Dairy Partners (Cymru Wales) Ltd, Newcastle Emlyn

Odour Management Plan

Review Issue	Issue Date	Description	Authorised By
1.0	12 July 2022	Original Document Issue	HSE Lead
2.0	25 May 2023	Complete review, as per Improvement Condition IC20 of Environmental Permit EPR/WP3231NB V005	HSE Lead – John Potter
3.0	12 September 2023	Amendments made	HSE Lead – John Potter
4.0	15 December 2023	Revisions made in response to IC20 review by NRW received 17 November 2023	HSE Lead – John Potter
5.0	July 2024	Amendments made	Ashton Daniels
6.0	September 2024	Amendments made	Ashton Daniels

Contents

1.0 Introduction

This Odour Management Plan (OMP) outlines the methods by which Dairy Partners (Cymru Wales) Ltd will systematically assess, manage, reduce, and prevent potentially odorous emissions from the Wastewater Treatment Plant (WWTP) and the site's other activities. The OMP is a working document, with the specific aim of ensuring that:

- Odour impact is considered as part of routine inspections;
- Odour is primarily controlled at source by good operational practices, including physical and management control measures, which are compliant with BAT 15 of Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries: Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control);
- All appropriate measures are taken to prevent or, where that is not reasonably practicable, to reduce odorous emissions to air from the WWTP and resultant odour impacts at nearby receptors.

This OMP addresses the main sources of potential odour release and the control measures employed to mitigate the risk of odour nuisance at offsite sensitive receptors. These are supported through monitoring procedures to identify elevated levels of odour and to review complaints should they arise. The complaints management procedure, including the management responsibilities, is also addressed.

The methodologies presented in this OMP take full account of Environment Agency (EA), Natural Resources Wales (NRW) and European Commission guidance documentation, as detailed below:

- H4 Odour Management: How to comply with your environmental permit;
- Best available techniques (BAT) reference document for waste treatment: Industrial Emissions Directive 2010/75/EU (integrated pollution prevention and control);
- Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries: Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control);
- How to comply with your environmental permit (Natural Resources Wales).

1.1 Plant Operation

Site Setting

The site is in Aberarad, Newcastle Emlyn, at grid reference SN 31672 40106 (SN316401), with the closest residential receptors located within 20 meters of the site boundary. At its closest point, the WWTP is situated at 40m from the nearest residential receptor.

Description of Site Operations

The process is a 24/7 manufacturing process and the business remains open all year round.

The WWTP operates in line with the manufacturing process; sludge tankers collect sludge waste approximately three times per week between 08:00-16:00, under supervision and in accordance with the sludge transfer SOP-065.

'Normal working hours' is referenced in this document. These are:

- WWTP Operator: Every day, 06:00-16:00
- Management: Monday to Friday, 08:30-17:00

Products

The principal product from the installation is manufactured mozzarella in bulk blocks. However, the installation also produces saleable by-products in the form of sweet cream and whey concentrate.

1.2 Main Operations

Milk Intake

Milk is delivered to site by road tanker; milk deliveries are delivered into the main milk intake bay where the product is transferred from the road tanker to the silo storage.

Boilers and Fuel Supply

There are two boilers located on site, operating dual fuel burners with the primary fuel choice being liquified natural gas (LNG), and light fuel oil (LFO) the secondary option.

Cheese Manufacturing Process (basic description)

Milk is taken from the milk silos and transferred into the cheese making process. Curds and whey are split within the vats before being turned into block and transferred through the water baths in order to achieve the correct volume of salt required. Blocks are produced, packaged and sent to refrigeration until collection.

Refrigeration

The product is placed into refrigeration with the temperature controlled by a mixture of fans, a system control provided by the glycol chiller unit and two cooling towers.

1.3 Wastewater Treatment Plant

The WWTP has been designed to treat and discharge up to a Permit limit of 900m^3 of wastewater per day to a discharge point located approximately 1km north-west of the site into the River Teifi (through the W1 emission point). Operation of the WWTP is overseen by a dedicated WWTP Operator during normal working hours of 06:00-16:00 every day. Outside of normal working hours, the engineering department is responsible for monitoring correct operation and reacting to any emergent issues that could affect wastewater treatment or serviceability.

The sequence of operation at the WWTP is as follows:

Physical / Chemical Pre-treatment

The wastewater from the factory will be screened by a mesh filter and collected in the Crude Pit. From the Crude Pit it will be pumped to the Balance Tank in enclosed pipework, where two-way pH correction is carried out. Dairy waste from concentrate (raw milk and raw whey sludge) from the separators and clarifier is sent to the Sludge Pit. The Sludge Pit contents can be routed to either the Crude Pit or directly to the Sludge Tanks to be tankered away.

From the Balance Tank, the water will be pumped to the Serpentine (coagulation/flocculation/flotation) system. In the Serpentine, a coagulant, a neutraliser and a flocculant will be dosed for coagulation and flocculation of the suspended and emulsified wastewater.

The flocks are separated by a Dissolved Air Floatation (DAF) unit. The sludge which is generated by the DAF unit will be pumped into the Sludge Tanks, awaiting collection via road tanker. The DAF unit is equipped with a forced air system to inject air into the DAF, allowing sludge waste to rise to the surface and be 'scraped'.

Each DAF unit is equipped with multiple access lids, each manually operated and retarded by gas springs.

The treated water after the DAF 1 system will be pumped into the Aeration Tank for biological treatment.

FBR (Flotation Bio Reactor) Biological Treatment

In the biological treatment system, the wastewater is decomposed by aerobic biological bacteria that live in flock-like colonies, called activated sludge.

The wastewater from the DAF is fed into a selector, built inside the Aeration Tank. In the selector, the water is mixed with a set amount of activated sludge (from DAFs 1 and 2). In the selector tank, optimal conditions exist for the activated sludge to absorb most of the dissolved pollution, which prevents excessive concentrations of filamentous bacteria to be formed. Phosphoric acid and urea will be dosed into the selector to obtain correct nutrient balance.

From the selector tank, the water flows into the Aeration Tank. Here, the activated sludge bacteria utilises oxygen to decompose pollution into mainly carbon dioxide and water. The required oxygen is supplied by a bottom aeration system, fed by blowers. The aeration grids can be lifted out for maintenance purposes.

The separation of treated water and biomass is achieved by a second DAF unit (DAF 2). In the feed line to this DAF unit, polymer will be dosed to enhance the separation of the activated sludge. Most of the activated sludge will be returned to the selector tank and aeration tank. A proportion of the sludge will be directed to the Sludge Tank as waste activated sludge.

The effluent quality of the DAF will be monitored continuously.

Cleaning Process

The cleaning process takes place after the manufacturing period with a production run lasting 23 hours and a clean cycle running for approximately 6 hours (dependent on milk quantity in storage).

Cleaning is in line with requirements for food manufacturing and washes are completed using caustic-

based and acidic cleaning chemicals.

All plant washing is automated using cleaning in place (CIP) systems, with floors and walls washed down manually with a mixture of foam product and water.

1.4 WWTP Training

Following installation of the WWTP in 2020, the two WWTP Operators undertook formal vendor training to familiairise them with the safe operation of the plant.

The engineering department, responsible for monitoring the operation of the WWTP outside of normal working hours (06:00-16:00 for WWTP Operators) receive on-the-job training and mentoring from a senior engineer familiar with the plant's operation.

All operators are familiar with the potential odour sources at the WWTP. The potential odour sources can be controlled during normal working hours and are unlikely to present a significant issue outside of these times providing the WWTP Operations and Housekeeping procedure is followed when the WWTP Operator is present.

2.0 Sources, Releases and Impacts

Since July 2021, Dairy Partners (Cymru Wales) Ltd has commissioned experienced odour specialists Air Quality Consultants Ltd (AQC) to carry odour testing on-site on multiple occasions. Odour field surveys are carried out in accordance with the horizontal guidance note (H4) on odour assessment and management, and the Institute of Air Quality Management's (IAQM) odour guidance.

In the AQC report titled 'Technical Note: Dairy Partners (Cymru Wales Ltd) Odour Review, ref. no. J10/12625A/10A/1/F6', dated 17 February 2022, it was identified that some areas were not compliant with BAT for the control and minimisation of odours:

- Dissolved Air Floatation (DAF) tanks 1 and 2
- Sludge tanker exports
- Decommissioned DAF tank
- Open crude and sludge pits
- Spillages associated with sludge tanker filling
- Drop heights of liquid discharge pipes

The report also referenced the uncovered Aeration Tank as not being identified as a significant source of odours at the WWTP.

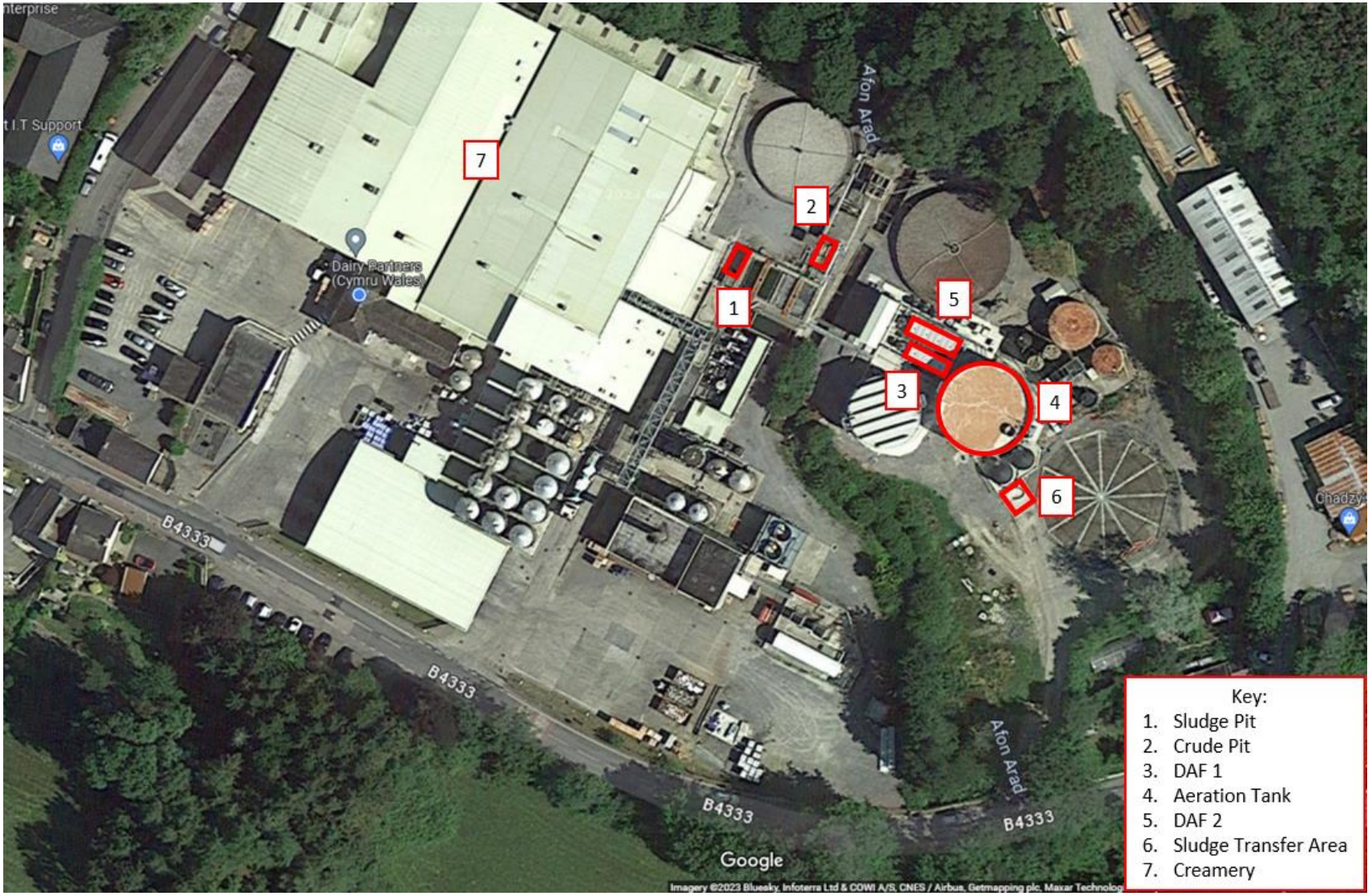
The report included suggested improvements to achieve BAT, some of which have been implemented:

Improvement Area	Improvements Made
DAFs 1 and 2	Passive carbon filter units installed on DAFs to remove odour from displaced air from the headspace
Sludge tanker exports	A passive carbon filter unit is used to treat odorous displaced air from the tanker
Decommissioned DAF tank	Emptied, clean and decommissioned
Open crude and sludge pits	Pit levels are continually monitored, including high level sensors Both pits are inspected daily Both pits are cleaned daily to remove potentially odorous sludge build-up from the pit walls Direct tankering is available, if required Covered pits were trialled, however, this led to a concentration of odour which was released during inspection and cleaning
Spillages from tanker filling	Sludge transfer SOP used to control tankering operation Tankers are in close proximity to the concrete slab, allowing any spillages to be contained on impermeable ground and safely washed into the sump (which is re-directed back into the WWTP)
Drop heights of liquid discharge pipes	See open crude and sludge pits for monitoring, inspection and cleaning regime Using discharge pipework with longer vertical sections increased the likelihood of blockages as the effluent levels rise. This was identified in AQC Technical Note: Dairy Partners (Cymru Wales Ltd) Odour Review, Report no. J10/12625A/10A/1/F6, dated 17 February 2022. The pipes were reverted back to short lengths only.

The latest specialist report from AQC, in their report titled Odour Technical Note: Dairy Partners (Cymru Wales Ltd), ref. no. J10/12625F/10/1/F2, dated 21 June 2024, focused on the entire site, including the abatement systems used to control odour emissions. The report concluded that, *"This risk assessment was based on the H4 guidance 'FIDOR' factors and concluded a low risk of odour, provided risk management measures listed in the risk assessment, and included within the site's odour management plan, are adhered to".*

**FIDOR – Frequency, Intensity, Duration, Offensiveness, Receptor sensitivity.*

2.1 Potential Odour Source Locations



Document No	Issue Date	Issue By	Authorised By	Issue Number	Page Number
EHS-MISC-001	19-09-2024	AD	AD	6	9

1. Sludge Pit

2. Crude Pit

3. DAF 1

4. Aeration Tank

5. DAF 2

6. Sludge Transfer Area

7. Creamery.

Odour Description from the Creamery.

The creamery operates without any significantly odorous processes. Milk is delivered in tankers and transferred via an automated closed pipe system, all milk is chilled, ensuring no odor is produced. Any minor spillages in milk intake are promptly cleaned by the operator, with any liquid directed to local effluent drains.

The milk is then pasteurised with a plate heat exchanger inside the building, the milk is then sent up to the vats via seal pipework. The vat process itself is not an odorous one as the vats are enclosed, starter culture and citric acid are added to start the recipe process.

A rotating drum is then used to separate the curds from the whey. The whey is then sent to a clarifier where the cheese fines are removed and then pasteurised and undergoes reverse osmosis to remove excess water.

The curds are then steam cooked and stretched in counter-rotating and independent augers. The curds (now mozzarella) are then cooled and formed into blocks before being soaked in brine for up to 8 hours. The mozzarella blocks are then vacuum-packed and sent offsite. All the above process is done within the main building resulting in no external odour.

Odour Description from Each WWTP Source

The odour characteristics from each source has been assessed, below. It should be noted that odour is a subjective assessment and factors such as intensity and hedonic score may differ between different assessors. Additional factors such as cleaning and chemical use will influence the results and provide slightly different outcomes at different times.

The intensity of the odour has been assessed using FIDOR guidance:

Intensity

0 No odour /not perceptible - No odour when compared to clean air.
1 Slight/very weak odour - There is probably some doubt as to whether the odour is actually present.
2 Slight/weak odour - The odour is present but cannot be described using precise words or terms.
3 Distinct odour - The odour character is barely recognisable.
4 Strong odour - The odour character is easily recognisable.
5 Very strong odour - The odour is offensive. Exposure to this level would be considered undesirable.
6 Extremely strong odour - The odour is offensive. An instinctive reaction would be to mitigate against further exposure.

The hedonic score refers to the level of 'pleasantness' or 'unpleasantness' of an odour, in relation to its hedonic tone. The scoring scale is based on an extract from the odour specialist's reports:

Tone is scored on a scale of +4 to -4 where: +4 = Pleasant odours, 0 = Neutral odours, and -4 = Foul odours.

The characteristics of each odour, i.e.: the description, is derived from the Scottish Environmental Protection Agency's (2010) list of List of Common Descriptions in Appendix 6. Characterising odour is

subjective by nature and the experience can differ between individuals. Although characteristics have been defined in the table below, these are not steadfast and only represent the opinion of the author of this OMP.

Odour Source	Intensity Score	Hedonic Score	Characteristics
Sludge Pit	1	-1	Rancid
Crude Pit	0	0	Nil
DAF 1 (open)	4	-3	Rancid, sour
DAF 1 (closed)	0	0	Nil
Aeration Tank	0	0	Nil
DAF 2 (open)	0	0	Nil
DAF 2 (closed)	0	0	Nil
Sludge Transfer Area*	0	0	Nill
Creamery	0	0	Nill

**can occasionally be detected during sludge transfer operation.*

2.2 Odour Source Vessel Specifications

Name	Maximum Capacity	Odour Controls
Sludge pit	32,000L	Regular inspection, emptying and cleaning
Crude pit	42,000L	Regular inspection, emptying and cleaning
DAF 1	30,000L	Passive carbon filtration units
Aeration tank	1,599,000L	Nil – assessed as low risk by specialist consultant
DAF 2	50,000L	Passive carbon filtration units
Sludge tank (x2)	30,000L each	Passive carbon filters on tanks and a passive carbon filter unit are used to treat odorous displaced air from the tanker

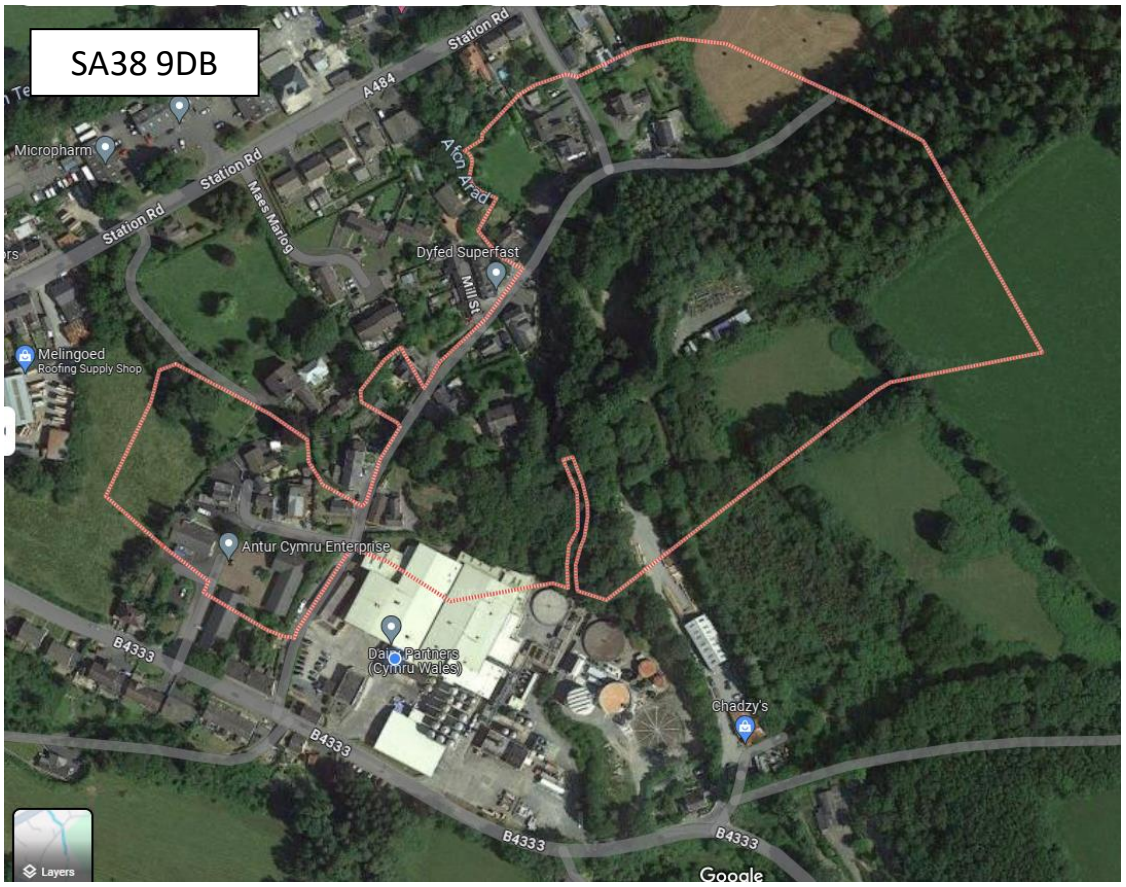
2.3 Nearby Receptors

In recent years, the site has received a large number of complaints relating to odour from the WWTP and the site. Typical descriptions of odours include:

- “Foul stench”
- “Sewage”
- “Putrid”
- “Acrid smell/odour”
- “Excessive odour”
- “Dead vermin”
- “Rotten cheese”
- “Smells of faeces”

Once released into the atmosphere, the pathway for odour will be through the air. Sensitive receptors include the site’s neighbours, particularly the residential properties closest to the boundary fence line of the site. Historically, odour complaints have originated from post codes SA38 9DB and SA38 9DQ:

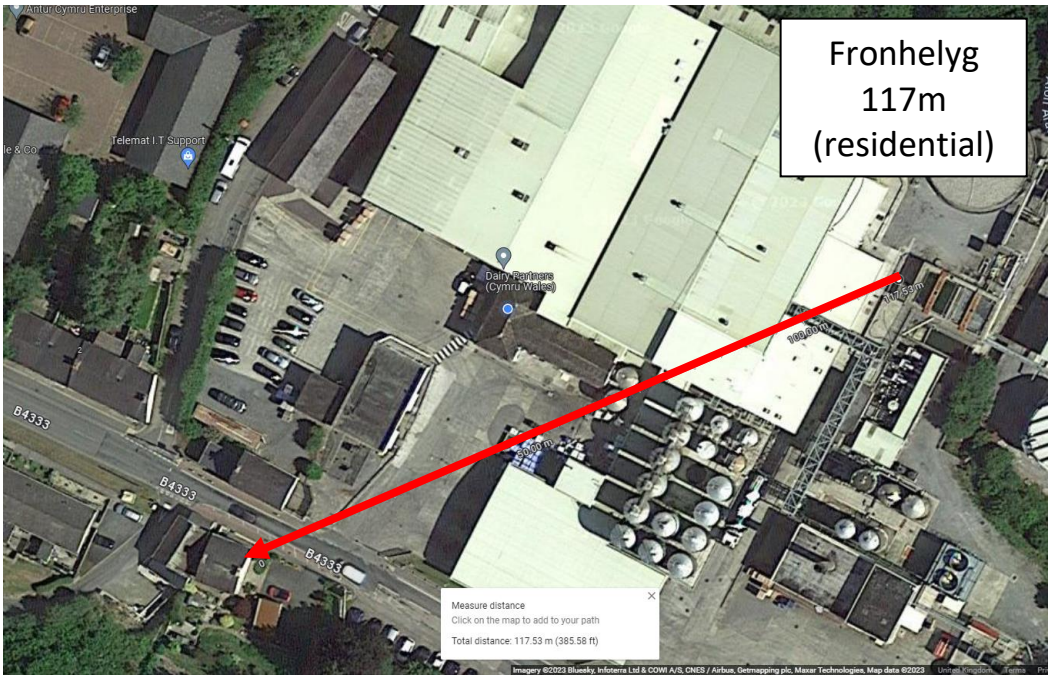
SA38 9DB



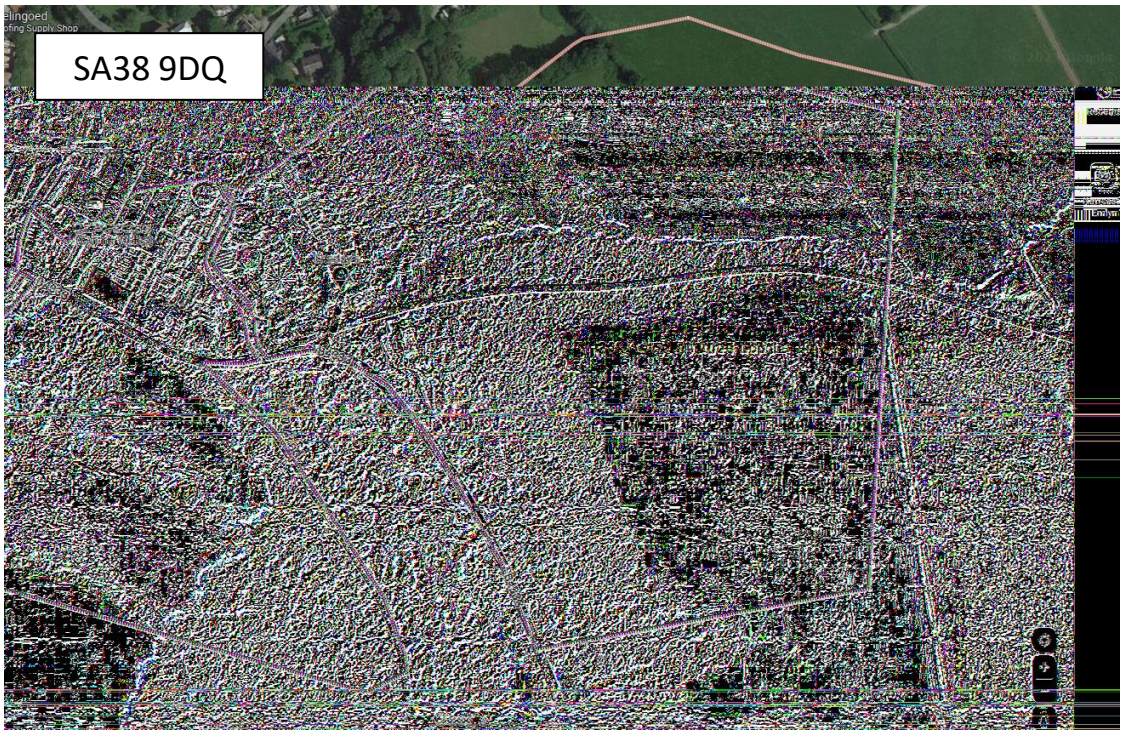
SA38 9DB lies to the north and west of the Dairy Partners site, and comprises mostly residential homes, a wooded area and a small business park.

Distances to nearby receptors at SA38 9DB are taken from the sludge pit (as the closest possible source of odour to the perimeter) to the nearest property in the post code:


Tan y Banc
91m
(residential)
Antur Cymru Enterprise
Ashmole & Co
Telemat I.T Support
Dairy Partners
(Cymru Wales)
B4333
B4333
50.00 m
Measure distance
Click on the map to add to your path
Total distance: 91.34 m (299.67 ft)

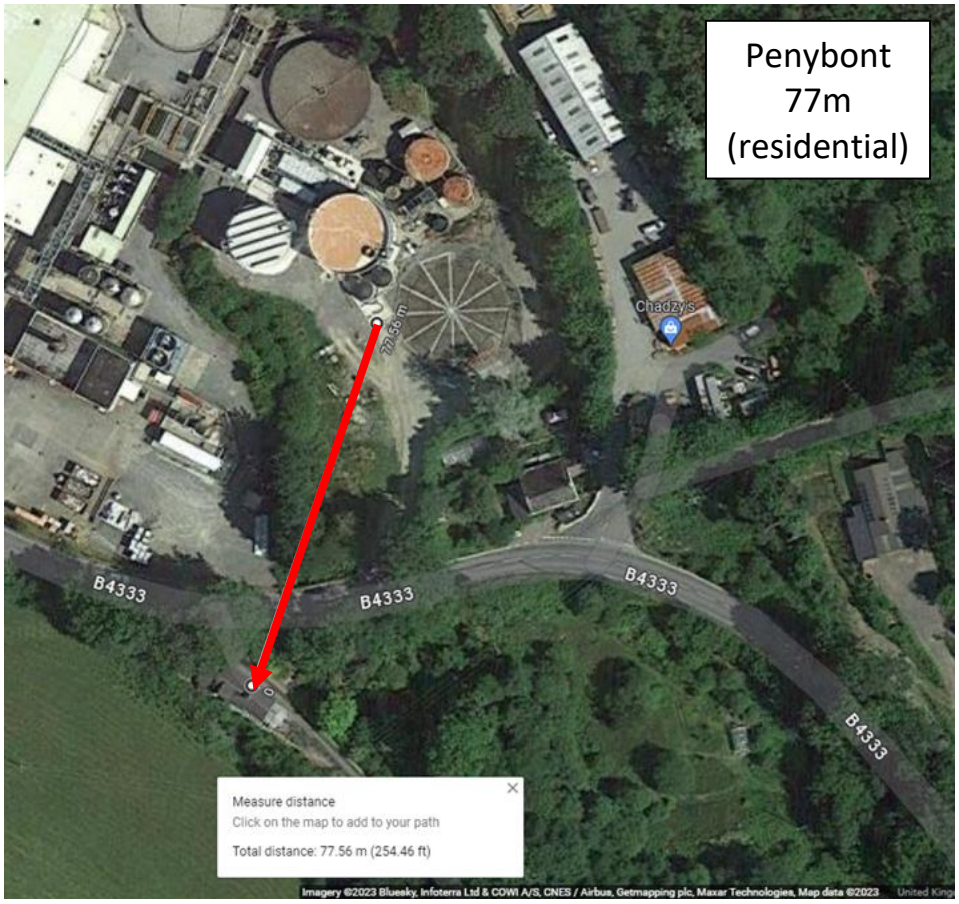

Fronhelyg
117m
(residential)
Telemat I.T Support
Dairy Partners
(Cymru Wales)
B4333
B4333
B4333
Measure distance
Click on the map to add to your path
Total distance: 117.53 m (385.58 ft)

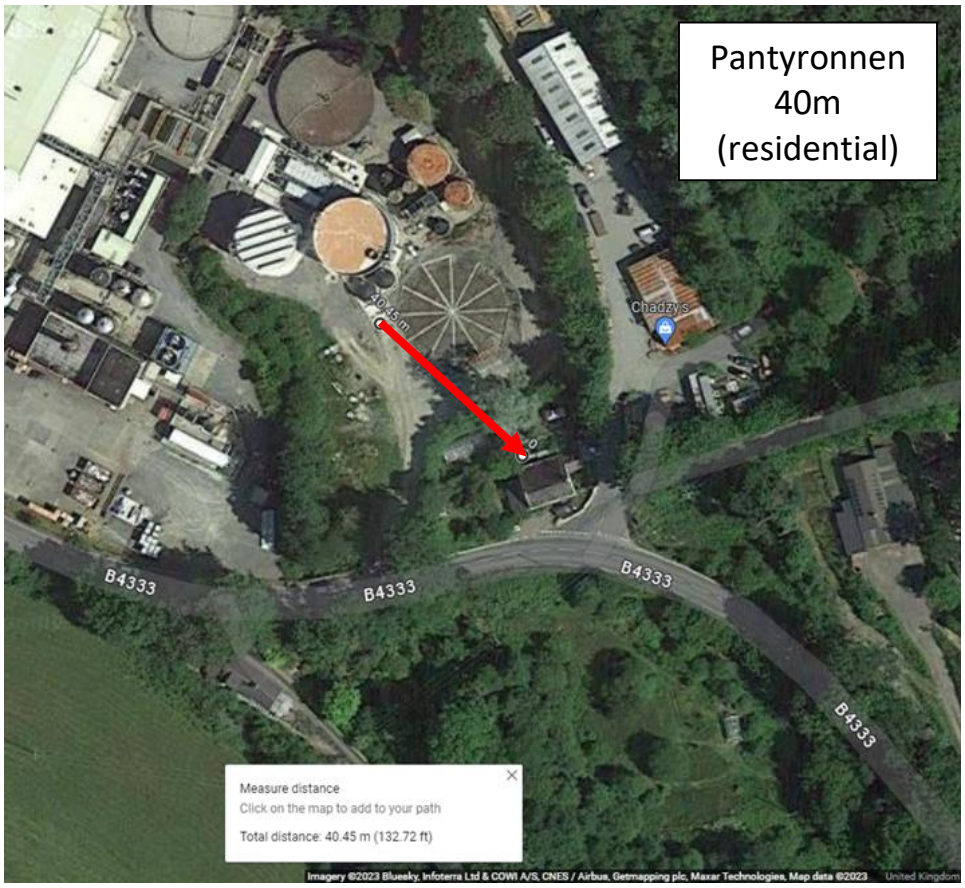
SA38 9DQ



SA38 9DQ lies to the south and east of the Dairy Partners site, and largely encompasses agricultural land with three residential houses and a commercial timber yard. One house lies directly east of the perimeter fence and one house is situated opposite the perimeter south of the just, just across the B4333.

Distances to nearby receptors at SA38 9DQ are taken from the sludge transfer area (as the closest possible source of odour to the perimeter):


Penybont
77m
(residential)
77.56 m
Chadzy's
B4333
B4333
B4333
B4333
Measure distance
Click on the map to add to your path
Total distance: 77.56 m (254.46 ft)
Imagery ©2023 Bluesky, Infoterra Ltd & COWI A/S, CNES / Airbus, Getmapping plc, Maxar Technologies, Map data ©2023


Pantyronnen
40m
(residential)
40.45 m
Chadzy's
B4333
B4333
B4333
B4333
Measure distance
Click on the map to add to your path
Total distance: 40.45 m (132.72 ft)
Imagery ©2023 Bluesky, Infoterra Ltd & COWI A/S, CNES / Airbus, Getmapping plc, Maxar Technologies, Map data ©2023

Post Code	Property Name	Use	Direction from Site	Distance from WWTP	Sensitivity
SA38 9DB	Tan y Banc	Residential	NW	91m	High
SA38 9DB	Fronhelyg	Residential	SW	117m	High
SA38 9DQ	Penybont	Residential	S	77m	High
SA38 9DQ	Pantyronnen	Residential	SE	40m	High
SA38 9DQ	Chadzy's	Commercial	E	50m	Medium

Sensitivity assessed using the descriptors listed in Guidance on the Assessment of Odour for Planning (Institute of Air Quality Management, 2018) – see Appendix 4.

All potential odour emission sources have been considered, with those areas judged to generate the highest intensity odours having now been upgraded to include source-specific odour control measures. This includes covers being added to both DAF tanks, the use of passive carbon filters on the DAF units and a dedicated carbon filtration system to treat displaced air from the sludge export tankers during filling events.

The aeration tank, whilst identified by NRW as not being compliant with BAT due to it not being covered, was not identified as a significant source of odour by AQC, including report ref. no. J10/12625F/10/1/F2,

dated 4 October 2022. The aeration tank, when operating efficiently, does not generate odours high in intensity and offensiveness. Furthermore, the open tank and exposed effluent is raised several metres from ground level, which improves the dispersion of odours (odours from elevated sources are generally dispersed more effectively than from ground level sources). Therefore, physical odour control measures are not deemed necessary for the aeration tank. The parameters and effluent treatment performance of the tank is continuously monitored to ensure the process is operating efficiently, and thus potential odour generation from the tank remains low. DAF 2 is downstream of the aeration tank and although it does not constitute a significant source of odour, passive carbon filtration units have been installed to control any residual odour emissions.

2.4 Incidents and Emergencies

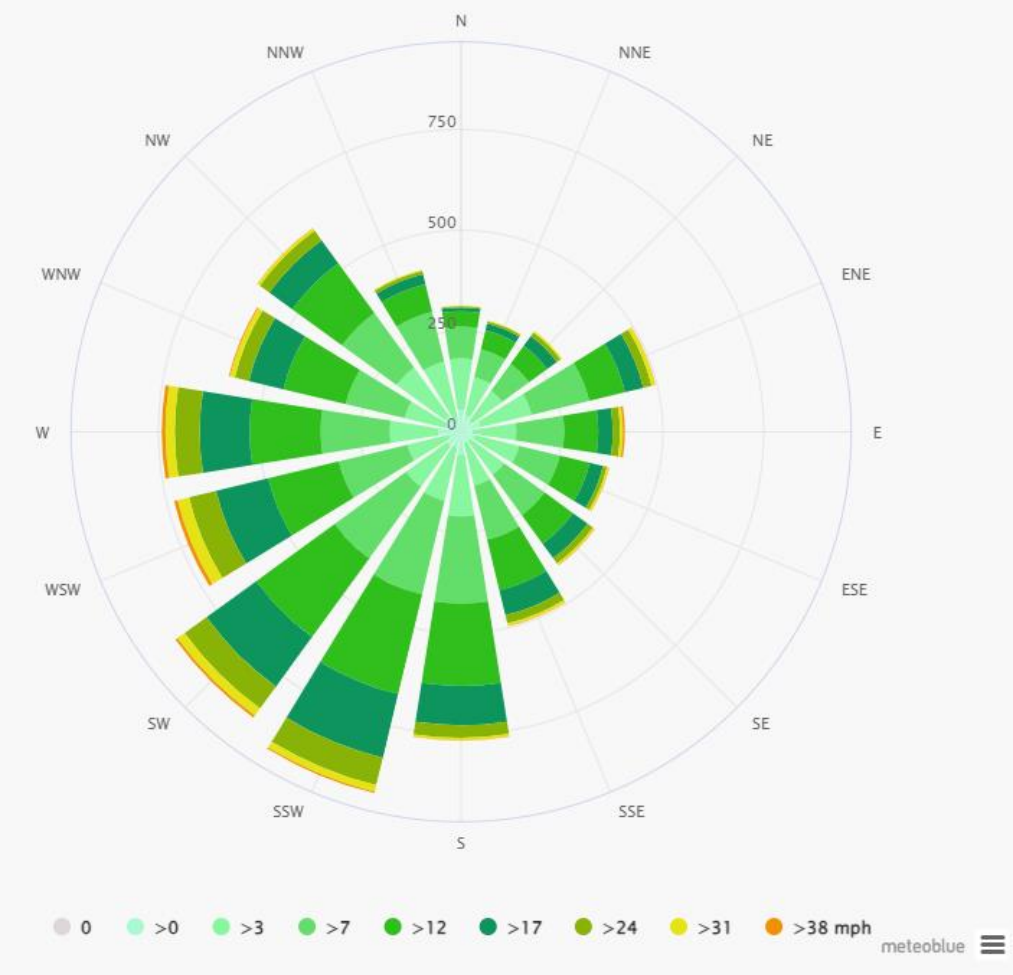
On site, there are incidents and emergencies that could lead to an increase in odour emissions. Possible scenarios are listed below, including their impact and current mitigations to reduce or prevent excess odour:

Incident or Emergency	Impact	Mitigations
Power failure at the WWTP	An increased risk of an abnormal or emergency scenario developing and subsequent risk of an increase in odour	24/7 engineering cover on site SOP/WWTP/004 details actions to be taken in the event of abnormal or emergency scenarios
Equipment failure at the WWTP	An increased risk of an abnormal or emergency scenario developing and subsequent risk of an increase in odour	24/7 engineering cover on site Various spare parts held in stock SOP/WWTP/004 details actions to be taken in the event of abnormal or emergency scenarios
WWTP area flooding from River Arad	Nil	SOP-062 River Arad Flooding Procedure
Fire	Fire damage to containment vessels, pipework or abatement systems	New fire alarm installation at the WWTP
WWTP Operator absence	Potential lack of control over WWTP processes, including odour monitoring and control	He site employs two WWTP Operators who cover for each other's absence Engineering department monitors WWTP outside of normal working hours (06:00-16:00, every day)
Frozen pipes	Unable to clean Sludge Pit, Crude Pit and spills	WWTP Operator uses warm water to defrost pipes to enable continued use
Inadequate cleaning	Increased odour from residual waste on pit walls	Regular direct tanker transfer from Crude Pit to remove excess dairy waste build-up

		Daily inspection and cleaning schedule Power cleaner/lance used
Failure of abatement measures	Release of odours from DAFs 1 and 2, x2 30,000L sludge tanks and from the tanker during sludge transfer	Daily informal odour sniff tests carried out Formal sniff tests carried out using FIDOR scale (minimum once a week) Periodic odour testing by an independent specialist Replacement carbon filters/media easily attained. (SOP WWTP006)
Sludge tanker unavailability	Potential for excess odour from un-filtered Sludge Tank vent	WWTP Operators continually monitor sludge levels and arrange collection in advance of a high level Pre-alarm and high level sensors on each Sludge Tank Auto-switching function when one tank becomes full Tanker unavailability unlikely due to size of carrier fleet. Can be requested at short notice
Failure of aeration system/blowers within the Aeration Tank	Complete breakdown of biological process from a lack of oxygen	O2 sensor installed in Aeration Tank – triggers alarm if low oxygen condition is present WWTP Operator present in normal working hours (06:00-16:00, every day) to monitor oxygen levels in aeration system
Spillages	Odour release	Spill response plan in use Spill kits located around the site Basic spill response training provided

2.5 Local Meteorological Conditions

The following wind rose for Newcastle Emlyn is based on 30 years of hourly weather model simulations (source: Meteoblue at: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/newcastle-emlyn_united-kingdom_7292362).



The wind rose identifies the prevailing wind direction as SSW and SW. Therefore, at the site, the most likely receptor of odour from the WWTP will be the commercial timber yard to the north-east.

3.0 Odour Control Measures

A comprehensive range of physical control measures have been implemented at the site. These control measures are as follows:

- Enclosed DAF tanks with moveable covers (to allow for inspection, maintenance and cleaning) and passive carbon filters installed on the vents to reduce the odour emissions released from the tanks' headspace;
- Third-party licensed tankers to remove the waste in the event of an aeration tank failure;
- Regular inspection and cleaning of the sludge pit;

- Regular inspection and cleaning of the crude pit and removal of accumulated crude pit waste to an offsite tanker;
- A dedicated passive carbon odour control unit to treat odorous displaced air from the tankers during sludge export operations.

A description of the passive odour control systems is provided in Appendix 5.

Furthermore, the following management control measures are implemented at the site to control odours:

- Waste sludge transfer to tanker is undertaken in accordance with an internal SOP-065 (this is provided to the waste carrier);
- All drains to the WWTP are covered to avoid any odour emissions from the enclosed drainage system;
- Regular site walkarounds to monitor for odour on a predetermined route (see Paragraph 6.2);
- Routine sniff testing carried out by HSE Lead (minimum once a week);
- Periodic odour monitoring by an external specialist odour consultant, as required;
- WWTP operation is monitored by a designated operator during normal working hours, seven days per week. Outside of normal working hours, the engineering department is responsible for monitoring use of the WWTP, including controlling nuisance odour sources.

If at any time it is necessary to undertake temporary actions that are likely to cause elevated levels of odour (such as plant maintenance), Dairy Partners will contact NRW, the residents, and any other interested parties before such actions are taken. Where practicable, such tasks will be completed when the prevailing wind direction is away from sensitive residential receptors.

3.1 **Inspection and Cleaning**

The WWTP cleaning process is documented on a daily Operation and Housekeeping programme, aimed at scheduling the inspection and cleaning of all potentially odorous sources at the WWTP. The WWTP Operators record all daily inspection and cleaning activity on a check sheet, which site management monitor for completion.

Sludge Pit

The Sludge Pit is inspected daily. The pit is routinely drained into the Crude Pit when it is deemed necessary by the WWTP Operator. Sludge can also be directly sucked from the pit by tanker if the sludge is out-of-specification and likely to affect the performance of the activated sludge process. Sludge pit walls are cleaned when any sludge is evident, using a pressure washer to remove any lingering sludge that could emit odour.

Crude Pit

The Crude Pit is inspected daily. Sludge can be directly sucked from the pit by tanker if residual sludge is deemed to be excessive. Crude pit walls are cleaned when any sludge is evident, using a pressure washer to remove any lingering sludge that could emit odour.

DAF Units 1 & 2

The DAF Units (1 & 2) are inspected daily to ensure correct operation of the system. The scraper blades are also inspected daily and cleaned whenever there is a build-up of sludge on them. An odour check from the passive carbon filters is carried out on a daily basis and any odours are to be reported to management.

Aeration Tank

Correct operation of the aeration tank (and WWTP) is carried out on a continual basis using the Simatic HMI programme, which can be remotely controlled. An inspection of the Aeration Tank is carried out every day by the WWTP Operator, including an odour check from the upper servicing platform.

Sludge Transfer Area

The sludge storage and transfer areas are inspected on a daily basis. If any sludge is present, it is immediately cleaned by washing the concrete plinth with a pressure washer, washing any debris into the sump (which recycles sludge back to the WWTP). The same process is followed if spills are apparent after a sludge transfer to tanker.

3.2 **Plant Monitoring and Control**

Correct monitoring and control of the WWTP and associated operations is essential for controlling any potential odour release.

Sludge and Crude Pits

Transfer of sludge from the Sludge Pit to the Crude Pit is carried out on a daily basis by the WWTP Operator. The transfer is manually controlled. High level sensors indicate whether the pit is approaching full capacity and will generate an alarm. Outside of normal working hours, the Team Leader is responsible for checking the level in the pit and reporting on the twice-daily handover sheet.

Transfer of sludge from the Crude Pit to the Balance Tank operates on an automated, continual basis. The pit contains three float switches linked to pumps; when each float switch is activated, the corresponding pump will divert sludge waste to the Balance Tank. In the event of an electrical failure, an alternate electrical system will be connected to ensure continuity is maintained. If a pump or multiple pumps fail, the remaining pump(s) act as a redundancy to maintain flow. Replacing defective pump parts is considered as a priority task.

In both pits, maintaining a low level of sludge and regular inspection and cleaning will reduce the likelihood of odours accumulating and being released to atmosphere.

In the event the Sludge Pit or Crude Pit is emptied via direct tanker transfer using a suction hose, any residual spills will be cleaned and safely disposed of to prevent inadvertent odour release.

DAF 1

- DAF 1 operates on a cycle of long pause followed by a short run period. The WWTP Operator will monitor the speed and cycle rate of the DAF for optimum performance. For example, a typical cycle may be a 20 minute pause period followed by a 20 second run.

- DAF 1 typically operates around pH 6.5; should the pH drop lower than 6.5, sodium hydroxide is dosed until the pH returns to normal. An increase in pH will be lowered by dosing coagulant via the serpentine.

- DAF 1 has a forced-air system, which pumps air from the bottom of the DAF to encourage sludge to the top of the vessel prior to it being 'scraped'.

- In DAF 1, temperature is monitored, although there is no specified range.

- The passive carbon filters installed on DAF 1 are larger and contain more carbon media than is recommended by the DAF manufacturer. In DAF 1, there is a distinct odour emission with a lid open, which is not apparent with the lid closed (see Paragraph 2.1). This demonstrates the effectiveness of the passive carbon filtration system controlling odour displaced from the headspace. The volume of headspace does vary depending on the settings of the DAF, however, it is not believed this has a significant impact on the characteristics of the odour emitted. The effectiveness of the passive carbon filter system is gauged by the WWTP Operator carrying out a daily sniff test around the DAF unit to determine whether any odours are apparent. The effectiveness is also assessed as part of routine odour sniff testing at the perimeter fenceline, adjacent to likely receptor properties.

Aeration Tank

- In the Aeration Tank, pH is will remain in the 7.2 to 7.4 range because of the pH balancing carried out earlier in the process.

- The oxygen concentration in the Aeration Tank is maintained at an upper limit set-point of 1.7ppm. Any rise above 1.7ppm will trigger the forced air to be shut off until oxygen levels return to normal. If a condition occurs when the oxygen concentration falls below 1.7ppm, the WWTP Operator will wait until the oxygen recovers. A fall in oxygen concentration is indicative of a problem within DAF 1 and will require further investigation. A typical example is if the waste being sent to the WWTP is out-of-specification which could adversely affect the health of the bacteria in the Aeration Tank.

- The presence of foam in the Aeration Tank is indicative of 'carry over' from DAF 1, which may be as a result of an unexpected dairy discharge, e.g.: a milk spill. This is a rare occurrence. Reducing foam is achieved by adding antifoam (pH 7) to the Aeration Tank.

DAF 2

- DAF 2 operates on a continuous cycle. The WWTP Operator will monitor the speed and cycle rate of the DAF for optimum performance. Therefore, there is no fixed residence time attributed.

- DAF 2 does not have a pH sensor installed. pH is monitored at the M1 final pit prior to discharge at

the W1 emission point. pH limits of minimum 6 and maximum 9 are defined in the site Permit WP3231NB, version 5.

- DAF 2 has a forced-air system, which pumps air from the bottom of the DAF to encourage sludge to the top of the vessel prior to it being 'scraped'.

- DAF 2 does not have a temperature sensor installed. Temperature is monitored at the M1 final pit prior to discharge at the W1 emission point. A temperature limit of 21°C is defined in the site Permit WP3231NB, version 5.

- The passive carbon filters installed on DAF 2 are larger and contain more carbon media than is recommended by the DAF manufacturer. In DAF 2, following the activated sludge bacteria process in the Aeration Tank, the odour emitted is negligible. With the lids open, there is no odour apparent, therefore, although the passive carbon filters are installed, they have little impact on a non-odorous headspsace. The volume of headspace varies depending on the settings of the DAF; however, it is not believed this has a significant impact on the characteristics of the odour emitted. The effectiveness of the passive carbon filter system is gauged by the WWTP Operator carrying out a daily sniff test around the DAF unit to determine whether any odours are apparent. The effectiveness is also assessed as part of routine odour sniff testing at the perimeter fenceline, adjacent to likely receptor properties.

Spillages

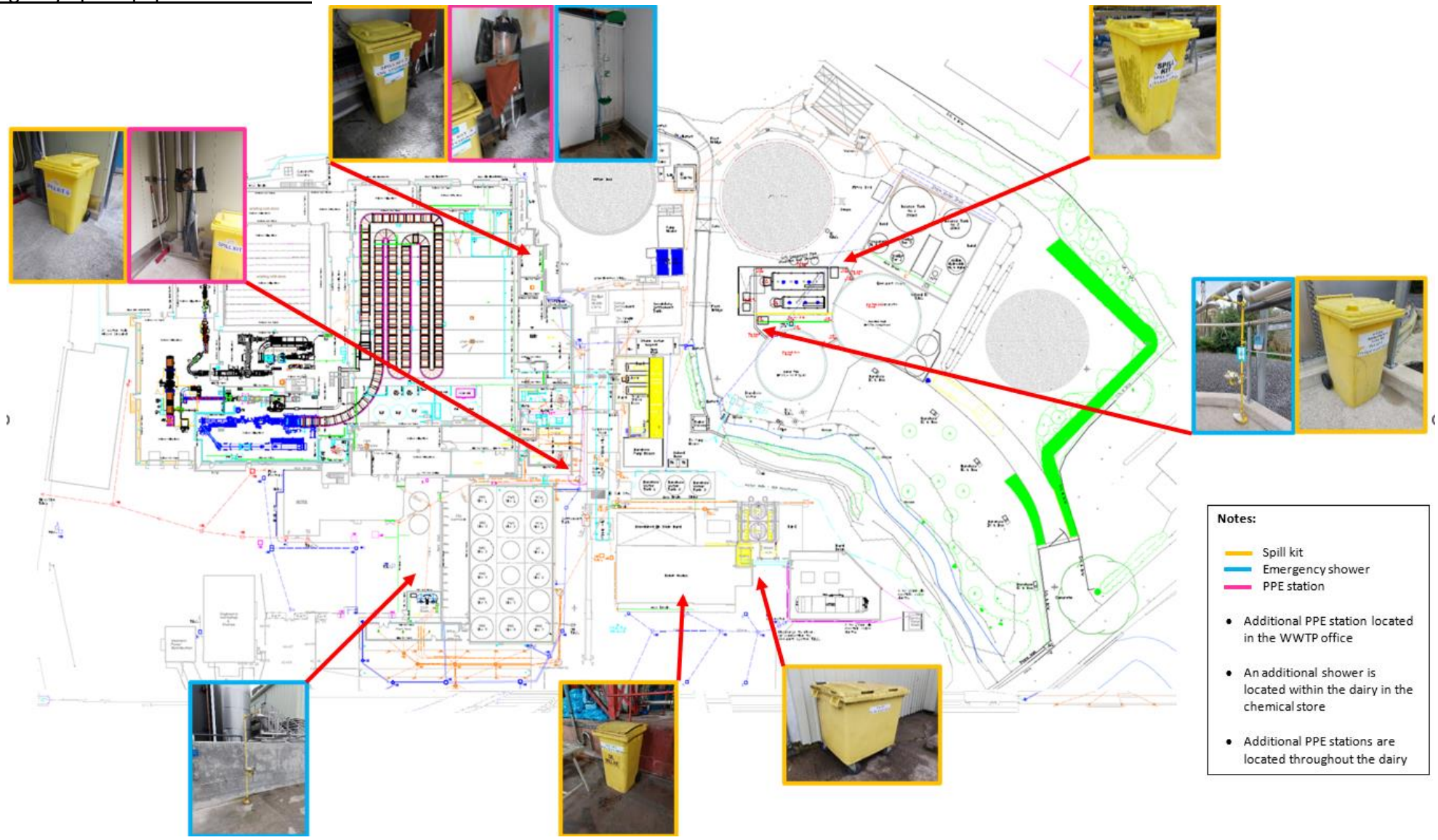
Spillages are to be addressed by following the procedures outlined in EP-017 Environmental Accident Management Plan and EP-021 Spill Response Plan.

Spillages that emit odour will likely occur from sludge at the WWTP during procedures such as sludge transfer to tanker, faults within the WWTP (e.g.: sump pump failure which will cause the sump to overflow) or cleaning. Spills will be contained in the bunded areas and washed into the sump. Spills which occur at the sludge transfer area will be contained on the concrete slab and washed into the sump. Any sludge waste within the sumps will be returned to the plant for treatment. All sludge spills will be immediately cleaned to limit the impact from odour.

Major spills (e.g.: a major tank rupture) will be beyond the containment capacity of the spills kits held on site. In this scenario, EP-021 Spill Response Plan must be followed. Protection of the environment will be the foremost consideration, with odour release being secondary.

At the milk intake and cream and whey fill points, residual dairy product may be spilt during the respective transfer processes. Each specialist odour assessment did not detect a risk of odour release from these processes. Any spills are immediately cleaned by washing residual dairy waste into the red drains before any odour becomes apparent. No odour has been detected from these processes during daily walkarounds.

Emergency Spill Equipment Locations



Transfer of Sludge from Sludge Tank to Tanker

Transfers of dairy sludge/wastewater to the tankers takes place three times per week. This can occasionally increase to four times per week during peak production. Sludge transfers are carried out in accordance with SOP-065, only at the designated transfer area behind the Sludge Tanks.

As stated in the SOP, transfer times vary between the hours of 08:00-16:00, usually on Monday, Wednesday and Friday (dependent on tanker availability and whether an additional load is required), and for up to 30 minutes in duration.

During the transfer, the WWTP Operator will monitor for odour emissions from the displaced air passed through the passive odour control unit, and from any spills. Minor spills will occur over the concrete slab and will be washed into the sump at the cessation of the transfer. The WWTP Operator will also purge the open section of transfer pipe to eliminate any potential odour from residual sludge.

4.0 Odour Control Passive Filter Maintenance

Activated carbon, as used in the passive carbon filters on the DAF tanks, x2 sludge tanks vents and the tanker export odour control unit, has a shelf life. Carbon filters remove contaminants through adsorption, whereby contaminants are attracted to the surface of the activated carbon and held to it. Once the carbon media has become “loaded” with pollutants its odour abatement removal efficiency decreases. Therefore, the carbon within these units will be replaced if a breakthrough of odour is observed by site staff during routine weekly odour sniff tests, odour investigations or routine site maintenance. All carbon filters will be changed every 12months as per the manufacturers guidelines.

Dairy Partners is responsible for the replacement of carbon media, including the DAF, sludge tanks and tanker loading drum cartridges. Replacement carbon media is not held on site, but can be ordered when required, usually with a short delivery period.

5.0 Site Management Responsibility

Dairy Partners senior management are responsible for ensuring that nuisances and hazards arising from the facility due to odour are minimised. On a routine basis, this will involve ensuring that any causes of odour are identified (through odour monitoring, identification of malfunctions and complaints recording), actions to reduce odours taken, and any problems rectified.

6.0 Odour Monitoring (sniff testing)

Informal, daily sniff checks will be undertaken at locations around the site, as part of a daily walkaround. On normal working days (Monday to Friday), this is carried out by the HSE Lead; at weekends, the site will be monitored for odour on an informal basis by the engineering staff and Production Team Leaders, availability permitting.

The formal sniff test procedure will be used:

- If a significant, noticeable odour is present

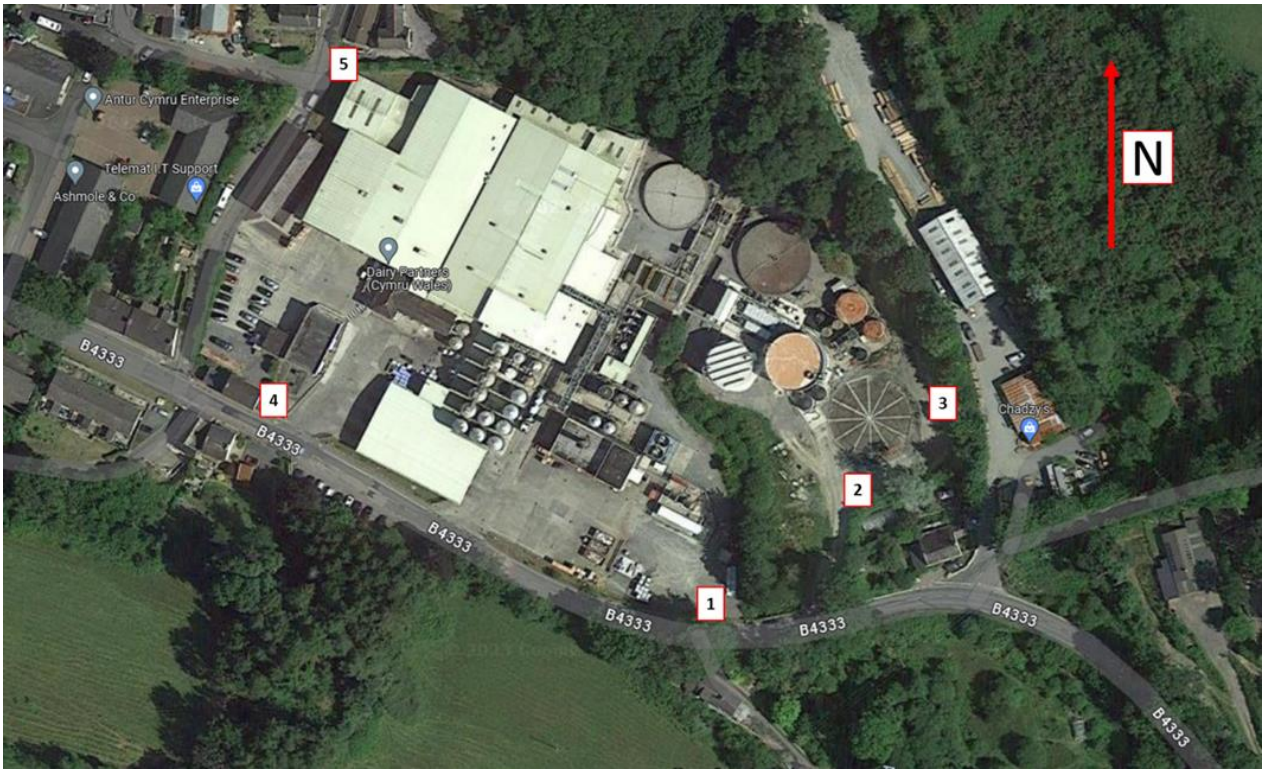
- In receipt of a complaint (during normal working hours only)
- Routinely on a minimum once-weekly basis

If uncertainty about an odour exists, a member of staff drawn from those that do not work in production or effluent treatment areas, e.g.: Shipping or Accountancy departments, will be used to provide additional judgement on the extent of the odour. Staff from these types of departments will not be subject to de-sensitisation from regular exposure to dairy odour and can be used to gauge odour characteristics alongside an experienced odour inspector with knowledge of FIDOR methodology.

The routine minimum weekly sniff test and tests carried out in response to a complaint will be carried out by the HSE Lead only. The results will be recorded on the Sniff Test Form (Appendix 2). Weather conditions (including temperature, wind speed and direction) will be obtained from the MET Office[1] and recorded during to each sniff test. This will enable potential odour issues to be predicted (and investigated) and necessary remedial actions implemented.

All operational staff will be responsible for reporting any odour problems immediately to the WWTP Operator, the Site Manager, the HSE Lead, or, if during the nightshift, the Production Team Leader. A summary of the sniff test approach is set out as follows:

- Along the site boundary, the odour inspector shall record any odours that are detected. The intensity should be noted using the criteria set out in Appendix 2, and a description of the odour characteristics shall be recorded. Observations are to be made at all locations where there is sensitive exposure (i.e.: occupied residential and commercial premises), in the five locations highlighted in the map, below:



[1] https://www.metoffice.gov.uk/weather/forecast/gckb43ehx#?date=2022-01-21

- Sniff tests will be recorded using the 'FIDOR' methodology, summarised in the Sniff Test Form in Appendix 2. This method is based on the following criteria: frequency, intensity, duration, offensiveness, and receptor sensitivity.
- At each location, records of the meteorological conditions at the time of the test shall be recorded. Wind speed and direction should be measured by the operator using an anemometer, or be obtained from the MET Office website[1], at the time of the test if an anemometer is not available.
- Following the identification of an odour at the site boundary or offsite location with sensitive exposure, an onsite inspection will be carried out to trace any odour back to source and enable any corrective or preventative action to take place.

Observations including time, date, weather conditions, temperature, wind strength, wind direction, odour intensity and odour character will be recorded on a Sniff Test Form (Appendix 2). Site operating conditions at the time of survey will also be recorded enabling the identification of any 'abnormal' site operating conditions such as sludge transfers to tanker, cleaning or maintenance.

Should elevated levels of odour be identified, the WWTP Operator and/or senior management will be informed immediately and will initiate the mitigation measures identified within this OMP.

6.1 **Odour Sniff Test Training**

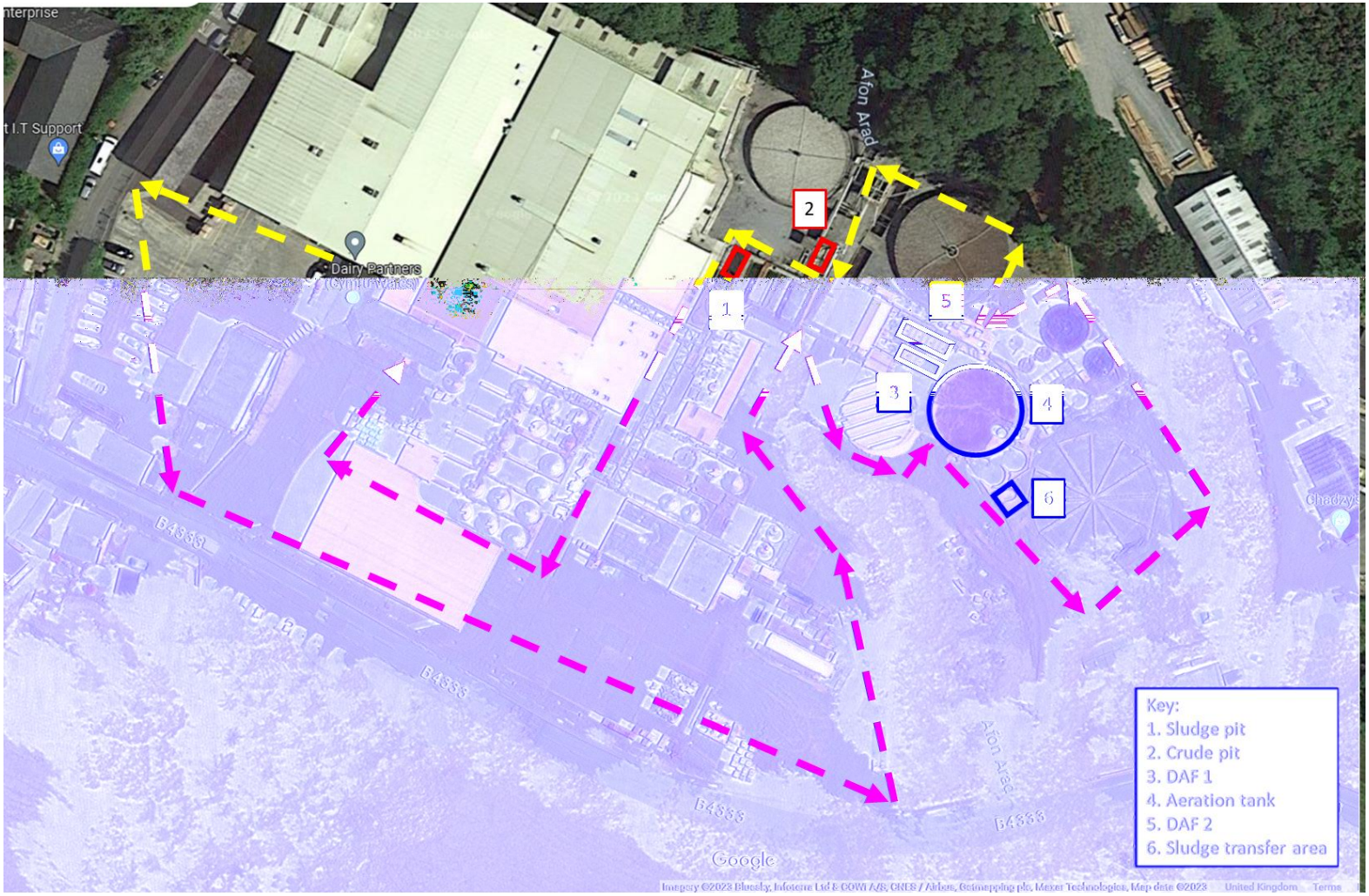
The operations Manager is the primary person assigned to carrying out sniff testing on site. However, if he/she is unavailable, odour inspectors shall be chosen from staff that are unlikely to suffer from de-sensitisation to odour (i.e.: someone has been exposed to the odour and thus will not be able to detect it as effectively as someone who has not). Although WWTP Operators are most likely to be exposed to any odour, their level of de-sensitisation will not be low enough to prevent them being able to smell dairy sludge odour, particularly from DAF 1 which is the most intense odour source on site and would represent a failure of the passive carbon filter system.

All staff responsible for assessing odour will receive appropriate and adequate training from the HSE Lead on the odour inspection procedure and FIDOR methodology used in the reporting form in Appendix 2. Each inspector carrying out sniff tests will be initially accompanied by a more experienced member of site management to ensure that the nature and offensiveness of any odours detected are being similarly perceived. Staff will be instructed to avoid strong food or drinks for at least one hour beforehand and those members of staff that have a cold, sore throat or sinusitis will not be used to carry out sniff testing.

The site management has agreed to purchase smell sensitivity test kits to allow those persons undertaking odour sniff tests to assess and understand their own sensitivities with regards to smell. Based on a recommendation from NRW, formal sniff test kits will be procured. Employee training will also focus on the odour inspection and reporting procedure, including understanding the FIDOR methodology to be able to quantify odours.

6.2 Daily Walkaround Route

The route for the daily walkaround encompasses all potential odour sources and the impact on nearby receptors:



7.0 Specialist Odour Testing

Dairy Partners commits to conducting a formal odour assessment every two years by a specialist, independent odour consultant. Also, following major infrastructure changes on site, this will also require a specialist assessment to be carried out to gauge the adverse effects of any change.

An action and timeline for specialist odour testing is recorded on a calendar held by the HSE Lead.

8.0 Odour Complaint Recording and Investigation

Odour complaints are typically submitted to NRW via their incident line. Complaint records are logged on the IT network by the operation manager, including the company's response.

For complaints made directly to the company, Dairy Partners will use the form in Appendix 1 to record odour complaints, which will be completed by the Dairy Partners management. All completed forms shall be scanned and saved electronically in an accessible location on the company IT network.

It should be noted that outside of normal working hours, Monday to Friday, 08:30-17:00, the site operates on a skeleton basis and may not have the staff capacity to investigate every complaint. Urgent complaints and emergencies will be directed to the site management using the emergency contact list made available to NRW by Dairy Partners. As a minimum, NRW complaints will be directed to all internal stakeholders and logged on the Complaint Record by the operations manager and investigated, where possible. The engineering department is responsible for monitoring the WWTP outside of normal working hours, including carrying out informal sniff tests whilst at the plant.

All complaints made via NRW will be forwarded to the Dairy Partners operation manager to action and record. Dairy Partners will ensure that:

- All direct complaints will be logged using the Environmental Complaints Log on the company IT network;
- If the complaint is received in normal working hours, it will be immediately investigated by the HSE Lead to identify the cause. If necessary, and if the complainant's details have been received from NRW, this may involve direct communication with the complainant;
- In the event of elevated levels of odour being detected, the presence of 'abnormal' on-site activity is assessed and, if necessary, preventative action is taken that will prevent a recurrence of the same problem. These actions will be documented;
- The complainant will be contacted and given information on the investigations conducted and actions taken, as appropriate;
- All complaints are reported to the site management team and discussed at daily site meetings;
- If the investigation indicates that the complaint has not been justified this will be clearly recorded in the Environmental Complaints Log – due to staffing capacity, investigations may be limited to those carried out during normal working hours only.

9.0 Odour Reduction Programme

As part of a continual odour reduction programme, Dairy Partners (Cyrmu Wales) Ltd will continue to

monitor odour with a view to making improvements. Elevated levels of odour may be identified by:

- Testing by an external odour specialist
- Receipt of an odour complaint from a third party suggesting that there is an odour from the WWTP or other area of the site
- Detection of odour at the site boundary as a result of the monitoring procedures detailed within this OMP, including routine and informal sniff testing

Odours will generally arise from one or more of the following:

- Malfunction or bypassing of any odour filtration system installed (i.e.: carbon filters)
- Major spillages
- Malfunction of equipment
- WWTP Operator error
- Inadequate odour monitoring and/or reporting
- Poor cleaning
- Inadequate odour control measures at source

As part of the monitoring programme, including routine and specialised assessment, the FIDOR methodology will be used to assess the characteristics of the odour. Any elevated levels of odour identified by the monitoring program and/or the complaints procedure detailed in this OMP will be mitigated as follows:

- Dairy Partners will carry out checks at the identified source of the elevated levels to ensure that the plant and physical odour control measures are being operated to the manufacturers' specification;
- To further mitigate the elevated odour levels, the following actions shall also be considered:
  - In the event of a serious incident requiring the complete shutdown of the plant for an extended period, Dairy Partners will ensure that adequate waste removal plans are in place for sludge effluent
  - Dairy Partners will liaise closely with NRW throughout all stages of the process;
- Once improvements have been identified, an appropriate timeframe will be assigned to the works depending on aspects such as the purchase of spares, delivery forecasts, the time required to implement the improvement(s) and whether specialist intervention is required – actions and timelines for the implementation of improvements will be recorded and monitored by the HSE Lead for completion in the allotted time, to the appropriate standard;
- Once the improvements have been completed, the management will commission an odour assessment to ensure that the improvements have addressed the source of the elevated levels. If the elevated levels are still present, then the operator will repeat the request for improvements and subsequent assessments until the limits are met;
- If operational failings are identified, re-training of employees will take place to ensure that all employees operate to the required standards. If the failings are identified as part of the operating techniques, then the problem will be raised as part of a review of control measures.

9.1 **BAT 14 of Waste Treatment BRef**

To achieve BAT (as identified in BAT 14 of Best available techniques (BAT) reference document for waste

treatment: Industrial Emissions Directive 2010/75/EU (integrated pollution prevention and control)), a combination of techniques is required to reduce odour emissions to air. In addition to the odour control measures outlined in Paragraph 2.0, Dairy Partners continues to seek improvements to its odour controls relevant to the limited odour sources and potential odour characteristics that nearby receptors may be exposed to.

Control measures such as regular inspection and cleaning of storage pits and the odour abatement systems installed on the main potential source of odour (DAF 1) are compliant with BAT. Supporting plant such as pumps, valves and pipework have not been identified as a potential source odour, therefore, investing in high-integrity equipment above what is already installed is not considered feasible at this stage.

10.0 Reporting Measures

In the event an odour is detected during a formal sniff test, the results will be recorded in the Sniff Test Record Log on the company IT network. This will act as the basis for further investigation. In the event of elevated levels of odour being identified outside of normal working hours, the event will be recorded in the shift handover record. Dairy Partners will investigate the performance failure event at the earliest opportunity and, if necessary, will report the event to NRW.

11.0 Abnormal Meteorological Conditions

Abnormal meteorological conditions such as low wind speeds or high temperatures may promote elevated levels of odour either on the site or at nearby sensitive receptors. A wind direction towards sensitive receptors may increase the risk of a nuisance odour occurring, and subsequent complaints being submitted. Very low wind strength and temperature inversions may minimise dispersion and potentially create an accumulation of odour. High ambient temperatures may also increase the likelihood of odour emissions.

The mitigation measures to be undertaken in the event of abnormal meteorological conditions are the same as the contingency mitigation measures detailed in this OMP.

12.0 Breakdown of Process Equipment and Plant

The breakdown of the wastewater treatment process or abatement equipment may cause elevated levels of odour due to the build-up of waste or the failure of control equipment. Any plant breakdown which is likely to cause a release of odour must be brought to the attention of the site management and controls put in place to resolve the fault(s) or apply control measures to limit the impact on nearby receptors. Significant odour emissions are likely to be as a result of a major spill only, e.g.: a containment vessel breach. Beyond a major spillage event, the limited sources and intensity of odour on site means there is a low likelihood of adverse impact on neighbouring properties.

13.0 Human Error

Human error and accidents may cause elevated levels of odour to be created either through the stopping or breakdown of the process or the failure of control equipment. The mitigation measures to be undertaken in the event of staffing issues are the same as the contingency mitigation measures detailed

in this OMP.

14.0 Emergency Events

Environmental accidents could result in the loss of control of odorous substances and could have an unacceptable short-term impact on the local community. Emergency situations are to be managed in accordance with the site Environmental Accident Management Plan (EP-017).

15.0 Management Responsibilities and Review

The control of odour will be managed in accordance with the Environmental Management System.

The Dairy Partners WWTP Operator will be supported by the Engineering Lead and HSE Lead. The HSE Lead is responsible for monitoring and evaluation of site performance, which will include ensuring continued compliance with the Environmental Management System.

The Odour Management Plan will be reviewed on an annual basis. However, a more frequent review will be considered if changes occur at the site which may have an adverse impact on nearby receptors.

The latest version of the OMP is available on the company network drive. A hard copy will be retained in the first aid room site information folder and is accessible to all employees at all times.

16.0 Appendices

16.1 Appendix 1 – Odour Complaint Reporting Form

Odour Complaint Report Form	
Time and date of complaint:	Name and address of complainant:
Telephone number of complainant:	
Date of odour:	
Time of odour:	
Location of odour, if not at above address:	
Weather conditions (i.e.: dry, rain, fog, snow):	
Temperature (very warm, warm, mild, cold or degrees if known):	
Wind strength (none, light, steady, strong, gusting):	
Wind direction (e.g.: from NE):	
Complainant's description of odour: ○ What does it smell like?	
○ Intensity (see below):	
○ Duration (time):	
○ Constant or intermittent in this period:	
○ Does the complainant have any other comments about the odour?	
Are there any other complaints relating to the installation, or to that location? (either previously or relating to the same exposure):	
Any other relevant information:	
Do you accept that odour likely to be from your activities?	
What was happening on site at the time the odour	

Odour Complaint Report Form		
occurred?		
Operating conditions at the time the odour occurred:		
Actions taken:		
Form completed by:	Date:	Signed :

Intensity

0 No odour /not perceptible – No odour when compared to clean air.
1 Slight/very weak odour – There is probably some doubt as to whether the odour is actually present.
2 Slight/weak odour – The odour is present but cannot be described using precise works or terms.
3 Distinct odour – The odour character is barely recognisable.
4 Strong odour - The odour character is easily recognisable.
5 Very strong odour – The odour is offensive. Exposure to this level would be considered undesirable.
6 Extremely strong odour – The odour is offensive. An instinctive reaction would be to mitigate against further exposure.

16.2 **Appendix 2 – Sniff Test Form**

The form below, which has been adapted from the 'Odour Report Form' set out in the Environment Agency's H4 Odour Guidance (Environment Agency, 2011) should be used for detailing sniff tests. The first column has been completed to provide an example of the information that is required.

A new form should be used for each survey. Once completed, the forms shall be logged on a spreadsheet on the site IT network.

Example:

Sniff Test Report Form				**Date:** 12/07/2019	
Test Number	1	2	3	4	5
Time of Test	*14:10*				
Location of Test	*Location 1 on map*				
Weather Conditions	*Clear, dry*				
Wind Speed	*15 mph*				
Wind Direction	*SE*				
Odour Intensity	*3*				
Duration of Test	*2 mins*				
Constant Odour?	*Yes*				
Odour Character	*Sewage. Unpleasant.*				
Do Odours Relate to Site Operations?	*Yes*				
Any Other Observations or Comments	*Odour was constant. Test was done near to house.*				

Sniff Test Report Form				**Date:** 12/07/2019	
Test Number	1	2	3	4	5
Investigative or Remedial Action Required?	*Yes – inform Site Manager*				

Intensity

0 No odour /not perceptible - No odour when compared to clean air.
1 Slight/very weak odour - There is probably some doubt as to whether the odour is actually present.
2 Slight/weak odour - The odour is present but cannot be described using precise words or terms.
3 Distinct odour - The odour character is barely recognisable.
4 Strong odour - The odour character is easily recognisable.
5 Very strong odour - The odour is offensive. Exposure to this level would be considered undesirable.
6 Extremely strong odour - The odour is offensive. An instinctive reaction would be to mitigate against further exposure.

16.3 Appendix 3 – Meeting of Guidance Criteria for an OMP

This OMP details the guidance criteria for an OMP:

16.3.1 BAT Conclusion 1 (xiv) and BAT Conclusion 12 of Waste Treatment BRef Document (EU 2018)

An OMP has been provided, as specified in Conclusion BAT 1 (xiv). The requirements of BAT 12 are set out below:

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 actions and timelines;
- a protocol for conducting odour monitoring;
- a protocol for response to identified odour incidents, e.g.: complaints;
- 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.

16.3.2 BAT Conclusion 1 (ii) and BAT Conclusion 15 of Food, Drink and Milk Industries (EU 2019)

Conclusion BAT 1 (ii) has been addressed in this OMP as far as practicable. The "*the identification of characteristics of the installation that are associated with possible risks for the environment* ", i.e. odour, has been set out in the 'Sources, Releases and Impacts' section on Page 2 of this document.

The requirements of Conclusion BAT 15 are the same as for Conclusion BAT 12 as set out above.

16.3.3 Horizontal Guidance H4: Odour Management

This OMP meets the requirements as set out in the Environment Agency's 'Horizontal Guidance H4: Odour Management' document, which states that:

OMPs should be designed to:

- employ appropriate methods, including monitoring and contingencies, to control and minimise odour pollution;
- prevent unacceptable odour pollution at all times;
- reduce the risk of odour releasing incidents or accidents by anticipating them and planning accordingly.

All OMPs will need to consider sources, releases and impacts, and use these to identify cost-effective opportunities for odour management. For a particular activity, some methods may be more effective/applicable than others. Sample OMPs, templates or plans produced for other sites are often helpful starting points.

16.4 **Appendix 4 – Sensitivity Scale**

The following table is an extract from the odour sensitivity descriptors listed in Guidance on the Assessment of Odour for Planning (Institute of Air Quality Management, 2018).

For the sensitivity of people to odour, the IAQM recommends that the Air Quality Practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:

High sensitivity receptor	Surrounding land where: • users can reasonably expect enjoyment of a high level of amenity; and • people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium sensitivity receptor	Surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low sensitivity receptor	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads.

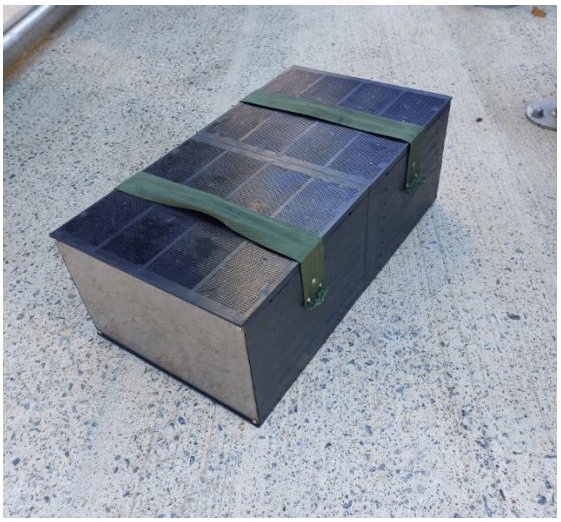
16.5 **Appendix 5 – Passive Odour Control Systems Specification**

DAF 1, 2, x2 30,000L sludge tanks and sludge tanker

According to the manufacturer of the filter units, *"the passive activated carbon filters are suitable for a wide range of applications including the control of odour in sludge/sewerage holding tanks. Available in both granular and pelletised forms they feature a disposable/refillable filter cell containing impregnated activated carbon suitable for Hydrogen Sulphide and sewage odour removal. They have a capacity up to 280m^3/h".*

Manufacturer's aperture for a passive odour filter system

Passive carbon filters used at Dairy Partners



Filter cartridges

Manufactures had an open vent on the sludge tanks.

Passive carbon filters used at Dairy Partners

Replacment filter cartridges are the same as above.

Sludge Transfer

According to the manufacturer of the filter units, *"The Drum Filter Vessel is a low cost, simple-to-install, single-use filter that is designed for VOC Abatement in vapour and low flow rate applications. This simple-to-install Filter is ideal for the efficient removal of organic and inorganic odours, such as formaldehyde, ammonia and hydrogen sulphide from the air or gas streams".*

According to the manufacturer, *"The carbon granules used in the drum are based on bituminous coal, which has been activated by a high temperature steam under rigidly controlled conditions. The starting material used in production provides high surface area, good mechanical strength and the necessary adsorption characteristics for removing low level organics from waste gases. The granules are a series of chemically treated carbon that combine adsorption of organic compounds, and catalytic oxidation of hydrogen sulphide as its odour control mechanism".*

16.6 **Appendix 6 – Characterising Odour**

Flora	Fruity	Vegetable	Earthy	Offensive	Fishy	Chemical	Medicinal
Almond	Apple	Celery	Ashes	Blood	Amine	Burnt plastic	Alcohol
Cinnamon	Cherry	Corn	Burnt wood	Burnt	Dead fish	Car exhaust	Ammonia
Coconut	Citrus -	Cucumber	Chalk	Burnt rubber	Perming solution	Cleaning fluid	Anaesthetic
Eucalyptus	Cloves	Dill	Coffee	Decay		Coal	Camphor
Fragrant	Grapes	Garlic	Grain silage	Faecal		Creosote	Chlorine
Herbal	Lemon	Green pepper	Grassy	Refuse		Diesel	Disinfectant
Lavender	Maple	Nutty	Mould	Landfill leachate		Petrol	Menthol
Liquorice	Melon	Potato	Mouse-like	Manure		Grease	Soap
Marigolds	Minty	Tomato	Mushroom	Mercaptan		Foundry	Vinegar
Perfumy	Orange	Onion	Musky	Putrid		Kerosene	
Roses	Strawberry		Musty	Rancid		Molasses	
Spicy	Sweet		Peat	Raw meat		Mothballs	
Vanilla			Pine	Rotten eggs		Oil	
			Smoky	Septic		Paint	
			Stale	Sewer		Petroleum	
			Swampy	Sour		Plastic	
			Woody	Spoiled milk		Resins	
			Yeast	Urine		Rubber	
				Vomit		Solvent	
						Styrene	
						Sulphur	
						Tar/asphalt	
						Turps	
						Varnish	
						Vinegar	
						Vinyl	

Source: Scottish Environment Protection Agency, 2010.