Appendix 2 of OGN 72

WFD Compliance Assessment template

Before completing this template for a WFD compliance assessment, refer to OGN72 for definitions, processes and further links to useful websites.

Document Owner: Regulatory Business Board

Version History:

Document Version	Date Published	Summary of Changes
1	September 2020	Document created and ready for trialling
2	Dec 2020	Document updated following trial
2.1	Feb 2021	Final draft

Review Date: This document is subject to continuous improvement and therefore you should always ensure you have the most up to date version.

To report issues or problems with this guidance contact Guidance Development

WFD Compliance Assessment of trade discharge at Dairy Partners (The Creamery, Aberarad)

Stage 1 step 1: Proposal Details

a): Project details where an external party has applied to NRW for any form of authorisation	
Application reference number	PAN-017188
Date application received	24/02/2022
Applicant details	Dairy Partners (Cymru Wales) Limited
Activity proposed	The proposal is for the existing installation (permit number EPR/WP3231NB) to upgrade their effluent treatment plant (ETP). The original ETP used a Dissolved Air Flotation (DAF) plant and then series of trickling filters. The new ETP uses two DAF units and an activated sludge process, with additional flocculants, coagulants, neutraliser, pH control and phosphoric acid and urea used in the process. The treated effluent is to be discharged to the Afon Teifi / River Teifi using the existing discharge point (listed as W1 on the existing permit). The permitted discharge volume is proposed to be reduced from 1,050 m^3/day to 900 m^3/day. The proposed change is relevant to the Water Framework Directive as the composition of the treated effluent will change as the effluent treatment process changes. The treated effluent will contain sanitary determinands (ammonia, BOD and phosphates). The new process will use the following additives in the ETP process: • ClearFlo C36 – polyaluminium chloride (PAC) • Flocculant – anionic emulsion polymer • Flocculant – cationic emulsion polymer • Urea (CH_4N_2O) • Phosphoric acid (H_3PO_4) • ClearFlo-pH-SA-D50% - Sulphuric acid (H_2SO_4) • ClearFlo-pH-SH-U-32% - Sodium Hydroxide (NaOH)

Therefore, the treated effluent could include anionic and cationic emulsion polymers, aluminium, urea, phosphoric acid, sulphuric acid, sulphate, sodium hydroxide.

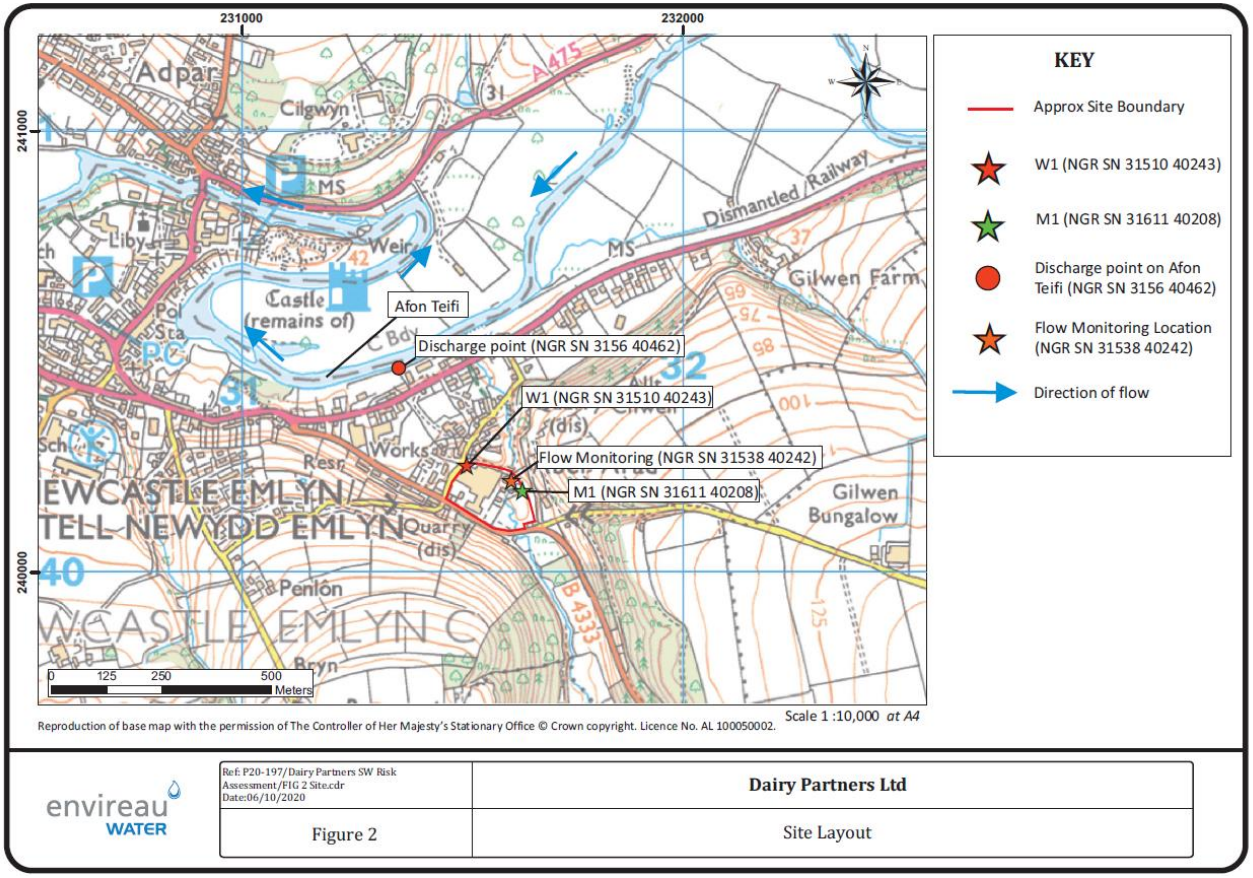
Mercury and Cadmium (priority hazardous substances) are currently listed on the permit and may also be affected by the proposed variation.

The Applicant has proposed a change in some the permitted limits as part of the variation based on the new ETP specification (lowest expected removal efficiencies).

	Existing	**Proposed**
Maximum daily discharge volume	1050 m^3/day (Max)	900 m^3/day (Max)
pH	-	6 - 9
Temperature	21 degrees Celsius (Max)	21 degrees Celsius (Max)
Chemical Oxygen Demand (COD)	120 mg/L (Max)	110 mg/L (Max)
Biological Oxygen Demand (BOD)	-	20 mg/L (Max)
Total suspended solids (TSS)	50 mg/L (Max)	30 mg/L (Max)
Ammonia as N	22 mg/L (Max)	10 mg/L (Max)
Nitrite as N	3 mg/L (Max)	1.0 mg/L (Max)
Total phosphate as P	-	1.0 mg/L (Max) (BAT ELV 2mg/L)
Aluminium	-	1.0 mg/L (Max)
Mercury	0.5 µg/L (Max)	0.5 µg/L (Max)
Cadmium	0.01 mg/L (Max)	0.525 µg/L (Max)

Note that a variation application for this proposal was previously submitted and was subsequently refused on 28/06/2021 (application reference PAN-010733). Refusal reasons were primarily related to the ETP's containment measures, please see PAN-010733 Dairy Partners Refusal Decision Document.pdf.for more information).

	An assessment of the proposal in accordance with WFD targets at that time was undertaken. In light of the conclusions of a detailed compliance assessment (Stage 3), and taking account of the advice received from technical specialist advisors; the assessment established that the activity/project has **no potential to cause deterioration of any water body or prevent a water body or WFD Protected Area from meeting its objectives**. Please see completed assessment here (saved to DMS, dated 15/03/2021). The applicant is now re-applying for the variation. There are no changes to the proposed ETP process, discharge rate or the composition of the treated effluent. The same surface water risk assessment as the original application has been resubmitted to support this current application. An updated WFD assessment is required to assess if the proposed limits are acceptable against current guidance and water quality targets. The modelling and assessment completed by NRW to support the previous application's assessment will be used. Relevance of the existing assessment conclusions for this current application will be discussed in detail below.
Relevant legislation	Environmental Permitting Regulations 2016
List other permissions that may be required where known	Planning Permission
Location (include map where appropriate)	The Creamery, Aberarad, Newcastle Emlyn, Carmarthenshire, SA38 9DQ The discharge is to the Afon Teifi at National Grid Reference: SN 31356 40462



Application documents	Please find all documents associated with the application on the relevant DMS folder here: EPR-WP3231NB (sharepoint.com) (dated 24/02/20223)
Environmental Statement	N/A
List ongoing maintenance requirements	The permit will require a management system to be in place to control the process and discharge quality. The Management system will also ensure risk is managed and will include ongoing maintenance works.
Timing of works	The new ETP is operational.

Pre-application correspondence	Advice to Operator on submission of new application (13/10/2021) Permit Application forms and required documents – Advice to operator (22/10/2021)
NRW team responsible for drafting this WFD Compliance Assessment report, and name of lead officer	Team: Regulated Industry & RSR Permitting Team Officer: Jennifer McGuire (Senior Permitting Officer, Installations & RSR Permitting Team)
Date of assessment	05/01/2023

Stage 1, step 2 : Collate baseline information on all water bodies at risk from the proposal

Date of classification information: 2021 C3 Classification

Water body ID	Water body name	Water body type	HMWB	Overall water body status	Morphology status*	Relevance to the proposal
GB110062043564	Teifi - Afon Clettwr to Afon Ceri	River	Natural	Good	Assumed good	Proposal is hydrologically linked – **at risk**
GB110062043563	Teifi – Afon Ceri to estury	River	Natural	Moderate	Assumed good	Proposal is hydrologically linked – **not at risk**
GB511006206900	Teifi Estuary	Transitional	Natural	Moderate	Assumed good	Proposal is hydrologically linked – **not at risk**

*where there is no information, or a null value then assume it is at good status for morphology (or hydromorphology for TraC water bodies) or, if the water body is designated HMWB the morphological status is not applicable (please be aware that these water bodies are still sensitive to physical modifications).

Stage 1, Step 3: Risk Screening - complete for each water body listed above that is either in the water body or hydrologically linked with potential risk.

Note that for the purposes of this assessment, the small non-reportable body into which the discharge is directly into will be assessed together with 'Teifi – Afon Clettwr to Afon Ceri' due to the close proximity of the waterbodies and them having the same status.

Water body name: Teifi - Afon Clettwr to Afon Ceri Water body ID: GB110062043564			
Question number	**Risk screening questions**	**Name of activity**	**Screening decision – delete as appropriate**
Q1.1	**Is the proposal in a water body at high status or high status for morphology or hydromorphology?**	N/A	**No** – go to Q1.2
Q1.2	**Is the activity listed in Annex D as a green activity?**	Water Discharge – Addition of:	**Yes** – screened out in H1 assessment (see Annex 1)

Water body name: Teifi - Afon Clettwr to Afon Ceri Water body ID: GB110062043564			
Question number	**Risk screening questions**	**Name of activity**	**Screening decision – delete as appropriate**
		• Aluminium • Sulphate • Mercury • Cadmium	
		Water Discharge – all other determinands / chemicals	**No –** complete scoping assessment for each water body
Q1.3	Are there any potential cumulative/in combination impacts? Or is there Local Expert Override*?	N/A	N/A
Q1.4	Is the water body at Good overall status?	N/A	N/A
Q1.5	Record best practice measures that the works include to help achieve the objectives of the water body.	N/A	

Stage 2: Scoping Assessment

Stage 2, step 1 – Relate activity to water body quality elements

Scoping table for River and Lake water bodies Water body name: Small non-reportable water body (known as Afon Arad) / Teifi - Afon Clettwr to Afon Ceri Water body ID: GB110062043564			
Elements	**Applicable**	**Potential Impact** (include direct and indirect potential impacts)	**Avoidance measures included in the proposal**
Rivers and Lake water bodies	Choose one of the following: **Direct** – risk of direct impact **Indirect** – risk of indirect impact **N/A – no impact pathway** **N/A – other** – include additional text to explain	Further detail on potential impacts. Where N/A is included then provide detail to explain.	Briefly describe any measure included within the proposal at this point that will ensure the potential effects are avoided. Where impacts can be avoided through measures already included in the scheme then add **Scoped Out**. Or where further assessment is required add **Scoped In**
Hydromorphology – hydromorphology constitutes both 'hydrology' and 'geomorphology' and describes the physical characteristics and processes of a water body. ***Could the proposal lead to:***			
• changes to flows, for example, changes to wetted width or depth profile, • abstraction of water (changes to quality and dynamics of water flow), • changes the physical form including structure and substrate of the river/lake bed or connection to groundwater, • or alter the process of sediment transport (erosion, deposition or transfer)?	**N/A – no impact pathway** The proposed change in flow is small (1,050 m^3/day to 900 m^3/day) and not anticipated to cause a change to the hydromorphology of the river.	N/A	N/A
Is the proposal in a HMWB?	**No**	N/A	N/A
Water quality An activity can modify the flow of water, introduce artificial materials or remove sediment and/or vegetation. These can all affect the water quality – particularly physico-chemical aspects of water quality - such as levels of dissolved oxygen, nutrients and ammonia. **Include water quality in the detailed assessment if the activity could affect:**			
• water clarity (turbidity or suspended particulate matter concentration)	**Direct – risk of direct impact**	The ETP process is changing as part of this variation which will	**Scoped out – no further assessment required.**

Scoping table for River and Lake water bodies Water body name: Small non-reportable water body (known as Afon Arad) / Teifi - Afon Clettwr to Afon Ceri Water body ID: GB110062043564			
Elements	**Applicable**	**Potential Impact** (include direct and indirect potential impacts)	**Avoidance measures included in the proposal**
• temperature • oxygen levels • nutrients: total phosphorus concentration (Lakes); soluble reactive phosphorus concentration (Rivers). • salinity/conductivity • acidification status		result in the composition of the treated effluent to change. The discharge will contain concentrations of sanitary determinands: • Ammonia • Orthophosphate • BOD The parameters could also be affected: • Flow • Temperature changes • pH Therefore, the variation could affect: • water clarity (turbidity or suspended particulate matter concentration) • temperature • oxygen levels • nutrients: total phosphorus concentration (Lakes); soluble reactive phosphorus concentration (Rivers). • salinity/conductivity • acidification status	The application is to permit the upgraded ETP. The new ETP uses a modern effluent treatment process and will lead to improvements in the water quality of the treated discharge. A surface water risk assessment was provided by the Applicant. This was the same assessment submitted for the previous application (PAN-017033) which was considered unsatisfactory due to the following factors: • Afon Teifi existing surface water quality data was not appropriate as was sourced from one sample at three locations • The applicant had not used River Quality Planning (RQP) software to model impacts of sanitary determinands • The applicant had not assessed all of the chemical additives used in the effluent treatment plant Therefore, NRW undertook further assessment to determine the impact of the proposed new discharge on the receiving waterbody and compare it to the existing permitted discharge. This assessment included water quality modelling using RQP and comparing results to the relevant limits.
Chemicals - A detailed assessment will also be required if the activity uses or releases chemicals, for example, through sediment disturbance or building works. This is necessary when either the:			
• chemicals are on the Environmental Quality Standards Directive (EQSD) list • or, if the activity releases chemicals on the EQSD list and has a mixing zone, like a	**Direct – risk of direct impact**	The ETP process is changing as part of this variation causing the composition of the discharge to	

Scoping table for River and Lake water bodies Water body name: Small non-reportable water body (known as Afon Arad) / Teifi - Afon Clettwr to Afon Ceri Water body ID: GB110062043564			
Elements	**Applicable**	**Potential Impact** (include direct and indirect potential impacts)	**Avoidance measures included in the proposal**
discharge pipeline or outfall, follow the Environment Agency's surface water pollution risk assessment guidance. This is part of the Environmental Permitting Regulations guidance.		change. Pollutants that need to be considered are: • Anionic and cationic emulsion polymers • Urea (CH4N2O) • Phosphoric acid (H3PO4) • Sulphuric acid (H2SO4) • Sodium Hydroxide (NaOH) Other chemicals associated with the discharge have been screened out at stage 1 of this assessment.	The proposed reduction in daily discharge volume and reduction in concentration of sanitary determinands discharged was found to ensure that both BOD and Ammonia will comply with the relevant targets. Whilst orthophosphate concentrations where shown to be in excess of the relevant target, the proposal will result in a large reduction in discharged orthophosphate load and can be seen as a large improvement. The proposed pH and temperature standards were deemed appropriate when reviewing the relevant WFD classification boundaries. The limits proposed by the Applicant for based on the ETP specification (see stage 1, step 1 'Project Details') are considered appropriate and will be listed on the varied permit. The limits proposed by the Applicant for Mercury and Cadmium were deemed appropriate and will be listed on the permit. No other numeric limits on chemicals were considered necessary due to existing controls in the permit (such as

Scoping table for River and Lake water bodies Water body name: Small non-reportable water body (known as Afon Arad) / Teifi - Afon Clettwr to Afon Ceri Water body ID: GB110062043564			
Elements	**Applicable**	**Potential Impact** (include direct and indirect potential impacts)	**Avoidance measures included in the proposal**
			the Environmental Management Systems and other limits). Please see Appendix 1 and 2 for full discussion on modelling and assessment results.
Biology Expert judgement will be required to consider whether any changes to the hydromorphology or water quality brought about by the project will potentially impact upon the Biological Quality Elements (BQEs) and may cause deterioration in status. • Identify if the activity or project could impact on the abundance or composition of the following biological elements: benthic invertebrates, phytoplankton, macrophytes and phytobenthos or fish. ***Could the proposal lead to:***			
• changes to the composition and abundance of aquatic flora, and or; • changes to the composition and abundance of benthic invertebrate fauna?	**Indirect** – risk of indirect impact	Changes in water quality could cause changes in composition and abundance of aquatic flora and/or benthic invertebrate fauna	**Scoped out – no further assessment required.** As impacts from changes in water quality have been scoped out (see above), there is no anticipated in-direct impacts on biological elements.
Fish fauna: could the proposal lead to:			
• changes to the composition, abundance and age structure of fish fauna, • an impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow), • entrainment or impingement of fish, • refuge/predation areas?	**Indirect** – risk of indirect impact	Changes in water quality could cause changes in composition and abundance of fish fauna or impact on normal fish behaviour.	**Scoped out – no further assessment required.** As impacts from changes in water quality have been scoped out (see above), there is no anticipated in-direct impacts on fish fauna.

WFD Protected Areas

If the proposed activity is within, or hydrologically connected to, a Protected Area. If the activity is hydrologically linked, then as a general rule those Protected Areas within 2 km of the proposed activity will be most at risk.

Protected Areas and Critical sensitive habitats/species		
Consider if Protected Areas are at risk from the proposal. These include:	Applicable	How have you considered the potential impacts?
Protected Areas:		
• SACs	**Yes**	An OGN 200 HRA Form 1 will be completed to assess impact on Afon Teifi SAC
• SPAs	No	
• RAMSAR	No	
• Bathing Waters	No	
• Shellfish Waters	No	
• Surface Water Drinking Water Protected Areas	No	
• Ground Water Drinking Water Protected Areas	No	
• Urban Waste Water Treatment Directive: designated Nutrient Sensitive Area	No	
• Nitrate Vulnerable Zones	No	
Other Protected and Priority habitats and species.		
• Nationally or locally protected areas e.g. SSSI, NNR etc	**Yes**	An Appendix 4 assessment will be completed to assess impact on Afon Teifi SSSI and Old Cilgwyn and Cae Heslop SSSI
Section 6 Biodiversity and resilience of ecosystems duty (Environment (Wales) Act 2016) here - other Protected and Priority habitats and species. The S6 duty requires that public authorities must seek to maintain and enhance biodiversity so far as consistent with the proper exercise of their functions and in so doing promote the resilience of ecosystems. Identify if there is a risk that the activity/project could impact on a water dependant priority habitat and or species which are either critical to the ecological health of the water body or sensitive to changes proposed on the water body.		
• Section 7 list of priority habitats e.g. wetlands	**Yes**	HRA Form 1 and Appendix 4 Assessments
• Section 7 list of priority species e.g. water voles	**Yes**	HRA Form 1 and Appendix 4 Assessments
Ecosystem Resilience The Environment (Wales) Act 2016, Section 3 states that the objective of the sustainable management of natural resources is to maintain and enhance the resilience of ecosystems and the benefits they provide now and for future generations		
Consideration of ecosystem resilience – diversity, extent, condition, connectivity.	N/A	N/A – if a permit variation is granted a high level of protection will be delivered for the environment through

Protected Areas and Critical sensitive habitats/species		
Consider if Protected Areas are at risk from the proposal. These include:	Applicable	How have you considered the potential impacts?
		the operation of the Installation in accordance with the permit conditions.

Summary of step 1 scoping

Q2.1 Is there a risk that a component of the proposal may cause deterioration of any element that makes up water body status?	**NO** – all potential impacts have been assessed considering the avoidance measures already included in the proposal and there are **no anticipated risks** to any water body quality element or risk of deterioration.

Stage 2, : Step 2 Summary of scoping decision of the project 'alone'

Q2.2 Is there a risk that a component of the proposal may prevent the water body or Protected Area from achieving its objectives in the future?	**NO** - all potential impacts have been assessed considering the avoidance measures already included in the proposal and there is **no perceived risk** to any water body or protected area from achieving its objects in the future.

Stage 2, step 3: Assessing potential in combination and/or cumulative impacts

Are there any activities or projects which may act in combination and/or cumulative?	**Nature of the in-combination/cumulative effect (if any)**	**Avoidance measures** Include details of how measures already included in the proposal would be applied, and who would be responsible for applying them.	**Can the risk of deterioration or prevention of achieving water body objectives from in combination/ cumulative effects be ruled out?** **'YES'** (or N/A) ***or*** **'NO'** (where there is any uncertainty then add **'**Don't know/uncertain')
N/A – there are no relevant permit applications 10 km upstream or downstream of the discharge point. Therefore, impacts will not be compounded by other proposals that can act 'in combination'.			N/A
Scoping decision of the project cumulatively or 'in combination'		**Potential cumulative/in combination impacts conclusion**	
Q2.3 Can the risk of deterioration or prevention of achieving	**(a) If the right-hand column is 'YES' or 'N/A' in all cases**	It **can** be concluded that potential deterioration or prevention of achieving water body objectives from in combination / cumulative effects can be ruled out	

Are there any activities or projects which may act in combination and/or cumulative?	Nature of the in-combination/cumulative effect (if any)	**Avoidance measures** Include details of how measures already included in the proposal would be applied, and who would be responsible for applying them.	**Can the risk of deterioration or prevention of achieving water body objectives from in combination/ cumulative effects be ruled out?** **'YES'** (or N/A) ***or*** **'NO'** (where there is any uncertainty then add **'**Don't know/uncertain')
water body objectives from in combination and or cumulative effects be ruled out?			

Stage 2, Step 4: Overall scoping decision

Overall scoping decision **Q2.4 Is there a potential risk that the proposal may cause deterioration or prevent a water body from meeting its objectives either alone or in combination?**	There is **no risk** of deterioration or prevention of the water body achieving its objectives as a result of the proposal, either alone or in combination/cumulative, and no further consideration under the WFD Regulations 2017 is required in order to determine the application.

Conclusion of WFD Regulations 2017 Compliance Assessment & Authorisation

WFD stage 2 scoping has been completed and the activity/project is considered as having **no risk of causing deterioration or preventing any water body or WFD Protected Area from reaching its objectives** and taking account of the advice from technical officers - is considered compliant with the WFD Regulations 2017.	
Name of authorising officer	Jennifer McGuire
Job title and date	Senior Officer, Installations and RSR Permitting Team

Technical specialist comments	*Agree with the conclusion of the assessment, this is a betterment over all to the environment.*
Name, job title and date	James Wakeford Lead Specialist Water Quality Permitting.

Consultation with technical advisors/specialists

Relevant section of the WFD compliance assessment	**Date of correspondence* and any meeting with technical advisor and include the name of the technical advisor**	**Description of how the comments from technical advisors have been considered**
All sections	04/01/2023 – 16/01/2023 Meetings regarding approach and content of the Assessment and final review - James Wakeford	Modelling used for previous assessment considered appropriate for current assessment. Conclusions of assessment agreed with (see sign off above)

The below modelling and assessments were completed to support the WFD Assessment for the previous application for this proposal (application number PAN-010733) in March 2021. As discussed, that application was subsequently refused, and the Applicant has now re-applied. Whilst the Applicant's proposal in terms of the ETP process is the same for this application, there is a need to re-assess the proposal against current guidance and targets. We have scrutinised the modelling and assessment done for the previous application as part of this assessment to check if the conclusions still apply. We have concluded they are still applicable. Please see highlighted yellow text in the appendices below for more information.

Appendix 1 – Assessment of Sanitary Determinands:

PAN-010733
Water Quality Assessment Audit (sanitary determinands)

Background

The variation is to upgrade the effluent treatment plant at The Creamery, Aberarad operated by Dairy Partners (Cymru Wales) Limited. The effluent treatment process is changing therefore the composition of the effluent will change as new dosing chemicals have been introduced (these have been assessed in the H1 assessment).
There is a decrease of permitted discharge volume from 1050 m^3/day to 900 m^3/day. The current permit limit for ammonia (22 mg/L) is being reduced to 10 mg/L. There are limits being added to the permit for:
Total phosphate as P - 1.0 mg/L
Biological oxygen demand (BOD) – 20 mg/L
In order to review the effect on the water quality of the proposed changes, water quality modelling was undertaken in RQP to establish the impact of the current activity vs the proposed activity just downstream of the discharge point. Inputs into the models have been summarised in the below table:

The applicant has applied for the same change in limits to ammonia, BOD and phosphate for this current application.

Upstream (U/S) River Quality Data			
U/S River Quality	**Mean**	**Std.Dev**	**Comments on U/S Quality Data**
orthophosphate	24 (ug/l)	21 (ug/l)	These values are from samples taken over the years 2012-2014 from 'Teifi – Henllan Bridge'. This sample point is 6km upstream and represents the most applicable
Ammonia	30.4 (ug/l)	27 (ug/l)	

BOD	1.29 (mg/l)	0.81 (mg/l)	background concentration data for use within the risk assessments. It should be noted that whilst the data is 6-8 years old, there have been no significant changes upstream in the catchment that would render these results invalid. Ammonia and orthophosphate were converted to ug/l from mg/l as RQP can only model to 2 decimal places.
U/S River Flow	**Mean (m3/day)**	**Q95 (m3/day)**	**Comments**
Flow Estimate	1,892,160	214,790	Data supplied by NRW Internal Hydrology Team as per email saved on the DMS folder. Slight variance between this flow data and the flow data used by the applicant in their assessments.
Effluent Quality	**Mean**	**Std.Dev**	**Comments**
Orthophosphate (current impact model) Orthophosphate (proposed impact model) BOD (current impact model) BOD (proposed impact model)	12150 ug/l 1000 (ug/l) 30 (mg/l) 20 (mg/l)	12150 ug/l 1000 ug/l 30 (mg/l) 20 (mg/l)	I have modelled to review the estimated impacts at the discharge point of the existing permitted effluent quality: Ammonia 22000ug/l and BOD 30mg/l as per the historic consents BN6293IK and FP3434UB and the values for phosphate are as per the sampling results that accompanied the original permit application. I have then compared these results to the proposed effluent quality limits

Ammonia (current impact model) Ammonia (proposed impact model)	22000 (ug/l) 10000 (ug/l)	22000 (ug/l) 10000 (ug/l)	(10000ug/l ammonia, 20mg/l BOD and 1000ug/l orthophosphate). In the absence of more complete reporting data, current impact models assume the concentration within the effluent currently is at the fully permitted load.
Effluent Volume	**Mean (m3/day)**	**Std.Dev (m3/day)**	**Comments**
Effluent volume (current impact model Effluent volume (proposed impact model)	1050 900	0 0	Again, in the absence of abundant historical reporting data, the models have been undertaken to establish impact should the fully permitting existing volume and proposed maximum discharge volume be utilised.

We consider the data used in the modelling for the previous assessment to still be appropriate for the purposes of this risk assessment.

Predicted current impact downstream of discharge point – BOD

MASS BALANCE CALCULATION: MONTE CARLO METHOD				
Version 2.5				
Calculations done on 19/01/2021 at 14.37				
Name of discharge	Dairy Partners (Current impact - 1050m3/day at 30mg/l)			
Name of river	Teifi			
Name of determinand	BOD (mg/l)			
INPUT DATA			**RESULTS**	
UPSTREAM RIVER DATA			**RIVER DOWNSTREAM OF DISCHARGE**	
Mean flow	1892160.0		Mean quality	1.35
95% exceedence flow	214790.0		Standard deviation of quality	0.83
Mean quality	1.29		90-percentile quality	2.31
Standard deviation of quality	0.81		95-percentile quality	2.82
90-percentile	2.29		99-percentile quality	4.17
DISCHARGE DATA			**DISCHARGE QUALITY**	
Mean flow	1050.0		Mean quality	30.85
Standard deviation of flow	0.00		Standard deviation of quality	28.41
Mean quality	30.00		95-percentile quality	84.90
Standard deviation of quality	30.00		99-percentile quality	142.79
... or 95-percentile	83.44		99.5-percentile quality	164.40

The model above demonstrates the current mean BOD concentration immediately downstream of the discharge point is **1.34 mg/l** and the 90%ile quality immediately downstream is **2.31 mg/l**

As the data used in the modelling is considered to still be appropriate, this results still applies.

Predicted impact downstream of discharge point as a result of the proposal – BOD

MASS BALANCE CALCULATION: MONTE CARLO METHOD				
Version 2.5				
Calculations done on 19/01/2021 at 14.38				
Name of discharge	Dairy Partners (Proposed impact - 900m3/day at 20mg/l)			
Name of river	Teifi			
Name of determinand	BOD (mg/l)			
INPUT DATA			**RESULTS**	
UPSTREAM RIVER DATA			**RIVER DOWNSTREAM OF DISCHARGE**	
Mean flow	1892160.0		Mean quality	1.33
95% exceedence flow	214790.0		Standard deviation of quality	0.83
Mean quality	1.29		90-percentile quality	2.29
Standard deviation of quality	0.81		95-percentile quality	2.81
90-percentile	2.29		99-percentile quality	4.16
DISCHARGE DATA			**DISCHARGE QUALITY**	
Mean flow	900.00		Mean quality	20.57
Standard deviation of flow	0.00		Standard deviation of quality	18.94
Mean quality	20.00		95-percentile quality	56.60
Standard deviation of quality	20.00		99-percentile quality	95.20
... or 95-percentile	55.62		99.5-percentile quality	109.60

The model above demonstrates that should the total daily discharge volume reduce to 900 cubic metres and BOD concentration be limited to 20mg/l in the effluent, BOD concentrations immediately downstream of the discharge point would be **1.32 mg/l** and the 90%ile quality immediately downstream would be **2.29 mg/l**

As the data used in the modelling is considered to still be appropriate, this result still applies.

Predicted current impact downstream of discharge point – Ammonia

MASS BALANCE CALCULATION: MONTE CARLO METHOD				
Version 2.5				
Calculations done on 19/01/2021 at 14.42				
Name of discharge	Dairy Partners (Current impact - 1050m3/day at 10mg/l)			
Name of river	Teifi			
Name of determinand	Ammonia (ug/l)			
INPUT DATA			**RESULTS**	
UPSTREAM RIVER DATA			**RIVER DOWNSTREAM OF DISCHARGE**	
Mean flow	1892160.0		Mean quality	65.78
95% exceedence flow	214790.0		Standard deviation of quality	66.99
Mean quality	30.40		90-percentile quality	130.20
Standard deviation of quality	27.00		95-percentile quality	174.59
90-percentile	60.39		99-percentile quality	368.02
DISCHARGE DATA			**DISCHARGE QUALITY**	
Mean flow	1050.0		Mean quality	22625.2
Standard deviation of flow	0.00		Standard deviation of quality	20836.6
Mean quality	22000.0		95-percentile quality	62260.6
Standard deviation of quality	22000.0		99-percentile quality	104715.0
... or 95-percentile	61187.3		99.5-percentile quality	120557.0

The model above demonstrates the current 90%ile ammonia concentration immediately downstream is **0.130 mg/l**

As the data used in the modelling is considered to still be appropriate, this result still applies.

Predicted impact downstream of discharge point as a result of the proposal – Ammonia

MASS BALANCE CALCULATION: MONTE CARLO METHOD				
Version 2.5				
Calculations done on 19/01/2021 at 14.41				
Name of discharge	Dairy Partners (Proposed impact - 900m3/day at 10mg/l)			
Name of river	Teifi			
Name of determinand	Ammonia (ug/l)			
INPUT DATA			**RESULTS**	
UPSTREAM RIVER DATA			**RIVER DOWNSTREAM OF DISCHARGE**	
Mean flow	392160.0		Mean quality	44.37
95% exceedence flow	214790.0		Standard deviation of quality	36.71
Mean quality	30.40		90-percentile quality	85.35
Standard deviation of quality	27.00		95-percentile quality	109.14
90-percentile	60.39		99-percentile quality	190.02
DISCHARGE DATA			**DISCHARGE QUALITY**	
Mean flow	900.00		Mean quality	10284.2
Standard deviation of flow	0.00		Standard deviation of quality	9471.2
Mean quality	10000.0		95-percentile quality	28300.3
Standard deviation of quality	10000.0		99-percentile quality	47597.7
... or 95-percentile	27812.4		99.5-percentile quality	54798.6

The model above demonstrates that should the total daily discharge volume reduce to 900 cubic metres and ammonia concentration be limited to 10mg/l in the effluent, 90%ile ammonia concentration immediately downstream would be **0.0854 mg/l**

As the data used in the modelling is considered to still be appropriate, this result still applies.

Predicted current impact downstream of discharge point – Orthophosphate

MASS BALANCE CALCULATION: MONTE CARLO METHOD				
Version 2.5				
Calculations done on 19/01/2021 at 14.43				
Name of discharge	Dairy Partners (Current impact - 1050m3/day at 12.15mg/l)			
Name of river	Teifi			
Name of determinand	Orthophosphate (ug/l)			
INPUT DATA			**RESULTS**	
UPSTREAM RIVER DATA			**RIVER DOWNSTREAM OF DISCHARGE**	
Mean flow	1892160.0		Mean quality	43.60
95% exceedence flow	214790.0		Standard deviation of quality	39.99
Mean quality	24.00		90-percentile quality	87.24
Standard deviation of quality	21.00		95-percentile quality	111.40
90-percentile	47.46		99-percentile quality	231.63
DISCHARGE DATA			**DISCHARGE QUALITY**	
Mean flow	1050.0		Mean quality	12495.3
Standard deviation of flow	0.00		Standard deviation of quality	11507.5
Mean quality	12150.0		95-percentile quality	34384.8
Standard deviation of quality	12150.0		99-percentile quality	57831.2
... or 95-percentile	33792.1		99.5-percentile quality	66580.3

The model above demonstrates the current mean orthophosphate concentration immediately downstream is **0.044 mg/l**

As the data used in the modelling is considered to still be appropriate, this result still applies.

Predicted impact downstream of discharge point as a result of the proposal – Orthophosphate

MASS BALANCE CALCULATION: MONTE CARLO METHOD				
Version 2.5				
Calculations done on 19/01/2021 at 14.44				
Name of discharge	Dairy Partners (Proposed impact - 900m3/day at 1mg/l)			
Name of river	Teifi			
Name of determinand	Orthophosphate (ug/l)			
INPUT DATA			**RESULTS**	
UPSTREAM RIVER DATA			**RIVER DOWNSTREAM OF DISCHARGE**	
Mean flow	392160.0		Mean quality	25.68
95% exceedence flow	214790.0		Standard deviation of quality	29.23
Mean quality	24.00		90-percentile quality	51.60
Standard deviation of quality	27.00		95-percentile quality	70.36
90-percentile	50.80		99-percentile quality	130.31
DISCHARGE DATA			**DISCHARGE QUALITY**	
Mean flow	900.00		Mean quality	1028.4
Standard deviation of flow	0.00		Standard deviation of quality	947.12
Mean quality	1000.0		95-percentile quality	2830.0
Standard deviation of quality	1000.0		99-percentile quality	4759.8
... or 95-percentile	2781.2		99.5-percentile quality	5479.9

The model above demonstrates that should the total daily discharge volume reduce to 900 cubic metres and orthophosphate concentration be limited to 1 mg/l in the effluent, mean orthophosphate concentration immediately downstream would be **0.0257 mg/l**

As the data used in the modelling is considered to still be appropriate, this results still applies.

Ammonia in Relation to Habitats and WFD Targets

Ammonia in relation to the Habitats Directive (JNCC CSM targets) - The table below demonstrates the organic pollutant standards relevant to all riverine SACs as published in 'Common Standards Monitoring Guidance for Rivers: (Version September 2016)':

Attribute	Target
10%ile DO (% saturation)	85
Mean BOD (mg L^{-1})	1.5
90%ile total ammonia (NH_3-N, mg L^{-1})	0.25
95%ile un-ionised ammonia (NH_3-N, mg L^{-1})	0.025

As the discharge is directly into the Afon Teifi SAC, the 90%ile total ammonia must be below the 0.25 stated target in the table above. The predicted current impact from the modelling above is a downstream 90%ile of 0.130 mg/l, the predicted impact is 0.0854 mg/l, the reduction in discharged load will result in more compliance headroom in relation to the Habitats Directive ammonia target.

Furthermore, the reduction in daily discharge volume and tightening of the ammonia concentration will reduce the daily load discharged from 0.0231 kg/day to 0.009 kg/day, a reduction in discharged load of 0.0141 kg/day.

The Ammonia target for habitats used in the previous assessment above has been compared to the current target as detailed in the Core Management Plan for the Afon Teifi / River Teifi SAC (Version 4, dated September 2022). Ammonia targets under current guidance now vary by waterbody. For this water body (Teifi - Afon Clettwr to Afon Ceri, GB110062043564) the target for 'total ammonia (90%ile mg l^{-1})' is 0.2. This is tighter than the limit that the results were previously assessed against, but the predicted impact is (0.0854 mg/L) still below the target and the proposal is still anticipated to reduce overall loading of ammonia. This conclusion therefore still applies.

Ammonia in relation to the WFD target – Due to the altitude and alkalinity of the receiving watercourse, Typology 1 standards for ammonia/BOD have been utilised for the assessment:

Table 7

Ammonia standards for rivers (rivers categorised by type in accordance with paragraph 1(1) of Schedule 2)				
Total Ammonia as nitrogen (mg/l)				
(90 percentile)				
Type	High	Good	Moderate	Poor
1, 2, 4 and 6	0.2	0.3	0.75	1.1
3, 5 and 7	0.3	0.6	1.1	2.5

This means to ensure the receiving watercourse remains in 'high' classification, the 90%ile ammonia concentration must remain below 0.2 mg/l.

The modelling demonstrates the watercourse at the discharge point is currently within 'high' classification and the reduction in discharged load will ensure this classification is maintained with more compliance headroom available.

The Ammonia target for WFD used in the previous assessment was taken from The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (legislation.gov.uk). The target has not changed and therefore this conclusion still applies.

Orthophosphate in Relation to Habitats and WFD Targets

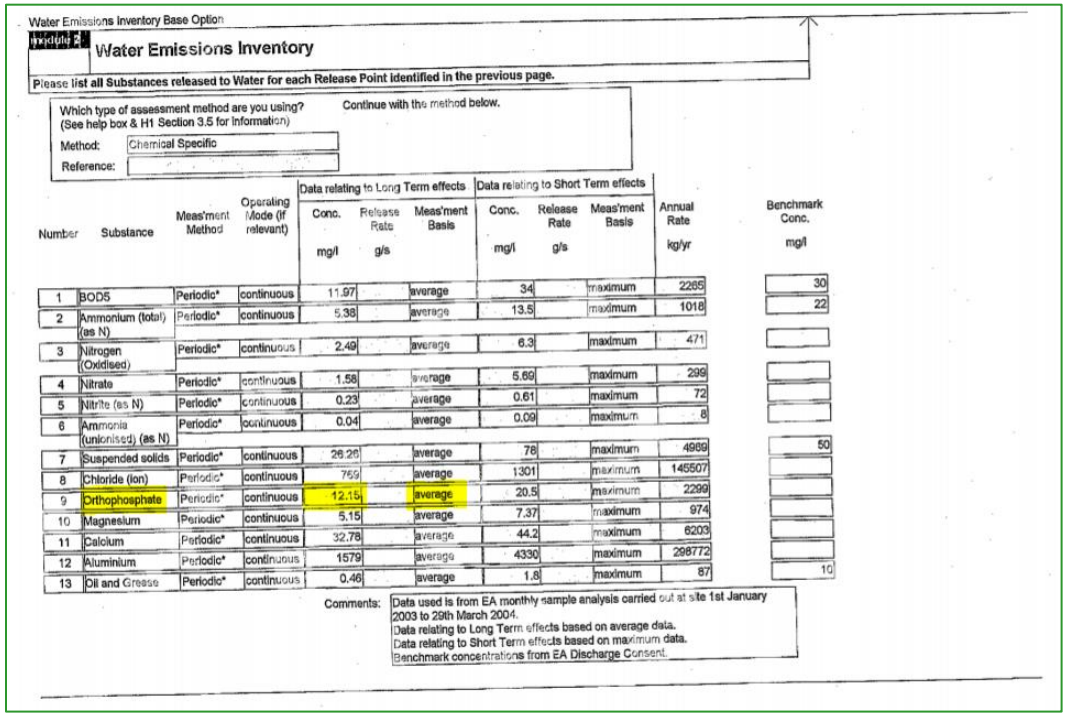
Orthophosphate in relation to the relevant targets - The table below is taken from the Afon Teifi SAC Core Management Plan and it outlines the relevant orthophosphate target for the receiving watercourse (highlighted):

Table A4. Phosphate target and typology for all waterbodies in or draining into the Afon Teifi SAC.

Water Body Name	Water Body ID	Type	Phosphate target (mg/L)	Reason
Brefi - headwaters to confluence with Teifi	GB110062039250	HL	0.010	CSM (max allowable)
Cerdin - headwaters to confluence with Teifi	GB110062039140	LL	0.030	CSM (max allowable)
Ceri - Dulas to conf Teifi	GB110062039110	LL	0.040	CSM (max allowable)
Ceri - headwaters to conf Dulas	GB110062039190	LL	0.030	CSM (max allowable)
Cledlyn - headwaters to confluence with Teifi	GB110062039150	HL	0.005	CSM (near natural)
Clettwr - headwaters to confluence with Teifi	GB110062039220	LL	0.030	WFD (good)
Cych - headwaters to confluence with Teifi	GB110062039041	LL	0.020	WFD (high)
Dulas - headwaters to confluence with Cych	GB110062039010	LL	0.020	WFD (high)
Dulas - headwaters to conf Teifi	GB110062039240	HL	0.020	CSM (max allowable)
Grannell - headwaters to confluence with Teifi	GB110062039230	HL	0.020	CSM (max allowable)
Groes - headwaters to confluence with Teifi	GB110062043490	HL	0.010	CSM (near natural)
Talog - headwaters to confluence with Tyweli	GB110062038980	HL	0.010	CSM (max allowable)
Teifi - conf Fflur to conf Brennig	GB110062043501	HL	0.010	CSM (near natural)
Teifi - Afon Brennig to Afon Dulas	GB110062043566	HL	0.010	CSM (near natural)
Teifi - Afon Ceri to estuary	GB110062043563	LL	0.020	WFD (high)
Teifi - Afon Clettwr to Afon Ceri	GB110062043564	LL	0.020	WFD (high)
Teifi - Afon Dulas to Afon Clettwr	GB110062043565	HL	0.010	CSM (near natural)
Teifi - headwaters to confluence with Meurig	GB110062043540	HL	0.010	CSM (max allowable)
Tyweli - confluence with Talog to confluence with Teifi	GB110062039020	LL	0.034	WFD (good)

The 0.020 mg/l target is set as a mean. As this WFD target in the table is tighter than the applicable CSM/JNCC target for the receiving watercourse, this is the target that should be adhered to.

From reviewing historical documents, a H1 risk assessment supporting a previous application (2005) demonstrates that the in situ effluent treatment plant is capable of treating to a mean of 12.15 mg/l orthophosphate:



Water Emissions Inventory Base Option

Schedule 2 **Water Emissions Inventory**

Please list all Substances released to Water for each Release Point identified in the previous page.

Which type of assessment method are you using? (See help box & H1 Section 3.5 for information) Continue with the method below.

Method: Chemical Specific

Reference:

Number	Substance	Meas'ment Method	Operating Mode (if relevant)	Data relating to Long Term effects			Data relating to Short Term effects			Annual Rate	Benchmark Conc.
				Conc. mg/l	Release Rate g/s	Meas'ment Basis	Conc. mg/l	Release Rate g/s	Meas'ment Basis	kg/yr	mg/l
1	BOD5	Periodic*	continuous	11.97		average	34		maximum	2265	30
2	Ammonium (total) (as N)	Periodic*	continuous	5.38		average	13.5		maximum	1018	22
3	Nitrogen (Oxidised)	Periodic*	continuous	2.49		average	6.3		maximum	471	
4	Nitrate	Periodic*	continuous	1.58		average	5.69		maximum	299	
5	Nitrite (as N)	Periodic*	continuous	0.23		average	0.61		maximum	72	
6	Ammonia (unionised) (as N)	Periodic*	continuous	0.04		average	0.09		maximum	8	
7	Suspended solids	Periodic*	continuous	26.26		average	78		maximum	4989	50
8	Chloride (ion)	Periodic*	continuous	759		average	1301		maximum	145507	
9	Orthophosphate	Periodic*	continuous	12.15		average	20.5		maximum	2299	
10	Magnesium	Periodic*	continuous	5.15		average	7.37		maximum	974	
11	Calcium	Periodic*	continuous	32.78		average	44.2		maximum	6203	
12	Aluminium	Periodic*	continuous	1579		average	4330		maximum	298772	
13	Oil and Grease	Periodic*	continuous	0.46		average	1.8		maximum	87	10

Comments: Data used is from EA monthly sample analysis carried out at site 1st January 2003 to 29th March 2004.
Data relating to Long Term effects based on average data.
Data relating to Short Term effects based on maximum data.
Benchmark concentrations from EA Discharge Consent.

More recent data is not available. It should also be noted there is no limit on the current permit.

Modelling the impact of the discharge assuming it still contains 12.15 mg/l orthophosphate shows that concentrations just downstream of the discharge point are currently estimated to be around 0.044 mg/l, which is in excess of the target within the SAC Core Management Plan.

Should the volume and load be reduced in line with the applicants proposals then the mean concentration of orthophosphate downstream of the discharge point would reduce to 0.026 mg/l. Whilst this value is still in excess of the proposed target of 0.02 mg/l, taking into account the reduction in permitted daily discharge volume, the variation will reduce the orthophosphate load discharged per day from 12.7575 kg/day to 0.9 kg/day, a reduction of 11.8575 kg/day or 92.9453 %. Furthermore, placing a 1 mg/l

orthophosphate limit on the permit will ensure the concentrations are closely regulated through regular monitoring and reporting, therefore, the proposal will not cause deterioration in the watercourse with respect to orthophosphate.

The current WFD class boundary for 'good' – 'moderate' for this watercourse is 0.04 mg/l. The phosphorous target for habitats as detailed in the current Core Management Plan for the Afon Teifi / River Teifi SAC (Version 4, dated September 2022) for this water body (Teifi - Afon Clettwr to Afon Ceri, GB110062043564) is 0.02 mg/l. This is tighter than the WFD target and is therefore the applicable target for assessment. As this is the same as the limit as used in the above assessment, the conclusion therefore still applies.

BOD In Relation to Habitats and WFD Targets

BOD in relation to the Habitats Directive (JNCC CSM targets) - The table below demonstrates the organic pollutant standards relevant to all riverine SACs as published in 'Common Standards Monitoring Guidance for Rivers: (Version September 2016)':

Attribute	Target
10%ile DO (% saturation)	85
Mean BOD (mg L^{-1})	1.5
90%ile total ammonia (NH_3-N, mg L^{-1})	0.25
95%ile un-ionised ammonia (NH_3-N, mg L^{-1})	0.025

As the discharge is directly into the Afon Teifi SAC, the mean BOD must be below the 1.5 mg/L stated target in the table above.

The current mean concentration downstream of the discharge point is estimated to be 1.34mg/l, should the applicant implement the improvements proposed, the mean concentration would reduce to 1.32mg/l. Both concentrations are compliant with the JNCC target with ample compliance headroom remaining.

The BOD target for habitats used in the previous assessment above has been compared to the current target as detailed in the Core Management Plan for the Afon Teifi / River Teifi SAC (Version 4, dated September 2022). The target has not changed and therefore this conclusion still applies.

BOD in relation to the Water Framework Directive

The below table demonstrates the class boundaries associated with Type 1 rivers for BOD standards

Table 2

Biochemical oxygen demand (BOD) standards for rivers[i] (rivers categorised by type in accordance with paragraphs 1(1) and 1(2) of Schedule 2)				
Biochemical Oxygen Demand (mg/l)				
(90 percentile)				
Type	High	Good	Moderate	Poor
1, 2, 4, 6 and salmonid	3	4	6	7.5
3, 5 and 7	4	5	6.5	9

[i] Biochemical Oxygen Demand must not be used in classifying the status of water bodies.

Based on the table above, the 90%ile BOD concentration downstream of the discharge point needs to remain below 3 mg/l. Based on the current permitted concentration, the downstream 90%ile is estimated to be 2.31 mg/l, should the operator implement the proposed improvements this would decrease to 2.29 mg/l. Both concentrations ensure the watercourse remains within 'High' classification with ample compliance headroom remaining.

The Ammonia target for WFD used in the previous assessment was taken from The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (legislation.gov.uk). The target has not changed and therefore this conclusion still applies.

pH In Relation to Habitats and WFD Targets

The proposal for a limit of a pH of 6 (minimum) and 9 (maximum) is in line with the WFD targets for a 'High' and 'Good' watercourse (see below), therefore the limit is deemed appropriate.

Table 3

Acid conditions standards in rivers pH – all river types in England and Wales			
High	Good	Moderate	Poor
5 and 95 percentile		10 percentile	10 percentile
>=6 to <=9		4.7	4.2

The target for 'High' and 'Good' watercourses used in the previous assessment was from The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (legislation.gov.uk). The target has not changed and therefore this conclusion still applies.

The Core Management Plan for the Afon Teifi / River Teifi SAC (Version 4, dated September 2022) now includes standards for pH. This waterbody (Teifi - Afon Clettwr to Afon Ceri, GB110062043564) is not considered sensitive to acidification as a result as changes in pH. However, a pH of above 6.54 is recommended (see table below). We consider the Applicant's proposed pH limit of 6-9 to be acceptable in line with this.

Water Body ID	Water Body Name	Acidification risk*	Acid Neutralising Capacity (ANC)	pH
GB110062039140	Cerdin - headwaters to confluence with Teifi	Not at risk	>80	>6.54
GB110062039190	Ceri - headwaters to conf Dulas	Probably not at risk	>80	>6.54
GB110062039220	Clettwr - headwaters to confluence with Teifi	Probably at risk	>80	>6.54
GB110062039230	Grannell - headwaters to confluence with Teifi	Probably not at risk	>80	>6.54
GB110062039240	Dulas - headwaters to conf Teifi	Probably not at risk	>80	>6.54
GB110062039250	Brefi - headwaters to confluence with Teifi	Probably not at risk	>80	>6.54
GB110062043490	Groes - headwaters to confluence with Teifi	Probably not at risk	>80	>6.54
GB110062043501	Teifi - conf Meurig to conf Brennig	Not at risk	>80	>6.54
GB110062043540	Teifi - headwaters to confluence with Meurig	At risk	>80	>6.54
GB110062043563	Teifi - Afon Ceri to estuary	Probably not at risk	>80	>6.54
GB110062043564	Teifi - Afon Clettwr to Afon Ceri	Probably not at risk	>80	>6.54
GB110062043565	Teifi - Afon Dulas to Afon Clettwr	Probably at risk	>80	>6.54
GB110062043566	Teifi - Afon Brennig to Afon Dulas	Probably not at risk	>80	>6.54

Temperature in Relation to Habitats and WFD Targets

The proposal is to keep the currently permitted 21 degree Celsius limit on the permit, there are no concerns with the proposed limit. The receiving watercourse GB110062043564 'Teifi (Afon Clettwr to Afon Ceri)' is designated 'High' for temperature, with the annual 95th percentile being 17.7 degrees Celsius, which is in line with the standards as published within the WFD (see below). Whilst there is no data available to show the impact the discharge is having immediately downstream, considering the temperature of the effluent itself lies within 'Good' status, it is anticipated there will be negligible effect on the temperature of the receiving watercourse. There have also never been any recorded incidents or issues associated with the temperature of the discharge, from reviewing recent monitoring submission data, the temperature is often comfortably below the permitting 21 degrees Celsius.

Table 6

Temperature standards for rivers (rivers categorised by type in accordance with paragraph 1(2) of Schedule 2)								
	High		*Good*		*Moderate*		*Poor*	
River temp type	*Salmonid*	*Cyprinid*	*Salmonid*	*Cyprinid*	*Salmonid*	*Cyprinid*	*Salmonid*	*Cyprinid*
River temp (°C) as an annual 98-percen-tile standard	20	25	23	28	28	30	30	32
Increase or decrease in temp (°C) in relation to the ambient river temp, as an annual 98 percentile standard(i)	2	2	3	3	-	-	-	-

Since the previous assessment, waterbody classifications have been updated following the publication of the 2021 Cycle 3 classifications. The water body (Afon Clettwr to Afon Ceri, GB110062043564) is still designated 'High' for temperature. This conclusion therefore still applies.

Final Comment on Sanitary Determinands

The proposed reduction in daily discharge volume and reduction in concentration of sanitary determinands discharged ensures both BOD and Ammonia comply with the relevant targets. Whilst orthophosphate concentrations are still in excess of the target, the proposal implements a large reduction in discharged orthophosphate load and can be seen as a large improvement. Furthermore, proposed pH and temperature standards are deemed appropriate when reviewing the relevant WFD classification boundaries.

This final conclusion still applies following re-assessment of the modelling and assessment.

Appendix 2 – Assessment of dosing materials and priority hazardous substances:

Dairy Partners – The Creamery Aberarad - H1 Surface Water Risk Assessment Audit Notes

Background

A normal variation has been received from Dairy Partners (Cymru Wales) Limited for their site: The Creamery Aberarad in Newcastle Emlyn. The variation is to upgrade the existing effluent treatment plant (ETP), the new ETP will replace their existing ETP. The upgrade will see a change of technology used in the effluent treatment process. The existing process uses 1x Dissolved Air Flotation (DAF) unit and 2x trickling filter systems, the new process will use 2x DAF units, an activated sludge process and pH control in a balancing tank. There will also be an 'out of specification' tank that will be used to store re-routed trade effluent that does not meet specification for discharge to surface water (Afon Teifi). The new process incorporates a number of new treatment chemicals, therefore a complete H1 surface water risk assessment has been completed to determine the impact of the new process, a complete review of any existing parameters/limits on the existing permit has also been carried to ensure these limits remain appropriate. There are no changes to the permitted activities and they will remain on the permit as:

S6.8 A(1)(e) – Treatment and processing milk, the quantity of milk received being more than 200 tonnes per day (average value on an annual basis) – *Cheese making activities*

S5.4 A(1)(a)(i) – Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving one or more of the following activities (i) biological treatment) - *effluent treatment plant*

Emissions to surface water – discharge of treated trade effluent from ETP

All process waters from the milk processing activity are directed through the ETP for treatment prior to discharge to the Afon Teifi. The existing emission point (where the discharge leaves the installation) is NGR: SN 31510 40243 (labelled as W1 on the existing permit), the effluent then travels via a shared pipe to the discharge point at NGR: SN 31356 40462 into the Afon Teifi. The parameters monitoring point is NGR: SN 31611 40208 (labelled as M1 on the existing permit) and flow rate is monitored at NGR: SN 31538 40242. None of these monitoring, discharge or emission points are changing as part of this variation. The current maximum permitted discharge volume is 1050 m^3/day, this will be reduced to 900 m^3/day as part of this variation.

The operator has employed a consultant (Envireau Water) to complete the H1 surface water risk assessment on their behalf. The site uses the following additives in the ETP process:

(i) ClearFlo C36 – polyaluminium chloride (PAC)

(ii) Flocculant – anionic emulsion polymer
(iii) Flocculant – cationic emulsion polymer
(iv) Urea (CH_4N_2O)
(v) Phosphoric acid (H_3PO_4)
(vi) ClearFlo-pH-SA-D50% - Sulphuric acid (H_2SO_4)
(vii) ClearFlo-pH-SH-U-32% - Sodium Hydroxide (NaOH)

MSDS have been provided for these additives and are available on the DMS.
The following two priority hazardous substances have also been assessed, they are currently listed in the permit, therefore have been assessed to ensure the limits remain appropriate:

(i) Mercury
(ii) Cadmium

As discussed, the Applicant has not proposed any changes in the proposed ETP process in the current application.

Anionic and cationic emulsion polymers

Non-ionic polyacrylamides are considered to be low toxicity and have no hazard ratings, are therefore are not considered any further in this surface water risk assessment. Anionic and non-ionic polyacrylamide polyelectrolytes are significantly less toxic (in the range of 50 – 100 mg/L) but have the same detection limit as their cationic forms. Anionic and non-ionic polyelectrolytes are therefore environmentally preferable in areas where water hardness and pH are low because polyelectrolyte activity will persist longer under such conditions and we need to be able to measure permitted concentrations in the effluent to demonstrate safe environmental concentrations. For anionic and non-ionic polyacrylamide polyelectrolytes, we set an EQS of 3.5 mg/l as a 95 percentile in soft acid waters (pH 6 or less, total hardness 20 mg/l or less). For hardness greater than 20 mg/l as calcium carbonate, a 95 percentile EQS of 7.5 mg/l is appropriate. Alternatively, 0.05 or 0.1 times an actual 24h LC50 for the polyelectrolyte in question could be used as a 95 percentile EQS (see Table 3). Tables 2 and 3 give default values for polyelectrolytes. More relaxed EQS can be considered on a case by case basis if the operator provides toxicity data and information on analytical methods. We will normally limit these substances at concentrations well below EQS by operational control through the Management System. We will only very exceptionally need to set a numeric permit limit.

We still consider it appropriate to not set a limit on the permit for anionic and non-ionic polyarclamides for the reasons discussed above.

Polyaluminium chloride (PAC) (ClearFlo C36) assessment

The primary pollutant associated with Polyaluminium chloride is aluminium. Aluminium is not a specified pollutant in the H1 assessment tool, however an EQS can be taken from EPR 7.01 guidance page 122 'Use of Chemicals in Treatment':

Aluminium	The standard is 1mg/l (total) MAC EQS but subject to a maximum concentration in the discharge of 10 mg/l (dissolved) EMISSION STD if • 1:10 dilution.

There are different EQS to be used for aluminium depending on the pH of the watercourse. The latest Water Framework Directive Phys/Chem data for GB110062043564 'Teifi (Afon Clettwr to Afon Ceri)' demonstrates the pH of the receiving watercourse is 7.6 therefore the EQS 1000 µg/L MAC is applicable in this H1 risk assessment.

The H1 risk assessment uses screening tests:

Screening test 1:

Substance (AA or MAC)	Release Concentration (RC) - µg/L (Mean for AA, 95%ile for MAC)	EQS (or PNEC) - µg/L (AA or MAC)	% of EQS (or PNEC)
Aluminium (effluent treatment plant specification)	**1000**	**1000**	**100 %**

The specification of the Effluent Treatment Plant is 1.0 mg/L of aluminium; therefore, this value has been used as the maximum release concentration. The specification of the ETP is listed within the H1 assessment submitted by the applicant, this can be found here.

As the % of the EQS exceeds 10 % the first screening test has failed and therefore the second screening test is applied.

Screening test 2:

Effluent Flow Rate (EFR) - m^3/s	Release Concentration (RC) - µg/L	River Flow Rate (RFR) - m^3/s	Process Contribution (PC) - µg/L	EQS (or PNEC) - µg/L	PC as % of EQS (or PNEC)
0.010416	**1000**	2.486	4.172381526	1000	**0.42 %**

The effluent flow rate (EFR) is taken as the existing (maximum) discharge volume of 900 m^3/day = 0.010416 m^3/second. The River Flow Rate (RFR) is based on the Q95 exceedance data provided by NRW hydrology, confirmation e-mail can be found here.

The process contribution (PC) is calculated using the following equation:

Process contributions for discharges to rivers

The process contribution of substances released to inland rivers is given by:

$$PC = \frac{(EFR \times RC)}{(EFR + RFR)}$$

where

- PC = process contribution (µg/l)
- EFR = effluent flow rate (m^3/s)
- RC = release concentration of the pollutant in the effluent (µg/l)
- RFR = river flow rate (m^3/s).

As the % of the EQS is less than 4 % the second screening test has passed and therefore no further assessment is required.

Conclusion

The screening tests have been based on the specification of the ETP. The proposed discharge has screened out in screening test 2 and no further modelling of aluminium is requested, a limit of 1000 µg/L will be set in the permit.

The latest Water Framework Directive Phys/Chem data has been checked and for the water body (Teifi - Afon Clettwr to Afon Ceri, GB110062043564)' the pH of the receiving watercourse is 7.6.

The Q95 exceedance data provided by NRW hydrology during the previous assessment is still considered appropriate.

As the targets and data used for the screening tests are still considered appropriate, this conclusion still applies.

Urea (CH_4N_2O) assessment

Dairy Partners use approximately 45 L/day of Urea (taken from here) which is approximately 40 % concentration. This is equivalent to 18 kg/day urea being added to the effluent. Using the average (693.09 m^3/day) and maximum (900 m^3/day) flow rates and the conservative assumption that 100 % of the urea dosed is present in the treated effluent, this represents release concentrations of 25970.65316 µg/L and 20000 µg/L respectively.

The hazard assessment conclusion gives a PNEC value of 0.47 mg/L (470 µg/L), this has been used as a surrogate EQS for the screening tests below:

Screening test 1:

Substance (AA or MAC)	Release Concentration (RC) - µg/L (Mean for AA, 95%ile for MAC)	EQS (or PNEC) - µg/L (AA or MAC)	% of EQS (or PNEC)
Urea (PNEC)	25970.65	470	**5525.67%**

Screening test 2:

Effluent Flow Rate (EFR) - m^3/s	Release Concentration (RC) - µg/L	River Flow Rate (RFR) - m^3/s	Process Contribution (PC) - µg/L	EQS (or PNEC) - µg/L	PC as % of EQS (or PNEC)
0.010416	25970.65	2.486	**108.36**	470	**23.06%**

Screening test 3:

Process Contribution (PC)	Avg. Background Concentration (BC) - µg/l	Predicted Environmental Concentration (PEC) - µg/l	EQS (or PNEC) - µg/l	Difference as % of EQS

108.36	**47.00**	**155.36**	**470.00**	**23.06%**

Screening test 4:
The PEC is <EQS, therefore urea screens out and modelling isn't required.

It is noted that in order to screen out from further assessment, both test 3 and 4 should have been passed. Therefore, in line with current guidance, Urea cannot be screened out at stage 1 of this assessment as a 'green light activity' as listed in Annex D of OGN 72. However, the modelling completed was highly conservative assuming 100% of the urea dosed is present in the treated effluent whereas in reality, this figure will be much lower where the urea will be utilised in the process. Notwithstanding this, the Applicant has proposed a pH limit range (6-9) which will be listed on the permit which provides sufficient control against a large volume of urea being present in the treated effluent by ensuring it remains within a neutral pH range. This is because a large volume of urea, which has pH value of 9.8-10, will result in the upper end of the range being exceeded. The use of urea will also be controlled by an automated system, only being used when required to achieve the current nutrient balances within the activated sludge process. Therefore, we consider further assessment is not required and no further limits are required on the permit.

Phosphoric acid (H_3PO_4) assessment

Dairy Partners use approximately 15 L/day of phosphoric acid (taken from *H1 risk assessment link)* which is approximately 70 % concentration. This is equivalent to 10.5 kg/day phosphoric acid being added to the effluent. Using the average (693.09 m^3/day) and maximum (900 m^3/day) flow rates and the conservative assumption that 100 % of the phosphoric acid dosed is present in the treated effluent, this represents release concentrations of 15149.54768 µg/L and 11666.6 µg/L respectively.
The hazard assessment conclusion gives a PNEC value of 0.49 mg/L (490 µg/L), this has been used as a surrogate EQS for the screening tests below:

Screening test 1:

Substance (AA or MAC)	**Release Concentration (RC) - µg/l (Mean for AA, 95%ile for MAC)**	**EQS (or PNEC) - µg/l (AA or MAC)**	**% of EQS (or PNEC)**
Phosphoric Acid (PNEC)	15149.55	490	**3091.74%**

Screening test 2:

Effluent Flow Rate (EFR) - l/s	Release Concentration (RC) - µg/l	River Flow Rate (RFR) - l/s	Process Contribution (PC) - µg/l	EQS (or PNEC) - µg/l	PC as % of EQS (or PNEC)
0.010416	15149.55	2.486	63.20970255	490	**12.90%**

Screening test 3:

Process Contribution (PC)	**Avg. Background Concentration (BC) - µg/l**	**Predicted Environmental Concentration (PEC) - µg/l**	**EQS (or PNEC) - µg/l**	**Difference as % of EQS**

63.21	49.00	112.21	490.00	**12.90%**

Screening test 4:
The PEC is <EQS, therefore phosphoric acid screens out and modelling isn't required.

It is noted that to screen out from further assessment, both test 3 and 4 should have been passed. Therefore, in line with current guidance, phosphoric acid cannot be screened out at stage 1 of this assessment as a 'green light activity' as listed in Annex D of OGN 72. However, it is noted that the modelling completed was highly conservative assuming 100% of the phosphoric acid dosed is present in the treated effluent whereas in reality, this figure will much lower where the phosphoric acid will be utilised in the process. Notwithstanding this, the Applicant has proposed a pH limit range (6-9) which will be listed on the permit which provides sufficient control against a large volume of phosphoric acid being present in the treated effluent by ensuring it remains within the neutral pH range. This is because a large volume of phosphoric acid, which has pH value of <1, will result in the lower end of the range being exceeded. The use of phosphoric acid will also be controlled by an automated system, only being used when required to achieve the current nutrient balances within the activated sludge process. Therefore, we consider detailed modelling is not required.

ClearFlo-pH-SA-D50% - Sulphuric acid (H_2SO_4) assessment
Dairy Partners use approximately 600 L/day of sulphuric acid (taken from *H1 risk assessment link)* which is approximately 37 % concentration. This is equivalent to 222 kg/day sulphuric acid being added to the effluent. Using the average (693.09 m^3/day) and maximum (900 m^3/day) flow rates and the conservative assumption that 100 % of the sulphuric acid dosed is present in the treated effluent, this represents release concentrations of 320304.7223 µg/L and 246666.6 µg/L respectively. From reviewing literature, the hazard to freshwaters associated with sulphuric acid is a drastic change in pH. Considering there will be a limit on the permit for pH (between 6-9), this is seen as appropriate control for sulphuric acid.

It is considered this assessment is reasonable and therefore this conclusion still applies.

There could be a potential concern with regards to sulphuric acid forming sulphate, which is an 'other pollutant' with a statutory EQS (400,000 µg/L), however even if we were to assume that 100% of sulphuric acid dosed is discharged in the form of sulphate in the final effluent, this screens out at test 2:

Effluent Flow Rate (EFR) - l/s	Release Concentration (RC) - µg/l	River Flow Rate (RFR) - l/s	Process Contribution (PC) - µg/l	EQS (or PNEC) - µg/l	PC as % of EQS (or PNEC)
0.010416	320304.72	2.486	1336.433496	400000	**0.33%**

The EQS for sulphuric acid has not changed since the previous assessment. Therefore, this conclusion still applies.

ClearFlo-pH-SH-U-32% - Sodium Hydroxide (NaOH) assessment

Dairy Partners use approximately 600 L/day of sodium hydroxide (taken from *H1 risk assessment link)* which is approximately 32 % concentration. This is equivalent to 192 kg/day sodium hydroxide being added to the effluent. Using the average (693.09 m^3/day) and maximum (900 m^3/day) flow rates and the conservative assumption that 100 % of the sodium hydroxide dosed is present in the treated effluent, this represents release concentrations of 277020.3004 µg/L and 213333.3 µg/L respectively.

NaOH does not fill the criteria for persistency, bioaccumulation and toxicity, therefore, in the absence of a generic PNEC available, no further assessment has been undertaken on this substance.

It is considered this assessment is reasonable and therefore this conclusion still applies.

Mercury

Mercury is found to be present in trace amounts in the milk and in dosing chemicals at the plant, therefore has the potential to be present in the treated effluent. There is already an emission limit value on the permit for mercury (0.5 µg/L), therefore the purpose of this assessment is to ensure this limit remains appropriate.

The H1 risk assessment uses screening tests:

Screening test 1:

Substance (AA or MAC)	Release Concentration (RC) - µg/L (Mean for AA, 95%ile for MAC) - µg/L	EQS (or PNEC) - µg/L (AA or MAC)	% of EQS (or PNEC)
Mercury (emission limit value)	**0.5**	**0.07 (MAC)**	**714.29 %**

As the % of the EQS exceeds 10 % the first screening test has failed and therefore the second screening test is applied.

Screening test 2:

Effluent Flow Rate (EFR) - m^3/s	Release Concentration (RC) - µg/L	River Flow Rate (RFR) - m^3/s	Process Contribution (PC) - µg/L	EQS (or PNEC) - µg/L	PC as % of EQS (or PNEC)
0.010416	**0.5**	2.486	0.002086191	0.07	**2.98 %**

The effluent flow rate (EFR) is taken as the existing (maximum) discharge volume of 900 m^3/day = 0.010416 m^3/second. The River Flow Rate (RFR) is based on the Q95 exceedance data provided by NRW hydrology, confirmation e-mail can be found here. The process contribution (PC) is calculated using the following equation:

Process contributions for discharges to rivers

The process contribution of substances released to inland rivers is given by:

$$PC = \frac{(EFR \times RC)}{(EFR + RFR)}$$

where

- PC = process contribution (µg/l)
- EFR = effluent flow rate (m^3/s)
- RC = release concentration of the pollutant in the effluent (µg/l)
- RFR = river flow rate (m^3/s).

As the % of the EQS is less than 4 % the second screening test has passed and therefore no further assessment is required.

Conclusion
The proposed discharge has screened out in screening test 2 and no further modelling of mercury is required. The current limit of 0.5 µg/L remains appropriate. The specification of the ETP ensures this limit can be met.

The EQS for Mercury detailed in current guidance (see Freshwater and Priority Substances and Other Poulltants Environmental Quality Standards) has not changed since this assessment. As the targets and data used for the screening tests are still considered appropriate, this conclusion still applies.

Cadmium
Cadmium is found to be present in trace amounts in the milk and in dosing chemicals used at the plant, therefore has the potential to be present in the treated effluent. There is already an emission limit value on the permit for cadmium (0.01 mg/L or 10 µg/L), although the applicant has stated the removal efficiency of the new ETP would achieve 0.525 µg/L in the treated effluent, therefore the release concentration has been based on the removal efficiency of the new ETP.

The H1 risk assessment uses screening tests:

Screening test 1:

Substance (AA or MAC)	Release Concentration (RC) - µg/L (Mean for AA, 95%ile for MAC) - µg/L	EQS (or PNEC) - µg/L (AA or MAC)	% of EQS (or PNEC)
Cadmium (AA)	**0.525 (no mean data available)**	**0.08**	**656.25**
Cadmium (MAC)	**0.525**	**0.45**	**116.67**

As the % of the EQS exceeds 10 % the first screening test has failed and therefore the second screening test is applied.

Screening test 2:

Effluent Flow Rate (EFR) - m^3/s	Release Concentration (RC) - µg/L	River Flow Rate (RFR) - m^3/s	Process Contribution (PC) - µg/L	EQS (or PNEC) - µg/L	PC as % of EQS (or PNEC)
0.010416	**0.525**	2.486	0.0021905	0.08	**2.74 %**
0.010416	**0.525**	2.486	0.0021905	0.45	**0.49 %**

The effluent flow rate (EFR) is taken as the existing (maximum) discharge volume of 900 m^3/day = 0.010416 m^3/second. The River Flow Rate (RFR) is based on the Q95 exceedance data provided by NRW hydrology, confirmation e-mail can be found here. The process contribution (PC) is calculated using the following equation:

Process contributions for discharges to rivers

The process contribution of substances released to inland rivers is given by:

$$PC = \frac{(EFR \times RC)}{(EFR + RFR)}$$

where

- PC = process contribution (µg/l)
- EFR = effluent flow rate (m^3/s)
- RC = release concentration of the pollutant in the effluent (µg/l)
- RFR = river flow rate (m^3/s).

As the % of the EQS is less than 4 % the second screening test has passed and therefore no further assessment is required

Conclusion

The proposed discharge has screened out in screening test 2 and no further modelling of cadmium is required. The current limit of 0.01 mg/L will be reduced to 0.525 µg/L and set in the permit.

The EQS for Cadmium detailed in current guidance (see Freshwater and Priority Substances and Other Pollutants Environmental Quality Standards) has not changed since this assessment. As the targets and data used for the screening tests are still considered appropriate, this conclusion still applies.

Appendix 3 – Consultation with Technical Specialist

RE_ Sulphuric Acid.msg

The above consultation response is considered still relevant.

See sign off email for this application here:
https://cyfoethnaturiolcymru.sharepoint.com/teams/Regulatory/Permitting/SW%20EPR%20Regulated%20Industry/EPR-WP3231NB/PAN-017188%20-%20WFD%20Assessment%20review%20and%20sign%20off.msg