Application for Planning Permission

Applicant – Dairy Partners (Cymru) Limited

Site for which planning is related – Newcastle Emlyn Creamery, Newcastle Emlyn, Carmarthenshire

Nature of site – Industrial, food production

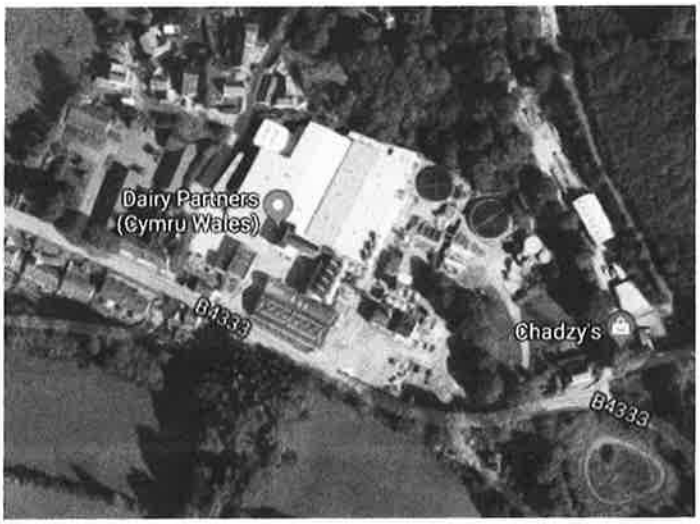
Planning Authority – Carmarthenshire County Council

Project title – Effluent Treatment Plant Replacement

The Site

The Newcastle Emlyn Creamery is located in Aberarad, Newcastle Emlyn, with main entry to the site off the B4333.

The River Arad runs through land owned by Dairy Partners, separating the position of the effluent plant from the main production site with access via a foot bridge from the factory side, and road access through a separate gate west of the main site.



The site is located at grid reference SN 31672 40106 (SN316401), with the closest residential receptors located within 20 meters of the site boundary, but approximately 150 metres from equipment related to the production facility/process.

The site operates under an Environmental Permit as issued by NRW, in respect of this application all discharges will meet (better) the consent limits as set within the discharge section of the permit

Project Background

Current Asset

The effluent treatment plant is an essential part of the process, as part of the cheese manufacturing process waste water is generated, as well as during the cleaning operations.

The current system in brief, relies on a small dissolved air filtration unit which takes out the solids, chemical dosing to remove the finer solids, and final biological treatment within two settlement beds, the solids are sent to a sludge tank which is emptied by road tanker up to three times per day.

The effluent plant in place is an aging asset with some parts of the system being >40 years old, the age of this asset means that it does not take advantage of newer technology which is currently available on the market, and it does not allow for newer technology to be 'bolted on' without significant alteration.

There have also been questions raised regarding the suitability of the current biological system, which in this case is in the form of settlement beds. The biology of the bacteria means that the system is very sensitive to changes in temperature, and the quality of water coming through the effluent system, meaning a slight increase or decrease in temperature or an issue with the water quality effects the bacterial treatment phase significantly, impacting the final discharge water quality.

After the treatment within the effluent treatment plant, the water is transferred to the main discharge point at the River Teifi which is reached by a pipeline running from the site effluent treatment plant.

As well as the age of the asset, the system has been subject to a recent issue which saw the treatment fail, and the water quality rise above the consent limits as set out within the discharge permit, as the effluent quality is monitored this issue was identified early, and dairy Partners took steps to shut off all discharges to the river until the problem was solved.

By redirecting the water away from the river, and with production ongoing, all liquid waste had to be transported from site for treatment via road tanker, not only did this incur significant costs for Dairy Partners >£30k / week, it also led to an increase in road traffic with approximately fifteen HGV tankers attending the site daily for three months, due to the nature of the production system this also included tankers having to attend the site during the night which impacted on the neighbours in respect of noise and light issues.

Dairy Partners could not sustain the weekly cost of the effluent removal in the manner above and engaged with a 3rd party specialist with experience in operating older treatment plants, again this has led to significant investment in order to cover the effluent plant operation 24/7.

Based on the risk of environmental pollution due to another failure in the system, coupled with the costs associated to the failure, and the current employment of a 3rd party to ensure the plant operates as effectively as possible, the company have decided to invest >£2m in a new system which will take advantage of latest technology, better telemetry, and a more automated system to remove the risk of human error

By replacing this asset with a new and improved system which meets the requirements of Best Available Technology on the market, Dairy Partners have an opportunity to improve the quality of its final effluent which in turn will have a significant (positive) impact on the local environment, not only in the form of water quality at the discharge point, but also in the reduction of road tanker movements from the site.

Proposed Asset

Project Description effluent treatment plant Dairy Partners – Newcastle Emlyn

Design parameters

Waste water source	
Type of industry	Dairy plant, mainly producing mozzarella
Operation	28 hours cheese production followed by 4 - 10 hours CIP cleaning
Daily flow	800 m^3/day
Flow CIP cleaning	up to 585 m^3 in 4 - 10 hours (up to 65% of daily flow)
Plant design flow	900 m^3/day
Peak flow during CIP cleaning	100 m^3/hr

Current Water Quality Consent limits as per Environmental Permit

Parameter		
COD	mg/l	120
TSS	mg/l	50
Ammonia as N	mg/l	22
Nitrite as N	mg/l	3
Phosphate as P	mg/l	No limit
Aluminium	mg/l	No Limit
Mercury	µg/l	≤ 0.5
Cadmium	mg/l	≤ 0.01

Target treated water quality

Parameter		
COD	mg/l	110
TSS	mg/l	40
Ammonia as N	mg/l	20
Nitrite as N	mg/l	3
Phosphate as P	mg/l	-
Aluminium	mg/l	-
Mercury	µg/l	0.3
Cadmium	mg/l	0.1

As you can see the water quality parameters issued to the vendor are an improvement on current permit discharge limits.

Physical / Chemical Pre-treatment

The waste water from Dairy Partners will be screened by an existing mesh filter and will be collected in a pump pit. From this pump pit it will be fed to the new balance tank by existing pumps. In the balance tank 2-way pH correction is foreseen.

From the balance tank the water will be pumped to the coagulation/flocculation/flotation system. In the pipe flocculator, a coagulant, a neutraliser and a flocculant will be dosed for coagulation and flocculation of the suspended and emulsified pollution.

The flocks which are formed are separated by a DAF unit. The sludge which is generated by the DAF unit will be pumped into the sludge tanks. The Redox DAF unit will be equipped with an automatic micro bubble diffuser cleaning system and is therefore clog-free.

The DAF unit will be equipped with a cover, operated by gas springs.

The treated water after the DAF system will be pumped to the biological treatment system. A transfer tank and transfer

FBR (Flotation Bio Reactor) biological treatment

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

The effluent from the DAF is fed into a selector which is built inside the aeration tank. In the feed line to the selector, the turbidity of the water will be monitored. In case a pre-set level is exceeded, an alarm will be generated.

In the selector the water is mixed with a set amount of activated sludge. In the selector tank the proper 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 in order to obtain a correct nutrient balance.

From the selector tank the water flows into the aeration tank. In the aeration tank the activated sludge bacteria utilise 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 done by a second DAF unit. 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 part of the sludge will be directed to the sludge tank as waste activated sludge, based on MLSS measurement in the aeration tank.

The effluent quality of the DAF will be monitored continuously. In case either the pre-set COD, TSS or ammonia level is exceeded, the water will be led to a transfer tank, from where it will be pumped into the out of spec tanks. The present 250 m^3 and 150 m^3 tanks with mixers will be used for this purpose.

Monitoring

The electrical control panel is equipped with a Siemens S7-1500 series PLC including 12" Full color HMI to control, adjust and monitor the complete process in the most user-friendly way. Including **eWon** modem with GSM functionality, for remote support and which can send an SMS text message for each alarm. The HMI can be taken over remotely via a device running VNC connected to the PLC network e.g. a mobile phone, tablet or PC. The ETP will be integrated into the site Scada system.

Construction Works

The construction phase of the project will include the setting out and creation of a new concrete slab, site investigation works have shown there is no requirement for any re-enforcing of the area.

The majority of the equipment will be pre-fabricated and transported to site for final positioning and connection, equipment will enter the work area via the gated entry point to the west of the main site, deliveries will be managed to take place between 0800 – 1700hrs Monday to Friday, in the event of an emergency delivery concession maybe raised for a weekend delivery between 1000 – 1600hrs.

Once the pre-fabricated equipment is in position, the works will revert to pipefitting, connection and electrical installation activities.

Construction site hours will be 0800hrs to 1800hrs Monday to Friday, with some Saturday activity permitted between 0900 – 1700hrs.

Lighting will be managed within the construction area, it is envisaged that due to the project start and duration the work will be completed during daylight hours, with task lighting required within electrical cabinets and therefore not likely to cause a nuisance to the local neighbours.

Highways Impact

As outlined above, during the construction phase the deliveries will be managed between the hours highlighted.

Ongoing, upon completion of the project and operation of the new plant it is expected that HGV traffic will be reduced from 3 to 4 movements per day to 3 or 4 per week.