	0.97
Volume flow rate (wet)	Am^3/s	2.25	2.17	0.55	2.30

[7] H1 Assessment to Support a Bespoke Installation Permit Application: Pattemore's Dairy, Mosterton Road, Misterton, Crewkerne, Somerset, TA18 8NT (ETL886/2024/H1/V1.0/Pattemore's Dairy/Nov2024)

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:

Velocity	m/s	12.4	7.67	27.5	10.8
Temperature	°C	214	213	311	321
Exit concentration SO_2	mg/Nm^3	4.0 (Monitored, 3% O_2)	29.3 (Monitored, 3% O_2)	6.08 (Monitored, 3% O_2)	33.6 (Monitored, 3% O_2)
Exit concentration TVOC	mg/Nm^3	n/a	n/a	n/a	n/a
Exit concentration NOx	mg/Nm^3	200 (ELV, 3% O_2)	200 (ELV, 3% O_2)	263 (Monitored, 3% O_2)	200 (ELV, 3% O_2)
Exit concentration CO	mg/Nm^3	88 (Monitored, 3% O_2)	85.2 (Monitored, 3% O_2)	86.4 (Monitored, 3% O_2)	70.8 (Monitored, 3% O_2)
Emission rate SO_2	g/s	0.004	0.03	0.001	0.03
Emission rate TVOC	g/s	-	-	-	-
Emission rate NOx	g/s	0.18	0.22	0.04	0.23
Emission rate CO	g/s	0.08	0.09	0.02	0.07

Notes: n/a = not applicable
For each source the location, diameter, stack height and hours of operation were advised by Pattemore's or taken from site plans.

[1]Boiler 1: Average exhaust temperature at 'high fire' (214°C) and average actual O_2 % at 'high fire' (6.99%) content of the exhaust are derived from monitoring data (Appendix C). Actual H_2O content of the exhaust (5.8% H_2O) has been taken from monitoring data of similar plant at other sites.

[2]Boiler 2: Average exhaust temperature at 'high fire' (213°C) and average actual O_2 % at 'high fire' (5.67%) content of the exhaust are derived from monitoring data (Appendix E). Actual H_2O content of the exhaust (5.8% H_2O) has been taken from monitoring data of similar plant at other sites.

[3]Boiler 3: Average exhaust temperature at 'high fire' (311°C) and average actual O_2 % at 'high fire' (6.21%) content of the exhaust are derived from monitoring data (Appendix H). Actual H_2O content of the exhaust (5.8% H_2O) has been taken from monitoring data of similar plant at other sites.

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
		[4]Boiler 4: Exhaust temperature at 'high fire' (321°C) and actual O_2 % at 'high fire' (3.47%) content of the exhaust are derived from monitoring data (Appendix I). Actual H_2O content of the exhaust (5.8% H_2O) has been taken from monitoring data of similar plant at other sites. Emission rates in this table are shown are for continuous operation; for long-term impact it has been assumed the Boiler 1, Boiler 2 and Boiler 3 will operate 96% of the time, and Boiler 4 for 8.5% of the time. The Standby Diesel Generator is used infrequently. *Refrigerant gases* 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 Environment Agency in accordance with any issued environmental permit.
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).	Energy consumption is recorded monthly. Import from the adjacent Solar Farm (operated by Pattemore's Transport (Holdings) Ltd), export to grid and usage on site. Energy use will be reported to the Environment Agency in accordance with any issued environmental permit. Raw material use is recorded along with all chemical usage and ingredients included: • Chemical usage is recorded by the engineering department. • Diesel and kerosene usage is tracked by the transport department. • Milk usage is recorded by the main office. • 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 Environment Agency.

BAT 2	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 waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:	
vi	Identification and implementation of an appropriate monitoring strategy with the aim of increasing resource efficiency, taking into account energy, water and raw 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).	Energy, water and raw materials consumption is monitored routinely, some of which are compared against production volumes. Key Performance Indicators (KPIs) are proposed to be introduced to increase resource efficiency.

Monitoring- process parameters for emissions to water

BAT 3	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).	Continuous monitoring includes: • Flow rates are measured at the 2 No. V-Notches via a Siemens LUT440 unit. The flow rate at the V-Notches is calibrated every 6 months. • pH is measured daily ay the V-Notch serving the ETP (emission point W1 (currently termed A1)).

Monitoring - emissions to water

BAT 4 Monitor emissions to water to the required frequencies and standards

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.

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		
Biochemical oxygen demand (BOD_5) (2)	EN 1899-1	Once every month	
Chloride (Cl^-)	Various EN standards available (e.g. EN ISO 10304-1, EN ISO 15682)	Once every month	—

(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.

Monthly UKAS accredited laboratory testing is carried out at the Emission Point for Sewage and Trade Effluent (emission point W1 (currently termed A1))for:

- Biochemical oxygen demand (BOD)
- pH
- Total Suspended Solids
- Ammonium as N
- Ammonium as NH_4
- Total Phosphorus
- Visible fats, oils and grease.

In house monitoring of pH, chemical oxygen demand, phosphate, total suspended solids, phosphate, total nitrogen and ammonia is also carried out daily using Hach test cuvettes. This monitoring in not MCERTS or UKAS accredited, however there are documented procedures for each test undertaken, all staff are trained on each test before being deemed competent and signed off to undertake monitoring.

The BOD monitoring meets BAT however, in order to comply with BAT 4 and BAT 12 the following monitoring is to be instigated and / or current monitoring frequency increased:

- Chloride – once a month both in house using Hach test cuvettes and at UKAS accredited laboratory.

Monitoring - air emissions

<table>
<tr><td>BAT 5</td><td colspan="2">Monitor channelled emissions to air to the required frequencies and standards</td></tr>
<tr><td></td><td>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:
<table>
<tr><td>Substance / parameter</td><td>Specific process</td><td>Standard</td><td>Minimum monitoring frequency</td><td>Monitoring associated with</td></tr>
<tr><td>Dust</td><td>Drying processes</td><td>EN 13284-1</td><td>Once every year</td><td>BAT 23</td></tr>
</table>
</td><td>Not applicable no drying.</td></tr>
</table>

Energy Efficiency

BAT 6	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	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.	The energy consumption of the dairy processing as a whole is reviewed per litre of production. Pattemore's are committed to introducing energy KPIs (as part of the EMS) which would be reviewed at quarterly management review meetings and which would help drive energy efficiencies. Much of the Site's electricity demand is met with renewable energy, utilising electricity produced from the 2 hectares (5 acres) solar farm located to the east of the site and operated by Pattemore's Transport (Holdings) Ltd. This provides approximately 60% of all electricity required to operate the Site (based on an annual average). 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).
b	Use of common techniques	Common techniques include techniques such as: • burner regulation and control; • cogeneration; • energy-efficient motors; • heat recovery with heat exchangers and/or heat pumps (including mechanical vapour recompression); • lighting; • minimising blowdown from the boiler; • optimising steam distribution systems; • preheating feed water (including the use of economisers); • process control systems; • reducing compressed air system leaks;	The following techniques are employed to increase energy efficiency: • Boiler burner regulation and control carried out through emissions monitoring and tracking of data • Economiser on Boiler 2 and heat exchangers on pasteurisers • Boiler blowdown is limited where possible • Steam distribution is manifolded with double isolations. Steam leaks reported and dealt with straightaway • Hot well tanks preheat feed water for boilers • Manual process control systems • Compressed air leaks checked daily

		• reducing heat losses by insulation; • variable speed drives; • multiple-effect evaporation; • use of solar energy.	• Compressor is captured on planned maintenance schedule • Pipework and buildings hot water ring main all insulated • Multiple effect evaporation – in place • Renewable energy from solar generation on-site, which provides 60% of the electricity required to operate the Site.

Water consumption and waste water discharge

BAT 7		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.	Recovered water from condensate process is used where possible instead of mains water or abstracted water. For example, for cleaning and washing of plant and mixing with polymers for the Dissolved Air Flotation (DAF) Plant.
b	Optimisation of water flow	Use of control devices, e.g. photocells, flow valves, thermostatic valves, to automatically adjust the water flow.	• Key water streams are sub-metered. • Automated processes ensure optimum flow control using valves. • 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 drainage systems. Clean roof water is segregated where possible. Clean water from the Upper Yard segregated and discharged to the tributary of the River Parrett via a consented emission point under existing discharge consent (A2) which is proposed Emission Point W2.
Techniques related to cleaning operations			
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	This technique is not used.

BAT 7		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.	
		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.	
g	High-pressure cleaning	Spraying of water onto the surface to be cleaned at pressures ranging from 15 bar to 150 bar.	High pressure cleaning techniques are used for: • Box washes – this involves the cleaning of used Pallecon cream storage containers - high pressure cleaning undertaken at 200 bar. • Lorry and tanker high pressure cleaning undertaken at 200 bar. • High pressure cleaning of the ETP. undertaken at 120 bar. When silos and tanks are cleaned, spray balls are used to increase the water spraying pressure to the contact surface.
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	There are 6 No. CIP sets in place, which are set on either a caustic or acid wash. This is dependent on product and the piece of plant that is being cleaned along with the wash schedule. Caustic acid is used within the CIP to break down and remove any accumulated fat, acid wash is used to remove calcium buildup. CIPs serve designated areas as follows: CIP1 – functions to clean all equipment in the factory that has contact with pasteurised products.

BAT 7		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.	
			CIP 2 – for the cleaning of the milk silos and milk pump and at times also for cleaning tankers. CIP 3 – serves the tanker and box wash stations. CIP 4 – for the cleaning of the Skim Silos. CIP 5 – currently not in use. Under commissioning for use on process lines within the dairy. CIP 6 – operates as a contingency for CIP 1 during downtime or breakdowns. An additional 2 No. CIP sets are to be installed which will serve the proposed goat's milk (CIP7) and as an upgrade to CIP1 (CIP8). Parameters considered as part of the CIP process monitoring includes the following: • Conductivity • Temperature • Caustic or acid strength, measured as a percentage • Quantity of chemicals used each day • No. washes undertaken each day • Visual assessments of the valves, pipework and pumps to check for any defects Process monitoring results as well as visual assessments on each CIP are recorded daily on manual logs. CIP 4 which is the newest CIP system does have an associated SCADA system and benefits from automatic process monitoring logging.

BAT 7		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.	
			CIPs are scheduled at certain intervals depending on production runs. Every product run also undergoes microbiological testing to ensure that CIPs are effective.
i	Low-pressure foam and/or gel cleaning	Use of low-pressure foam and/or gel to clean walls, floors and/or equipment surfaces.	Chemical foam cleaning is undertaken within the Dairy Building itself post-production.
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. When optimising the design and construction, hygiene requirements are taken into account.	The design and construction of equipment and process areas is optimised to assist cleaning where possible.
k	Cleaning of equipment as soon as possible	Cleaning is applied as soon as possible after use of equipment to prevent wastes hardening.	There is a cleaning schedule in place. Equipment is washed when off production, ready for next production run.

Harmful Substances

BAT 8	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	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.	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. Diversey, who supply Pattemore's with cleaning chemicals have provided a statement regarding food contact safety of rinsed products: Diversey's Position on Food Contact Safety of Rinsed Products '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.'*
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.	Chemical dosing is controlled via conductivity meters and where possible chemical is returned for reuse via return to the detergent tank.
c	Dry cleaning	Not applicable.
d	Optimised design and construction of equipment and process	See BAT 7j

<table>
<tr><td>BAT 9</td><td colspan="2">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.</td></tr>
<tr><td></td><td>Suitable refrigerants include water, carbon dioxide or ammonia</td><td>The refrigerants used on site and their Global Warming Potential are shown in Table 1 below:

Table 1 – Refrigerant type and Global Warming Potential
<table><tr><th>Refrigerant type</th><th>Global Warming Potential (GWP)</th></tr><tr><td>R134a</td><td>1,430</td></tr><tr><td>R407c</td><td>1,774</td></tr><tr><td>R401a</td><td>2,088</td></tr><tr><td>R32</td><td>675</td></tr></table>
Previously used refrigerants with a higher GWP greater than 2,500 have been replaced with lower GWP refrigerants as above.

Glycol circuits are used to keep raw materials and products cold to mitigate risk of freezing. Glycol is cooled by the refrigerants in the chillers. There is no other viable option for the production process.</td></tr>
</table>

Resource Efficiency

BAT 10	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, sludge from the Effluent Treatment Plant is removed from Site to an Anaerobic Digestion (AD) plant for treatment and recovery.
b	Use of residues	As detailed above, the residues are used as feedstocks an AD Plant.
c	Separation of residues e.g. using accurately positioned splash protectors, screens, flaps, catchpots, drip trays and troughs	The ETP is designed to separate residues, removing the solids from the process as sludge. Within the Dissolved Air Filtration Tank (DAF) most of the solids are removed through a combination of adding PAC, Sulphuric Acid and Polymer in conjunction with the white-water system and paddles to scrape the sludge off. The resultant sludge enters the Screw Press where any residual liquid is removed from the solid. The solid is then sold for use in anaerobic digestion as described in BAT 10a.
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.	There may on occasion be reuse of pasteurised cream; for example, if the incorrect percentage cream was produced it would be mixed with skimmed milk and pasteurised to achieve the correct percentage.
e	Phosphorus recovery as struvite (see BAT 12g)	Not applicable as phosphorus content below 5mg/l/. Only applicable to waste water streams with a high total phosphorus content (e.g. above 50 mg/l) and a significant flow.
f	Use of waste water for land spreading	A third-party contractor collects approximately one load a week of waste water for land spreading for agricultural benefit in accordance with a SR2010No4 mobile plant landspreading permit and associated deployments for agricultural benefit. This material is typically higher strength, high COD effluent, made up of concentrated milk and cream from the initial plant washdown between production runs or less frequently, from spillages within the dairy.

Emissions to Water

BAT 11	In order to prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for waste water.	
	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).	Raw effluent from the Dairy is stored in the concrete ring Balance Tank prior to treatment. Under normal operating conditions the Balance Tank operates a 225m3 working capacity. The maximum capacity of the Balance Tank is 250 m3 and there are an additional 6 No 'Back Tanks', each with a capacity of 60m3. This provides a combined contingency volume of 610m3. Production of raw effluent is in the region of 230m3 per day and therefore the combined contingency storage represents in excess of 2.5 days waste water production. There are also 2 No. additional contingency storage tanks for untreated effluent; Emergency Pit (10m3) and Emergency Silo (40m3). The 6 No. Back Tanks also function as temporary storage of any concentrated spillages within the dairy. An emergency divert switch situated on the outside of the ETP has the capacity to divert spillages from the Dairy directly into the Back Tanks from where the contents can be slowly added to the ETP to reduce the risk of overwhelming the system. Improvements for contingency storage capacity are planned with the proposed addition of further effluent storage which will be constructed to the relevant industry standard. The existing Balance Tank would be repurposed as an Activated Sludge Tank, building further treatment contingency within the ETP system. There is a contingency plan in place which forms part of the EMS, specifically covering the storage and treatment of liquid waste. Any excess high strength effluent beyond which the ETP can treat is collected by an authorised contractor and spread to land in accordance with a SR2010No4 mobile plant landspreading permit. This is typically within the region of 1 load per week.

BAT 12	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	Waste water is collected in the Balance Tank prior to further treatment within the ETP. From here, the liquid is pumped at a controlled rate which allows for a stable hydraulic loading rate into of the ETP.
b	Neutralisation	Within the Balance Tank caustic is added to maintain an acceptable pH for the DAF to operate. Caustic is predominantly required to lower the pH.
c	Physical separate (e.g. screens, sieves, primary settlement tanks etc.)	A strainer in the form of a wash down screen is located in front of DAF tank, allowing for the removal of large physical contaminants such as leaves. There is a monitor (sensor) for high solids which if activated, will divert flow to the Back Tanks. Scrapers on the DAF separate sludge from the effluent. Liquid from the DAF tank enters the Anoxic Tank, overflowing to the Activated Sludge and Aerobic Tank before entering the MBR Tank. Here there are 400 filter screens that allow the flow of liquid across the membranes to filter out all the MLSS and which then allows clean water to be discharged to Ponds. Any liquid not entering he MBR, is instead treated within the BIO DAF which also allows sludge to be removed from the surface with paddles.
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.)	The DAF plant utilise aerobic treatment processes. Anoxic conditions are maintained within the Anoxic Tank which helps to remove Nitrogen from the waste water. Effluent overflows from the Anoxic Tank and into the Activated sludge and Aerobic Tank. This tank is kept to a dissolved oxygen level of 2 and a pH level of 7.9-8.2, providing optimal conditions for the desired microbes. From here effluent either enters the BIO DAF or the MBR, both utilising aerobic treatment processes.
e	Nitrification and/or denitrification	Nitrification of ammonia takes place in the bioreactor and prior to this stage, within the Anoxic Tank.
f	Partial nitration - anaerobic ammonium oxidation	Not applicable
Phosphorus recovery and/or removal		
g	Phosphorus recovery as struvite	Not applicable, relatively low phosphorus.

h	Precipitation	Not applicable
i	Enhanced biological phosphorus removal	Not applicable
Final solids removal		
j	Coagulation and flocculation	This occurs in the DAF Plant through addition of Poly Aluminium Chloride, Sulphuric Acid and a Polymer. Aeration causes flocculation- sludge which is then removed from the surface of the DAF plant by scrappers. The BIO DAF operates in parallel to the MRB, with any residual solids within the effluent entering the BIO DAF removed through the addition of additional Polymer.
k	Sedimentation	Not applicable
l	Filtration (e.g. sand filtration, microfiltration, ultrafiltration)	Not applicable
m	Flotation	Relevant to DAF plant see (j) above

BAT 12	Associated emission levels (BAT-AELs) for direct emissions to a receiving water body		
	Parameter	BAT-AEL (daily average) (mg/l)	Comment
	Chemical oxygen demand[1]	25-100[2]	Can be achieved. The average figure for 2024 to date is 63.87mg/l.
	Total suspended solids	4-50 [3]	The existing discharge consent limit for both emission points to water (W1 and W2) is 40mg/l and this limit is routinely achieved.
	Total nitrogen	2-20 [4 5]	The existing discharge consent imposes a limit for Ammoniacal Nitrogen (as N) rather than Total Nitrogen for emission point W1 (A1 on current discharge consent) only. This limit is routinely met. Total Nitrogen is monitored from the Settlement Pond however as part of ongoing process monitoring. The average figure for the year is 57.26mg/l which is acknowledged as more than the BAT AEL. Pattemore's is committed to reducing Total Nitrogen levels within the ETP discharge and are investigating potential solutions, including the possibility of incorporating an additional dosing station within the process.
	Total phosphorus	0.2-2 [6]	The existing discharge consent limit for Total phosphorus as P is 4mg/l. Pattemore's currently monitor Phosphate levels, with a value of under 1mg/l being routinely achieved. The average figure for the year 2024 to date is 0.744mg/l of Phosphate.
(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

BAT 13	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 substantiated except for one isolated incident unrelated to normal daily operations which was fully resolved at the time. No further noise complaints have been received. Noise levels continue to be monitored monthly and recorded on the Noise Test Assessment Form (**PAT-FT-05**).
	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.

BAT 14	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.	The Cooling Tower is located to the south of the site with fans projected away from sensitive receptors (which lie to the north and west). The Boilers and the Standby Generator are situated within buildings or containers.
b	Operational measures. This includes techniques such as: • improved inspection and maintenance of equipment; • closing of doors and windows of enclosed areas, if possible; • equipment operation by experienced staff; • avoidance of noisy activities at night, if possible; • provisions for noise control during maintenance, traffic, handling and treatment activities.	Operational measures to reduce noise emissions include: • Planned preventative maintenance of plant and equipment. • Only trained staff permitted to operate equipment. • There is a 5mph speed limit on site. • Doors are kept closed on rooms with higher noise levels during normal operations to reduce external noise emissions.
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: • noise reducers; • acoustic and vibrational insulation of equipment; • enclosure of noisy equipment; • soundproofing of buildings.	The main production processes are entirely within buildings. Noisy equipment such as vacuum pumps and evaporating plant are located inside the Dairy Building.
e	Noise abatement. Inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).	This technique is not currently employed.

Odour

BAT 15	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) **(PAT-OD-03)** 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 **(PAT-SOP-09)** as part of daily checks and recorded within the Daily Checks **(PAT-MP-04).** 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

BAT 21	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	The working pressure of the Homogeniser is approximately 156 bar which does not qualify as an energy-efficient homogeniser. At such time that the existing homogeniser comes to the end of its design life, it will be replaced with an energy-efficient version.
c	Use of continuous pasteurisers	All pasteurisers are continuous.
d	Regenerative heat exchange in pasteurisation	All Pasteurisers use regenerative heat when heating and cooling product.
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.

Table 8

Indicative environmental performance levels for specific energy consumption

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 ([1])
Powder		0,2-0,5
Fermented milk		0,2-1,6

([1]) The specific energy consumption level may not apply when raw materials other than milk are used.

It is understood that under any issued environmental permit Pattemore's will be required to report annually the energy consumption per tonne of total product expressed as MWh energy / tonne product.

The main products include cream, various milks and milk concentrates, with a total combined annual production capacity of 425,473 tonnes.

Waste

BAT 22	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	There are currently 3 No. Centrifuges (termed Separators) with an additional one to be added within the next 6 months specifically for the goat's milk processing. Techniques utilised to ensure optimal operation of the Separators include: • Maintaining optimal speed of each Separator for each production line. Speed is maintained automatically for each production line and is dependent on the percentage of cream being produced; 20, 30 or 40% cream. • The Separators are maintained as per manufacturers recommendations and form part of a cleaning regime. Service is undertaken at predetermined intervals in line with operational hours. • Validation checks are undertaken including pH value and percentage cream to ensure they are within the optimal operating range for each product line.
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)	Not applicable – no cheese production.
e	Recovery and use of whey (Techniques related to cheese production)	Not applicable – no cheese production

Emissions to air

BAT 23	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

Table 10

BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from drying

Parameter	Unit	BAT-AEL (average over the sampling period)
Dust	mg/Nm^3	< 2-10 ([1])

([1]) The upper end of the range is 20 mg/Nm^3 for drying of demineralised whey powder, casein and lactose.

3 Conclusions and recommendations

The Best Available Techniques (BAT) review has highlighted that the current and proposed operation at Pattemore's Dairy is generally compliant with indicative BAT as stated BAT Reference Document for the Food, Drink and Milk Industries[2]. However, there are deviations from BAT related to BAT 1 Environmental Management Systems, BAT 4 Monitoring of emissions to water (and Associated emission levels (BAT-AELs) for direct emissions to a receiving water body), BAT 6 and BAT 21 Energy efficiency.

BAT 1 requires that the EMS incorporates *'establishing objectives and performance indicators in relation to significant environmental aspects, including safeguarding compliance with applicable legal requirements'*. These objectives and performance indicators are not currently integrated into the EMS. Senior management however are committed to the continual betterment of the EMS and these requirements will be incorporated. In addition, to meet the requirements of BAT 1 xvii, Pattemores' is looking to incorporate further auditing relating to environmental performance and EMS conformance in time.

BAT 4 requires monthly Chloride and BOD monitoring and daily monitoring of chemical oxygen demand (COD), Suspended Solids, Total Nitrogen and Total Phosphorous. Monthly monitoring of both BOD and Chloride will be undertaken at a UKAS accredited laboratory and as such meets the requirements of BAT 4. The daily monitoring of chemical oxygen demand (COD), Suspended Solids, Total Nitrogen and Total Phosphate, however, is not accredited with all daily monitoring undertaken internally at the on-site laboratory. There is already a rigorous monitoring schedule in place with process monitoring of the ETP undertaken at various intervals as well as from the V-Notch that serves the ETP (emission point W1 (A1 on existing discharge consent)).

Currently the Suspended Solids, Total Nitrogen and Phosphate analyses are undertaken using Hach cuvette testing. COD analysis is undertaken using Hach cuvettes in combination with the HT200S High temperature thermostat which expedites the analysis. There are written procedures for the existing sampling and analysis, which includes the training required for any new employees before being deemed competent to undertake each test. Training undertaken by each employee is documented and details their current level of competency. Monthly validation monitoring of pH, Total Suspended Solids, Ammonium an N, Ammonium as NH_4 and Phosphorous is undertaken a UKAS accredited laboratory.

To date, the discharge into the River Parrett from the ETP has been regulated under an existing environmental permit (Ref; EPR/ZB3799NK). Condition 3.3.3 of the permit states the following:

'Monitoring equipment, techniques, personnel and organisations employed for the emissions monitoring programme and the environmental or other monitoring specified in condition 3.3.1 shall have either MCERTS certification or MCERTS accreditation (as appropriate), where available, unless otherwise agreed in writing by the Environment Agency.'

The current testing regime has been deemed acceptable by the Environment Agency to date and as such Pattemore's would like to continue the current sampling regime which is well understood by all employees.

With regard to the Associated emission levels (BAT-AELs) for direct emissions to a receiving water body detailed within BAT 12; the limits for both COD and total suspended solids can be met. The average COD for the year to date being 63.7mg/l. The existing discharge permit limit contains a suspended solids limit for both the ETP emission and the surface water emission points (W1 and W2 respectively) which is 40mg/l and is routinely achieved.

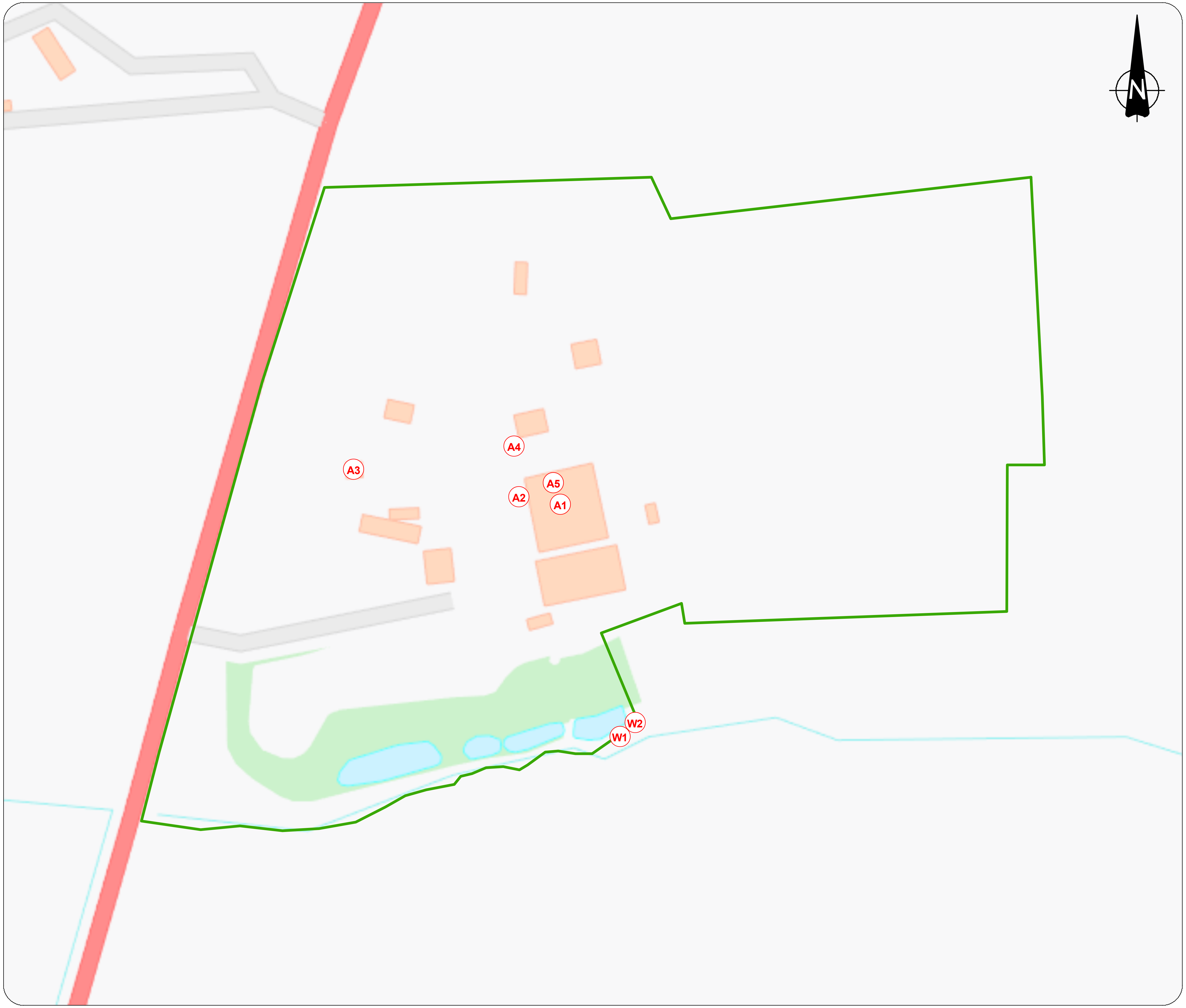
The existing permitted limit for Total phosphorus as P is 4mg/l. Pattemore's currently monitor Phosphate levels rather then Phosphorous with a value of under 1mg/l being routinely achieved. Phosphorous will continue to be monitored monthly at an external laboratory.

The existing discharge permit imposes a limit for Ammoniacal nitrogen (as N) rather than Total nitrogen (TN) for emission point W1 (A1 in current permit) only and this limit is routinely met. The BAT-AEL for TN is 20mg/l with a possibility of an upper end limit of 30mg/l if abatement is in place and is greater than 80% efficient as a yearly average or over a production period. Total Nitrogen is monitored from the settlement pond as part of ongoing process monitoring. The average figure for the year is 57.26mg/l which is acknowledged as more than the BAT AEL. Pattemore's is committed to reducing total nitrogen levels within the ETP discharge and are investigating potential solutions, including the possibility of incorporating an additional dosing station within the process.

With regard to energy efficiency, BAT 6 requires setting key performance indicators on an annual basis (for example for the specific energy consumption) and planning periodic improvement targets and related actions. Whilst this is not currently undertaken, Pattemore's is committed to introducing energy KPIs which would be reviewed at quarterly management review meetings and which would help drive energy efficiencies.

BAT 22 requires the use of an energy-efficient homogeniser. The working pressure of the existing homogeniser is approximately 156 bar which does not qualify as an energy efficient. At such time that the existing homogeniser comes to the end of its design life, it will be replaced with an energy-efficient version.

Appendix A – Permit Boundary and Emission Point Plan



REVISIONS

REV	DATE	DESCRIPTION	DWN	CHK	APP
-	15/11 2024	First Issue	JJ	MF	MF

LEGEND

Permit boundary

Ⓡ Emission point

0 10 20 30 40 50 60 70 80 90 m

Scale at A3: 1:1,500

Client
Pattemore's Transport (Crewkerne) Ltd

Project
Environmental Permit Application

Title
Emission Point Plan

Earthcare TECHNICAL

Manor Farm
Chalton
Waterlooville
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Drawn	Checked	Approved	Revision
JJ	MF	MF	

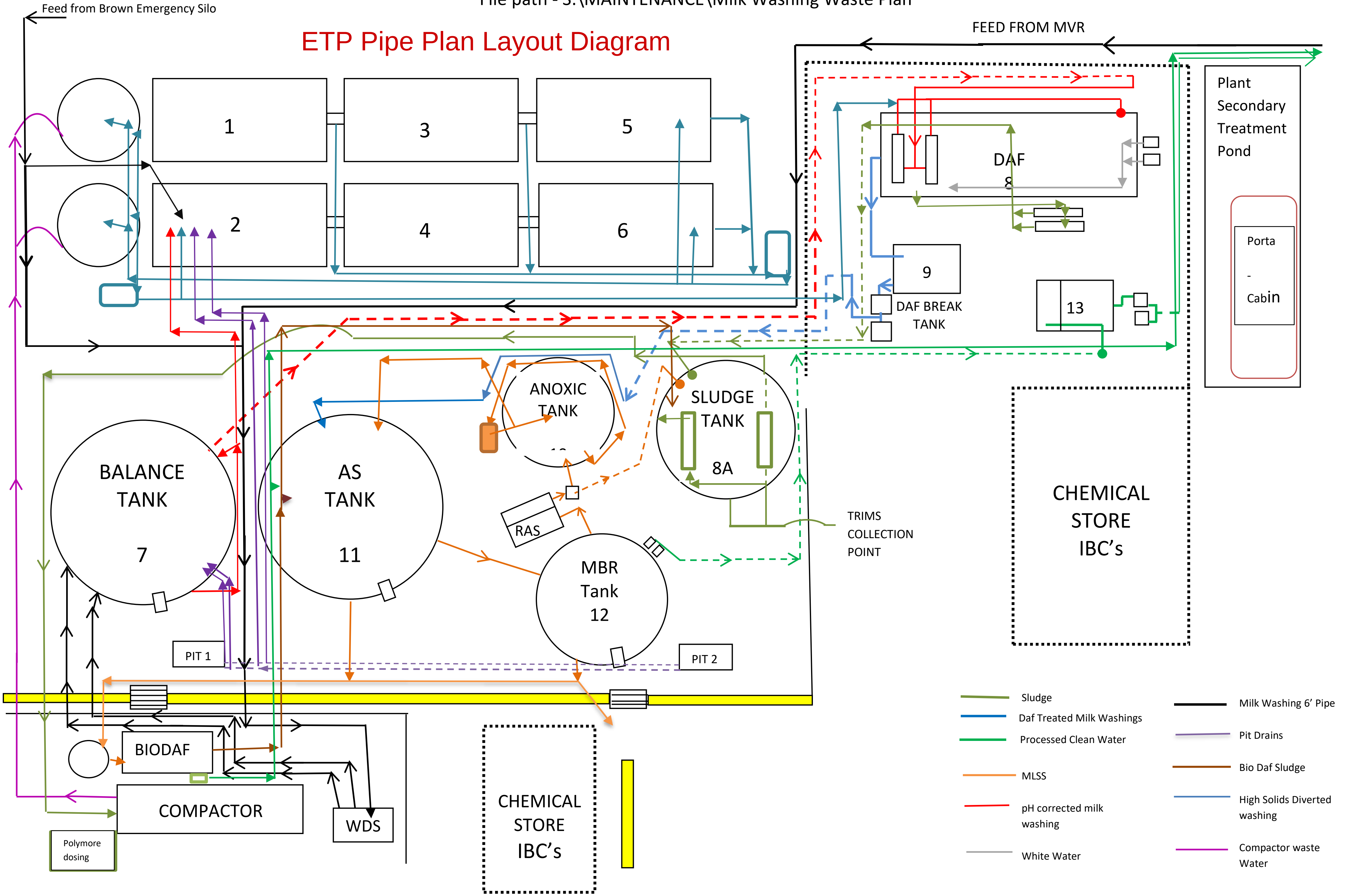
Date	Scale	Sheet Size
November 2024	1:1,500	A3

Drawing Number	File Reference
ETL886/2024/EPR02	ETL886/2024.mxd

Appendix B – Effluent Treatment Process Flow Diagram – 'ETP Pipe Plan Layout Diagram'

File path - S:\MAINTENANCE\Milk Washing Waste Plan

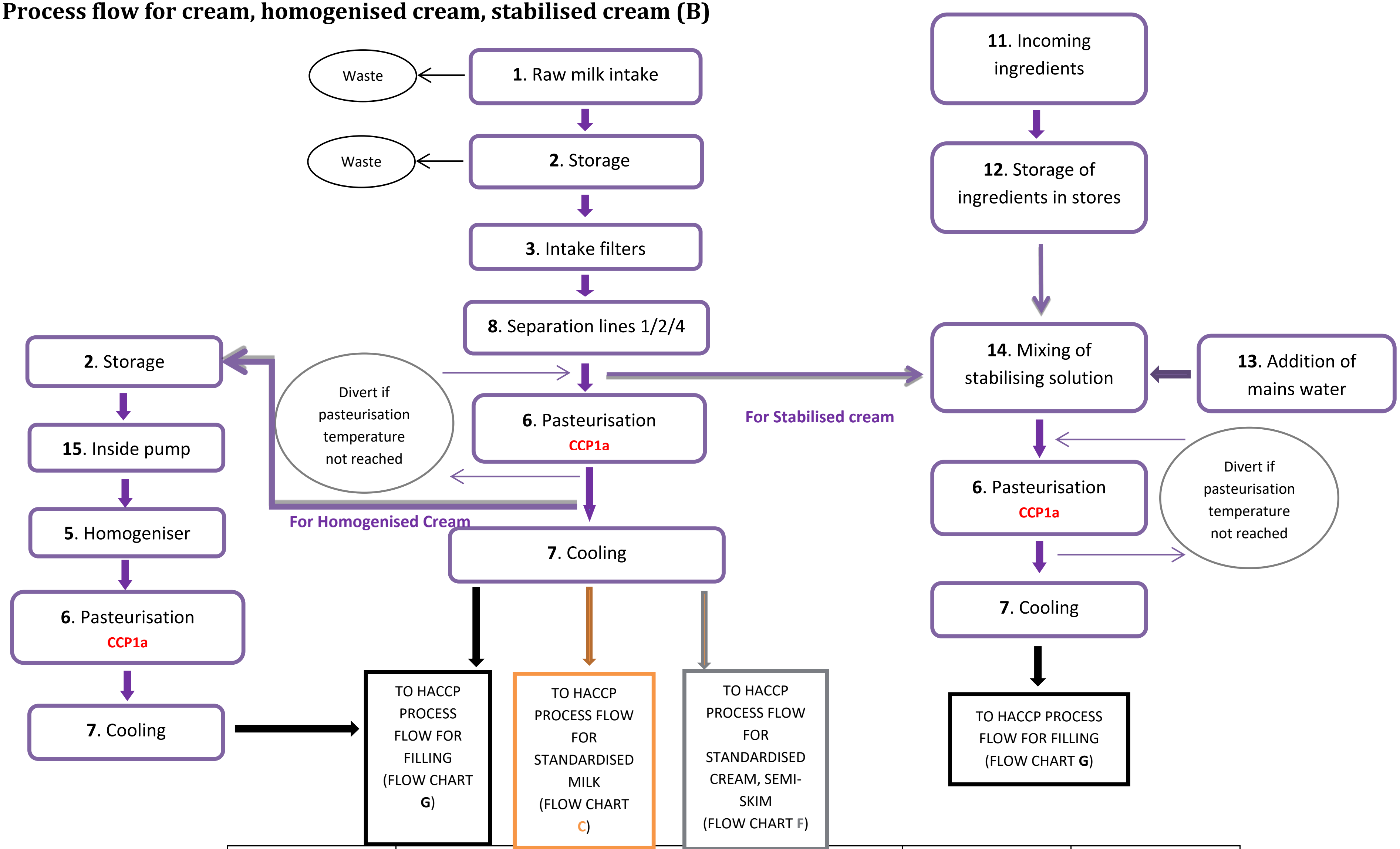
ETP Pipe Plan Layout Diagram



Appendix C Process flow for cream, homogenised cream, stabilised cream

Hazard Analysis Critical Control Points

Process flow for cream, homogenised cream, stabilised cream (B)



Document Number	Issue number	Issue date	Issued by	Authorised by	Page
QMP09 HACCP	20	15.01.2024	A. Jelonek	P. Williams	1 of 1

Appendix D – A Brief Overview of the Effluent Treatment Plant

A Brief Overview of the Effluent Treatment Plant

The main inputs to the ETP are from CIP (Clean in Progress) which comes from Tanker wash bays, Lorries, All the Dairy lines, Silo cleaning and associated pipework. We also get water from the Evaporation process but only the first stage and also the yard run off water.

Divert Valves and Washdown Screen

The washdown screen removes large solids like gloves, cable ties leaves etc and monitors for high solids and will divert to the back tank if solids levels become unacceptable i.e. cream and milk. Acceptable levels are pumped into the Balance tank.

Balance Tank

Takes all CIP washings and some rainwater and balances out spikes in pH and Solids. Where caustic is added to maintain an acceptable pH for the DAF to operate

D.A.F Tank (Dissolved Air Filtration)

Removes the majority of the solids through a combination of adding PAC, Sulphuric Acid and Polymer in conjunction with the white-water system and paddles to scrape the sludge off. The sludge then gets pumped to the sludge tank leaving the cleaner liquid to be fed into the Anoxic Tank.

Anoxic Tank

Takes inlet flow from the DAF and also receives the flow of MLSS from the MBR Tank allowing the 2 to mix and then overflow to the AS Tank. This also helps to remove the nitrogen from the system

AS Tank (Activated Sludge and aerobic Tank)

This tank is kept to a DO level of 2, a pH level of 7.9-8.2 where the bugs eat and thrive.

MBR Tank (Membrane Bio Reactor)

Is where there are 400 filter screens that allow the flow of liquid across the membranes to filter out all the MLSS and which then allows clean water to be discharged to ponds.

RAS (Recirculation Active Sludge) Pumps

These pump the MBR MLSS back to the anoxic tank where the bugs process restarts. These also control the amount of MLSS concentration to keep the MBR Tank approx. 33% thicker than the AS tank.

Sludge Tank

This tank receives the scraped off sludge from the Main DAF but also a % of the Bio DAF scrapings

Screw Press

This takes its feed from the Sludge Tank and by adding Polymer and then forcing it through a helicoid rotating screw and pressing it against the filter plates, removes the liquid form the solid. The solid is the sold for AD food and the liquid goes back into the SS round tanks. This in turn is the fed into the Main DAF under controlled conditions (as slowly as possible)

Bio DAF

Similar to the Main DAF, it is a secondary system to the MBR tank to allow more discharge to the river. It takes liquid MLSS from the AS tank, by adding Polymer and white water here you can separate the MLSS from the liquid, the clean liquid can then be discharged to the ponds and the majority of the MLSS sent back to the AS tank, with a % sent back to the Sludge Tank, to maintain the MLSS level in the AS tank

The Ponds

The ponds act as a secondary catchment to prevent accidental contamination to the waterways. The Reed bed is also a natural filtration process.

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