Intended for
Cambrian Pet Foods Ltd

Date
September 2019

Project Number
1700001923

CAMBRIAN PET FOODS LIMITED, LLANGADOG

WATER QUALITY RISK ASSESSMENT FOR EFFLUENT DISCHARGE

RAMBOLL

CAMBRIAN PET FOODS LIMITED, LLANGADOG
WATER QUALITY RISK ASSESSMENT FOR EFFLUENT DISCHARGE

Project No.	**1700001923**
Issue No.	**4**
Date	**September 2019**
Made by	**Richard Wood**
Checked by	**Lucy Cleverley**
Approved by	**Lucy Cleverley**

Made by:

Checked/Approved by:

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CONTENTS

APPENDICES

EXECUTIVE SUMMARY

Cambrian Pet Foods Limited (the Client) is required to prepare an assessment of water quality impact from the discharge of treated effluent from its operation at Llangadog, Carmarthen, Wales.

The intention of the output of this assessment is to demonstrate that the level of treatment achieved at the Llangadog installation represents the application of Best Available Techniques (BAT) in relation to the minimisation of impacts on the receiving watercourse.

Methodology

Ramboll applied the methodology set out in Environment Agency guidance H1 annex D2: assessment of sanitary and other pollutants in surface water discharges, and specifically the River Quality Planning model, to undertake the predictive risk assessment. A data request was made to Natural Resources Wales (NRW) for water quality (chemical) and flow for the Afon Tywi within the vicinity of the Llangadog facility.

The final draft of the Food & Drink BRef has now been released (October 2018), which contains expected emissions targets (BAT-AELs) for waste water treatment plant serving food and drink installations. As these revised limits are anticipated to be a key driver for the ongoing operation of the Llangadog facility, the assessment also considers these BAT-AELs.

Chemicals used in the wastewater treatment works were also assessed for potential contaminants, and aluminium was identified for impact assessment. This was completed using the H1 assessment tool.

Baseline Assessment

NRW classify the Afon Tywi as Good Water Quality status in the vicinity of Llangadog.

Outcome of the Effluent Discharge Modelling

Using the data provided and applying the above methodology described herein, the existing effluent discharge results in 'no deterioration' in the water quality of the Afon Tywi downstream of the discharge point at Llangadog.

On the basis of the above, a discharge to the Afon Tywi under the current emission levels is acceptable.

Notes and Recommendations

The above conclusions are based on the information provided by Cambrian in relation to its current effluent discharge and associated effluent parameters. Any change to that may result in a need to review the assessment presented herein and may alter the conclusions set out above.

The outcome of this assessment is based upon a limited data set for the Afon Tywi and the existing effluent discharge; Ramboll recommends that additional data is obtained to expand the dataset to a minimum of 12 (and preferably 36) data points for the determinands of interest, and to verify the outcomes of this initial assessment.

1. INTRODUCTION AND APPROACH

Cambrian Pet Foods Limited (the Client) is required to prepare an assessment of water quality impact from the discharge of treated effluent as part of its application for an Environmental Permit for its operation at Llangadog, Camarthen, Wales. The Client has instructed Ramboll Environment and Health UK Limited (Ramboll) to undertake an assessment of the impact of the discharge from the ETP into the Afon Tywi to determine if the discharge represents the application of Best Available Techniques (BAT).

A plan is provided in the Appendix 1 showing the location of the Site and the receiving watercourse (Figure 1), the Afon Tywi. The discharge is directly to the Afon Tywi (NGR SN 69600 28400), and the Afon Tywi is considered to represent the compliance assessment point for the purpose of this impact assessment.

1.1 Objectives

The objectives of this scope of works is to assess the impact of the existing discharge of treated effluent from the site to the Afon Tywi.

The output of this assessment supports the application for an Environmental Permit at the Llangadog facility.

1.2 Scope of Works

The following is the scope of works undertaken to inform this assessment:

- Ramboll requested data from Natural Resources Wales (NRW) on the water quality (chemical), and flow for the Afon Tywi within the vicinity of the Cambrian facility. NRW provided data for the Afon Tywi, however this was limited to data covering the period 2003 - 2005 which Ramboll reviewed.
- These data were evaluated to develop the key inputs for modelling of the discharge in line with EA/NRW guidance document H1 annex D2: assessment of sanitary and other pollutants in surface water discharges [1].
- The assessment is based upon 2½ years' worth of data on effluent discharge from the Cambrian site emissions, as monitored by Cambrian.
- River Quality Planning software (RQP v2.6) was used for the predictive surface water modelling.
- In addition, baseline water chemistry information, where available from NRW, was reviewed for the water bodies in the vicinity of the discharge location. Chemical data was compared against the regulatory environmental quality standards as set out within the D2 guidance.

1.3 Limitations

The H1 Annex D2 guidance recommends a minimum of 12 (and preferably 36) surface water samples taken over a 3-4 year period from the receiving waterbody, whilst the data provided by NRW was only available for 2½ years, covering 2003-2005. The dataset provided is also limited in terms of the pollutants assessed. As a consequence, there is uncertainty associated with the current conditions of the receiving watercourse.

Chemical quality data for the Afon Tywi was also limited. Ramboll have sought to apply reasonable assumptions based upon the information provided, and it is recommended that these assumptions are tested through a sampling regime incorporating specified elements of the assessment, and the assessment is subsequently updated.

[1] H1 annex D2: assessment of sanitary and other pollutants in surface water discharges. V4, October 2016

River quality standards are based upon English and Welsh standards as presented within the H1 guidance Annex D2, Appendix 3.

2. DATA COLLATION

Ramboll requested surface water quality data for the Afon Tywi, and were informed by NRW that the closest station to Llangadog only has data up to 2005, with data covering the period 2003-2005 provided. Other sampling points along the Afon Tywi have even less data available, so the assessment is based upon this dataset.

Ramboll have sought to apply reasonable assumptions based upon the information provided, and it is recommended that these assumptions are tested through a sampling regime incorporating specified elements of the assessment, and the assessment is subsequently updated.

Cambrian regularly monitor the performance of their effluent plant, and effluent discharge data is also collected by NRW. A dataset of 9 samples from 2017 for pH, suspended solids and temperature, 3 samples for BOD, and 33 samples from 2018 for nitrate and phosphate were provided for the effluent discharge. Daily flow data for 2017 was also provided, with a mean discharge rate of 653m^3 and a standard deviation of 213m^3. The existing discharge consent has a maximum discharge rate of 1000m^3/day, however the application proposes to increase this level to 1,820m^3/day, and this is reflected within the assessment.

3. BASELINE ASSESSMENT

NRW provided historical data relating to water quality on the Afon Tywi following Ramboll's data request. Ramboll has compiled the chemical information into a data table, which describes the baseline (upstream) condition of the watercourse.

3.1 Water Quality of the Receiving Environment

Surface water monitoring data from the NRW routine sampling station at Llangadog Road Bridge (NGR SN 69512 28611) are summarised in Table 3-1 below. This data covers the period 2003-2005, and represents the latest available data within a reasonable distance upstream of the discharge point. There are no exceedances of the water quality parameters at any of the sampling locations.

River quality standards for sanitary pollutants (including pH, BOD, ammoniacal nitrogen and reactive phosphorus) are defined according to the morphology of a river, as set out within the Environment Agency Guidance H1 Annex D2: assessment of sanitary and other pollutants in surface water discharges. The Afon Tywi in the vicinity of the proposed discharge point is at an altitude of <80 m above mean sea level. The alkalinity is not defined, so it is assumed to be at the mid-point (50-100mg/l $CaCO_3$). This classifies the river as Type 3 for BOD and ammonia/nitrogen standards, and Type 3 for reactive phosphorus standards.

Based upon the data presented within Table 3-1, the water quality for a Type 3 river would be described as 'High' for the determinands provided. Note that no data was provided for total phosphorus, and therefore the water quality assessment for this determinand has not been presented. However, recent work undertaken by NRW (https://naturalresources.wales/about-us/our-projects/river-projects/taclor-tywi-about-the-project/?lang=en) indicates that the phosphorus levels are considered to represent 'Good' Status. The overall status of the Afon Tywi at Llangadog is therefore considered to be 'Good'.

Table 3-1: Summary of Surface Water Monitoring Data

Determinand	Average Concentration (mg/l)	Standard Deviation (mg/l)	90%ile (mg/l)	Water Quality Status[A]
Nitrate (as N)	0.79	0.2	1.05	NC
Ammoniacal Nitrogen (as N)	0.022	0.015	0.04	High
Suspended Solids	6.7	14.1	15.2	NC
pH	7.23	0.26	6.89 (5%ile) 7.73 (95%ile)	High
Biochemical Oxygen Demand	0.93	0.34	1.4	High

Notes:

NC – No criteria available;

A - UK EQS; Appendix 3 - Horizontal Guidance H1 Annex D2: assessment of sanitary and other pollutants in surface water discharges.

No data was available for phosphorus upstream of the discharge point. Recent work undertaken by NRW (https://naturalresources.wales/about-us/our-projects/river-projects/taclor-tywi-about-the-project/?lang=en) indicates that the phosphorus levels are considered to represent 'Good' Status.

4. RISK ASSESSMENT AND MODELLING

This section describes the statistical predictive modelling that Ramboll has undertaken in accordance with regulatory guidance, subject to the limitations set out in Section 1.3.

4.1 Overview of Methodology

Data on the existing condition of the receiving watercourse has been obtained from NRW (see Section 3.1). This data has been subjected to basic statistical analysis to determine a mean and standard deviation for each determinand, and a mean and 95th percentile exceedance (Q95) for the flow. More detailed statistical analysis of the chemical data has not been applied due to the relatively small dataset. As a consequence, a parametric data distribution is assumed.

NRW has recommended that the proposed discharge be assessed for the main sanitary determinants i.e. Biological Oxygen Demand (BOD), Ammoniacal Nitrogen (Amm-N) and Total Phosphorus (TP). For these determinants, this risk assessment applies the methodology set out in Horizontal Guidance H1 Annex D2: assessment of sanitary and other pollutants in surface water discharges, and specifically the River Quality Planning model (also utilised by the Environment Agency for assessment of sanitary determinants).

Temperature, pH and water hardness (alkalinity) can influence the categorisation of the watercourse, so data on these determinants are also required.

4.2 River Quality Data

The Afon Tywi has flow monitoring points along its length, including a monitoring location upstream of the confluence with the Afon Sawdde at SN 695 281. The following flow data has been applied within the water quality modelling:

Table 4-1: Flow Data for Water Quality Modelling

Flow Data	Afon Tywi (m^3/sec)[1]
Mean	19.094
Q95 (95%ile)	3.969

Chemical quality data for 2003 to 2005 for the Afon Tywi were also provided by NRW. Determinants of interest are summarised in Table 3-1. As no data on phosphorus levels were available, phosphorus is assumed to be equivalent to the mid-point level for a 'Good' Status river.

4.3 Site Emissions Data

The expected quality of the discharge is presented in Table 4-2. This presents the current composition of the discharge, as monitored by Cambrian and NRW, and discharge levels derived from the proposed BAT-AELs in the final draft of the Food and Drink BRef. The BAT-AELs are presented as daily averages, so a standard distribution of one-third of the mean has been applied to represent the effluent variability, in line with the guidance for situations where there is insufficient or no background data.

The existing discharge is assessed based upon the flow rates provided for 2017, whilst the BAT-AEL assessment applies the proposed upper limit of 1800m^3/day (applied as a 95th percentile). This delivers a conservative assessment of the potential impacts from the installation based upon compliance with the BAT-AELs.

Table 4-2: Effluent Quality Input Data for Water Quality Modelling

	Existing Discharge		Proposed Limits – daily average			BAT-AEL discharge[2]	
Determinands	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**ELV (95th %ile)**	**Daily Average**	**Standard Deviation**
Flow (m^3/sec)	0.0076	0.0025	0.012	0.004	0.0208	0.012	0.004
Temperature (°C)	19.17	3.78	20	4	29	N/A	N/A
pH	6.89	0.14	7	0.4	>6 <8	N/A	N/A
Suspended Solids	5	4.97	25	16	55	50	15
BOD (mg/l)	18.94	8.26	20	10	40	20	6
Total Nitrogen (mg/l)	-	-	20	6	30	20	6
Total Nitrate (mg/l)	0.128	0.146	-	-	-	N/A	N/A
Total Phosphate (mg/l)	45.24	33.09	45	33	100	N/A	N/A
Total Phosphate (as P)[1] (mg/l)	14.44	10.56	15	10	35	2	0.6

Notes:
1: Derived by multiplying the phosphate levels by (30/94)
2: Expected to be applied four years following issue of BAT Conclusions

4.5 Results

The results tables presented are derived from the output of the River Quality Planning model and using the data presented in Tables 3-1, 4-1 and 4-2. The impacts are presented using the existing discharge levels, the proposed emission limits (based upon performance and existing discharge limits at the site), and the proposed BAT-AELs from the draft Food and Drink BRef. For the total nitrogen BAT-AEL, it is conservatively assumed that this represents ammonia emissions, to allow assessment against the ammoniacal nitrogen water quality criteria.

Table 4-3: Assessment of Impacts based on existing Emission Levels

	BOD	Phosphorus	Nitrate	Suspended Solids
Mean River Flow Rate (m3/s)	19.094	19.094	19.094	19.094
95%ile River Flow Rate (m3/s)	3.969	3.969	3.969	3.969
Mean River Quality (mg/l)	0.93	0.085	0.79	6.7
Standard Deviation of River Quality (mg/l)	0.34	0.01	0.202	14.1
90%ile of River Quality (mg/l)	1.4	0.098	1.05	15.22
Mean Discharge Flow Rate (m3/s)	0.0076	0.0076	0.0076	0.012
Standard Deviation of Flow (m3/s)	0.0025	0.0025	0.0025	0.004
Mean Discharge Quality (mg/l)	11.5	14.44	0.128	6.29
Standard Deviation of Discharge Quality (mg/l)	5.32	10.56	0.146	3.4
95%ile of Discharge (mg/l)	21.5	34.21	0.38	12.73
Mean Downstream River Quality (mg/l)	0.94	0.094	0.79	6.94
90%ile Downstream (mg/l)	1.38	0.112	1.05	14.99
Water Quality Status	High	Good	NC	NC
Classification Assessment	No deterioration	No deterioration	No deterioration	No deterioration

Table 4-4: Assessment of Impacts based on proposed Emission Levels

	BOD	Phosphorus	Ammonia (as nitrogen)	Suspended Solids
Mean River Flow Rate (m3/s)	19.094	19.094	19.094	19.094
95%ile River Flow Rate (m3/s)	3.969	3.969	3.969	3.969
Mean River Quality (mg/l)	0.93	0.085	0.022	6.7
Standard Deviation of River Quality (mg/l)	0.34	0.01	0.202	14.1

	BOD	Phosphorus	Ammonia (as nitrogen)	Suspended Solids
90%ile of River Quality (mg/l)	1.4	0.098	0.04	15.22
Mean Discharge Flow Rate (m3/s)	0.012	0.012	0.012	0.012
Standard Deviation of Flow (m3/s)	0.004	0.004	0.004	0.004
Mean Discharge Quality (mg/l)	21	15	20	25
Standard Deviation of Discharge Quality (mg/l)	10	11	10	16
95%ile of Discharge (mg/l)	39.88	35.59	31.05	55
Mean Downstream River Quality (mg/l)	0.95	0.09	0.04	6.96
90%ile Downstream (mg/l)	1.38	0.11	0.07	15.02
Water Quality Status	High	Good	High	NC
Classification Assessment	No deterioration	No deterioration	No deterioration	No deterioration

Table 4-5: Assessment of Impacts based on BAT-AEL Emission Limits

	BOD	Total Phosphorus	Ammonia (as Nitrogen)	Suspended Solids
Mean River Flow Rate (m^3/s)	19.094	19.094	19.094	19.094
95%ile River Flow Rate (m^3/s)	3.969	3.969	3.969	3.969
Mean River Quality (mg/l)	0.93	0.085	0.022	6.7
Standard Deviation of River Quality (mg/l)	0.34	0.01	0.015	14.1
90%ile of River Quality (mg/l)	1.4	0.098	0.4	15.22
Mean Discharge Flow Rate (m^3/s)	0.012	0.012	0.012	0.012
Standard Deviation of Flow (m^3/s)	0.004	0.004	0.004	0.004
Mean Discharge Quality (mg/l)	20	2	20	50
Standard Deviation of Discharge Quality (mg/l)	6	0.6	6	16.66
95%ile of Discharge (mg/l)	31.24	3.12	31.05	80.89
Mean Downstream River Quality (mg/l)	0.95	0.09	0.04	6.99
90%ile Downstream (mg/l)	1.38	0.10	0.07	15.04
Water Quality Status	High	Good	High	NC

	BOD	Total Phosphorus	Ammonia (as Nitrogen)	Suspended Solids
Classification Assessment	No deterioration	No deterioration	No deterioration	No deterioration

The assessment for total phosphorus is not an assessment of reactive phosphorus (as applied by H1 Annex D2); however, it is considered reasonable to assume that in the absence of specific data on reactive phosphorus, the lack of deterioration observed through the proposed discharge of total phosphorus would be representative of the expected situation with reactive phosphorus. The assessment shows that the modelled discharge into the Afon Tywi would not result in a deterioration of the water quality for the parameters shown in the table above.

5. SPECIFIC POLLUTANTS

5.1 Assessment of chemical additives

Cambrian maintains a high level of wastewater treatment through the use of additives in the wastewater process; namely Aquatreat 600 (polyaluminium chloride) and Midfloc A258B (anionic/non-ionic polyacrylamide). Material Safety Data Sheets (MSDS) are provided for these chemicals.

Non-ionic polyacrylamides are considered to be low toxicity and have no hazard ratings, and are not considered further in this assessment.

The primary pollutant associated with polyaluminium chloride is aluminium. Aluminium is not a specified pollutant in the H1 assessment tool, however EQS levels of 15ug/l as an annual average and 25ug/l as a maximum allowable concentration are identified in the Scottish Environmental Protection Agency's guidance (WAT-SG-53), so are applied here in the absence of agreed an EQS.

5.2 Assessment of aluminium

Cambrian use approximately $1m^3$ per month of Aquatreat 600, which is approximately 10% polyaluminium chloride solution. Polyaluminium chloride is normally present in the form $Al_2Cl(OH)_5$, with aluminium representing 31% of the molecular weight of polyaluminium chloride. This is equivalent to 1kg/day of aluminium being added to the effluent. Using the average and maximum site flow rates of $657m^3$/day and $1,820m^3$/day, and taking an extremely conservative assumption that 100% of the aluminium dosed into the treatment works is released, the estimated concentrations are between 550µg/l and 1,522µg/l. When these are assessed through the H1 assessment tool, the process contribution represents 7% of the annual average EQS and 32% of the Maximum Allowable Concentration, and are screened out at tests 3 and 4. It is noted that a more realistic scenario would account for just 10% of the dosed polyaluminium chloride being present in the final effluent, which would result in the process contributions being screened out at test 2. The impact from the use of the flocculant is considered to be insignificant.

As the presence of aluminium is controlled by dosing levels at the works, and impacts are screened even if 100% loss is assumed, no emission limit value is proposed.

6. SUMMARY AND CONCLUSIONS

Cambrian Pet Foods Limited is required to prepare an assessment of water quality impact from the discharge of treated effluent from its pet food manufacturing operation at Llangadog, Carmarthen, Wales.

The intention of the output of this assessment is to demonstrate that the level of treatment currently achieved at the Llangadog installation represents the application of Best Available Techniques (BAT) in relation to the minimisation of impacts on the receiving watercourse. The final draft of the Food & Drink BRef issued in October 2018, contains expected emissions targets (BAT-AELs) for waste water treatment plant serving food and drink installations (including pet food). Ramboll's assessment also includes the expected impact if these BAT-AELs were to be applied.

6.1 Current Plant Performance and Proposed Emission Limit Values

Using the data provided and applying the above methodology described herein, the current effluent treatment plant emissions result in 'no deterioration' in the water quality of the Afon Tywi downstream of the discharge point at Llangadog. A headroom of >50% for BOD and ammonia (as nitrogen) would continue to be available downstream of the discharge point. Phosphorus levels are anticipated to still achieve a 25% headroom for maintaining 'Good' status.

The specific levels of reactive phosphorus within the receiving water course and ammoniacal nitrogen within the effluent should be determined to allow confirmation of the significance of the proposed discharge. The proposed emission limit values for the discharge are set out in Table 5-1.

Table 5-1: Proposed Emission Limits for Effluent Treatment Plant Discharge

Determinand	Emission Limit Value (mg/l) (95th %ile)
pH	6 - 8.5
Temperature	29°C
Biochemical Oxygen Demand	40
Suspended Solids	55
Ammoniacal Nitrogen (as N)	30
Total Phosphate (as P)	35

No emission limit value is proposed for aluminium, as the impact of the use of polyaluminium chloride is screened even if a worst-case scenario of 100% loss to final effluent is assumed.

6.2 Application of Draft BRef BAT-AELs

Using the data provided and applying the above methodology described herein, the application of the potential BAT-AEL emissions would result in 'no deterioration' in the water quality of the Afon Tywi downstream of the discharge point at Llangadog. A headroom of >50% for BOD and ammonia (as nitrogen), and 25% for phosphorus would continue to be available downstream of the discharge point, similar to the existing discharge impact.

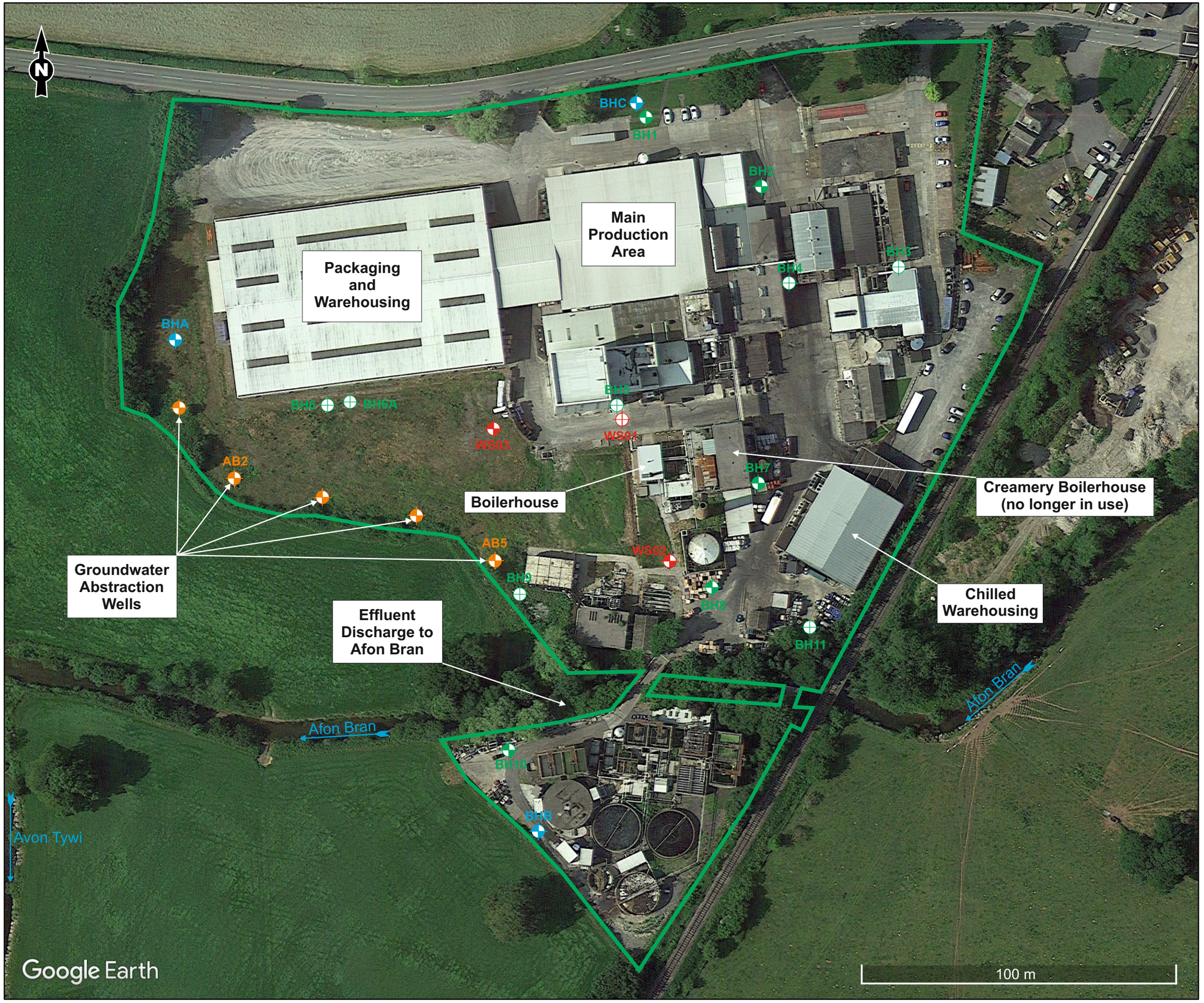
It is expected that the draft BAT-AELs will be formalised later in 2019, and that Cambrian Pet Foods will have four years to achieve compliance. Compliance routes will be investigated and options for the site will be reviewed when requested by NRW. In the interim, the limits state in Section 5.1 are proposed, based upon the existing plant performance and the discharge impacts.

6.3 Notes and Recommendations

The above conclusions are based on the information provided by Cambrian and NRW in relation to the Cambrian Pet Foods effluent, associated effluent parameters and river quality and flow data. Any change to the data or the proposed approach may result in a need to review the assessment presented herein and may alter the conclusions set out above.

The outcome of this assessment is based upon a limited data set (particularly for BOD, where 9 samples were available); Ramboll recommends that additional data is obtained to expand the dataset to a minimum of 12 (and preferably 36) data points for the determinands of interest both within the effluent and the receiving watercourse, to verify the outcomes of this initial assessment. In particular, consideration of total and ammoniacal nitrogen, and reactive phosphorus levels within both the effluent and the Afon Tywi should be investigated to confirm the level of impact.

APPENDIX 1
MAP OF SAMPLING LOCATIONS AND PROPOSED DISCHARGE PIPELINE



Legend

- Permit Boundary

On-site Boreholes:

- Ramboll 2018, installed as monitoring well
- Ramboll 2018, not installed as monitoring well
- Joynes Pike 2004, installed as monitoring well
- Joynes Pike 2004, not installed as monitoring well
- Rebecca Exley Groundwater 2004, installed as monitoring well (borehole identities for purpose of SCR only)
- Groundwater Abstraction Well (borehole identities for purpose of SCR only)

Figure Title	Figure 2: Site Layout
Project Name	Tywi Valley Food Park, Llangadog, Carmarthenshire, SA19 9LN
Project Number	1700001923
Figure No.	2
Date	July 2018
Prepared By	RH
Scale	1:1,000 @ A3
Issue	1
Client	Cambrian Pet Foods Ltd

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APPENDIX 2
WATER TREATMENT CHEMICAL MSDS

Section 1: Identification of Substance/mixture and of the company undertaking

1.1: Product Identifier

Product Name AQUATREAT 600

1.2: Relevant Identified use of substance/mixture and uses advised against

1.3: Details of the Supplier of the safety data sheet

Company Name: Aquatreat

Albany House
North Dock
Llanelli
Carmarthenshire
SA15 2LF

Telephone: 01554 775236

Fax: 01554 772253

E-mail: enquiries@aquatreat.co.uk

Website: www.aquatreat.co.uk

1.4: Emergency Telephone Numbers:

Emergency Telephone: 0333 333 9499

Section 2: Hazards Identification

2.1: Classification of substance/mixture according to Regulation (EC) No 1272/2008

Classification under CLP: H290 Met Corr. 1
H318 Eye Dam. 1

Additional Information:

2.2: Label Elements: Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Label elements under CLP: H290 May be corrosive to metals
H318 Causes serious eye damage

Signal Words: DANGER

Hazard Pictograms:

Precautionary Statements

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Remove immediately all contaminated clothing.

Store in corrosive resistant/… container with a resistant inner liner.

2.3: Other Hazards

Section 3: Composition information on hazardous ingredients

Polyaluminium Chloride

EINECS	CAS No	Classification according to Regulation (EC) 1272:2008	Percent
245-400-7	39290-78-3	H290: Met Corr.1; H318 Eye Dam.1	9 - 12

Section 4: First Aid Measures

4.1: Description of First Aid measures

Skin Contact: Remove affected person from source of exposure. Remove contaminated clothing. Wash the skin immediately with soap and water. Get medical attention promptly if symptoms occur after washing

Eye Contact: Remove victim immediately from source of exposure. Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention immediately. Continue to rinse.

Ingestion: Never make an unconscious person vomit or drink fluids. Rinse mouth thoroughly. Get medical attention immediately

Inhalation: Remove victim from source of exposure. Keep the affected person warm and at rest. Get prompt medical attention

4.2: Most important symptoms and effects both accute and delayed

Skin Contact: May cause serious chemical burns to the skin

Eye Contact: May cause serious eye damage

Ingestion: May cause burns in mucous membrane, throat, oesophagus and stomach

Inhalation: May cause burns to mucous membrane in nose, throat, lungs and bronchial system

4.3: Indication of any immediate medical treatment and special treatment required

No information available

Section 5: Fire fighting measures

5.1: Extinguishing media

Use fire extinguishing media appropriate for the surrounding materials.

Unsuitable Media

None known

5.2: Special hazards arising from the substance/mixture

May evolve corrosive gases/vapours/fumes of Hydrogen Chloride and Sulphurous gases in combustion or at high temperatures

5.3: Advice for firefighters

Wear acid resistant protective clothing and self contained breathing apparatus. Water spray should be used to cool containers

Section 6: Accidental Release Measures

6.1: Personal precautions, protective equipment and emergency procedures

Wear PPE as outlined in section 8

6.2: Environmental precautions

Avoid discharge into water courses or onto ground.

6.3: Methods and Materials for containment and clean up

Stop leak if possible without risk. Dam and absorb with sand, earth or other non combustible material. Shovel into dry containers and dispose of as special waste. Flush area with water

6.4: References to other sections

Section 7.0: Handling and Storage

7.1: Precautions for safe handling

Wear full protective clothing for prolonged exposure and or high concentrations. Eye wash facilities and emergency shower must be available when handling this producrt

7.2: Conditions for safe storage.

Use storage tank made of suitable plastic material or plastic lined steel drum.

7.4: Specific End Use(s)

Section 8: Exposurecontrols/PersonalProtection

8.1: Control Parameters

Soluble Aluminium Salts

WORKPLACE EXPOSURE		Respirable Dust	
8 Hour TWA	15MinSTEL	8 HoursTWA	15MinSTEL
2 mg/m3			

8.2: Exposure Controls

Engineering Measures	Provide adequate ventilation. Eye wash and emergency shower should be available.
Respiratory Protection	Respiratory protection required in case of aerosol formation
Hand Protection	PVC or rubber gloves.
Eye Protection	Goggles or face shield.
Skin Protection	Lightweight protective clothing, rubber or plastic apron

Section 9.0: Physical and ChemicalProperties

9.1: Information on basic physical and chemical properties

State:	Liquid
Colour:	Light or pale yellow
Odour:	Almost odourless
Relative Density:	1.2
pH:	2.0

9.2: Other Information

Section 10: Stability and Reactivity

10.1: Reactivity

In contact with metals generates hydrogen gas which can form explosive mixtures

10.2: Chemical Stability

Stable at ambient temperature

10.3: Possibility of Hazardous Reactions

10.4: Conditions to Avoid

Avoid excessive heat for prolonged periods of time. Avoid contact with acids

10.5: Incompatible Materials

Avoid contact with chlorites, hypochlorites and sulfites. Incompatible with other aluminium salts and iron salts.

10.6: Hazardous Decomposition Products

Hydrogen Chloride may be evolved during fire or at high temepratures

Section 11: Toxicological Information

No data available

Section 12: Ecological Information

12.1: Toxicity

12.2: Persistence and Biodegradable

Hydrolyses when diluted in water forming AL(OH)3

12.3: Bioaccumulative Potential

The product is not bioaccumulating

12.4: Mobility in Soil

No data available

12.5: Results of PBT and vPvB Assessment

No data available

12.6: Other adverse effects

Product is acidic and will reduce the pH of water courses and drains, and cause damage to fauna and flora. It should not be allowed to enter controlled waters in large quantities - in such cases the National Rivers Authority should be contacted.

Section 13: Disposal Information

Dispose of in accordance with local and national regulations

Section 14: Transport Information

UN Number	UN3264
Shipping Name	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (polyaluminium chloride)
Transport Class	8
Packing Group	II
Environment Hazard	No
Special Precautions	Emergency Action Code 2X

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Section 15: Regulatory Information

15.1: Safety, Health and Environmental regulations/legislation specific for the substance/mixture

15.2: Chemical safety assessment

Section 16: Other information

The above information is based on our present knowledge of the product at the time of publication. It is given in good faith, no warranty is implied as to the quality or specification of the product. Information contained in this data does not constitute an assessment of workplace risks. The user must satisfy himself that the product is entirely suitable for their purpose

Safety Data Sheet

According to Regulation (EU) No. 453/2010

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product Identifier

Product Name: MIDFLOC A258B

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use: Flocculation agent

1.3 Details of the supplier of the safety data sheet

Company name: Rochester Midland Corporation Ltd.
Address: Unit 24 Nine Mile Point
Cwmfelinfach
Crosskeys
NP11 7HZ

Web address: www.rmcorpltd.co.uk
Tel: 01495 200 005
Fax: 0700 393 7990
E-mail: hq@rmcorp.co.uk

1.4 Emergency telephone number

Tel: 01495 200 005 (will be redirected out of office hours)

Section 2: Hazards identification

2.1 Classification of the substance or mixture

CLASSIFICATION ACCORDING TO REGULATION (EC) NO. 1272/2008

Hazard types	Hazard class and category codes	Hazard statements
Physical and Chemical:	Not classified	n/a
Health:	Not classified	n/a
Environmental:	Not classified	n/a

2.2 Label elements

LABELLING ACCORDING TO REGULATION (EC) NO. 1272/2008

This product does not require a hazard warning label in accordance with this regulation.

2.3 Other hazards

May be dusty if not handled correctly.
As with many organic powders, flammable dust clouds may be formed.
Very slippery when wet.
This product does not meet the criteria for PBT or vPvB in accordance with Annex XIII of Regulation (EC) No. 1907/2006.

Section 3: Composition/Information on ingredients

3.2 Mixtures

Chemical nature: An anionic/non-ionic polyacrylamide.

This product does not contain any ingredients classified as hazardous to health or to the environment in concentrations which should be taken into account according to Regulation (EC) No. 1272/2008.

Section 4: First aid measures

4.1 Description of first aid measures

Skin contact: Remove all contaminated clothing and wash before wearing again.
Wash affected area with soap and plenty of water.
If any irritation or symptoms persist, seek medical attention.

Eye contact: Remove contact lenses if worn and rinse eye with plenty of water for at least 10 minutes holding eye open.
If any irritation or symptoms persist, seek medical attention.

Ingestion: If ingested only as far as mouth, wash out with plenty of water and seek medical advice if there is any ill effect.
If swallowed, DO NOT INDUCE VOMITING, give water to drink, seek immediate medical attention and show this safety data sheet or label.

Inhalation: Move to fresh air and seek medical attention if any irritation or symptoms persist.

4.2 Most important symptoms and effects, both acute and delayed

Skin contact: Powder may cause localised irritation.

Eye contact: Powder may cause temporary irritation.

Ingestion: May cause irritation to digestive system.

Inhalation: May cause irritation to respiratory system.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.
No specific antidote known.

Section 5: Firefighting measures

5.1 Extinguishing media

Use carbon dioxide, dry powder or foam.
It is preferable not to use water as the floor will become very slippery.

5.2 Special hazards arising from the substance or mixture

Build-up of dust may form an explosive mixture with air.
Oxides of carbon and nitrogen may be emitted in fire conditions.
Slip hazards will be formed in the presence of water.

5.3 Advice for firefighters

Wear full protective clothing and self-contained breathing apparatus.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedure

Wear suitable equipment for protection of eyes and skin.
Prevent formation of dust if possible.
Respiratory equipment should be worn if a dust has been formed.

6.2 Environmental precautions

Prevent product from entering drains and prevent further spillage if safe to do so.
Advise local authorities if large spills cannot be contained.

6.3 Clean-up procedures

Do not use water to clean up this product as it may cause surfaces to become very slippery.
Use vacuum cleaner or, if only a small amount is involved, sweep up very carefully without raising a dust. Then transfer to suitable, labelled container for disposal.

6.4 Reference to other sections

Suitable equipment for eye/face, skin and respiratory protection is quoted in section 8.
Suitable methods for disposal are quoted in section 13.

Section 7: Handling and storage

7.1 Precautions for safe handling

Avoid contact with eyes and skin.
Wear suitable equipment for protection of eyes and skin.
Avoid formation of dust and ensure adequate ventilation of the working area.
Respiratory equipment should be worn if Workplace Exposure Limit is exceeded.
Do not eat or drink in working area and wash hands after use.

7.2 Conditions for safe storage, including any incompatibilities

Keep packaging well sealed and away from moisture.
Store in cool, dry, well ventilated area.
Avoid using metal containers or equipment, except stainless steel, when mixing.

7.3 Specific end use

There is no specific end use in addition to that shown in section 1.

Section 8: Exposure controls/personal protection

8.1 Control parameters

WORKPLACE EXPOSURE LIMIT EH40

Ingredient name	LTEL (8 hr. TWA reference period)		STEL (15 min reference period)	
	ppm	mg/m³	ppm	mg/m³
Respirable dust	-	4	-	-
Inhalable dust	-	10	-	-

8.2 Exposure controls

Engineering controls: Ensure adequate ventilation of the working area.
Where dust can be generated, local exhaust ventilation should be provided.
Eyewash facilities should be provided in the working area.

Eye/face protection: Safety goggles (EN166).

Skin protection: Chemical resistant gloves (EN374), lightweight protective overalls and protective footwear.

Respiratory protection: Full or half mask respirator with P2 particle filter (European standard EN143) or disposable respirator (EN149 FFP2S).

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance:	Off-white powder
Odour:	Not significant
Odour threshold:	n/a
pH:	6 - 8 (1.0% aqueous solution)
Melting point/freezing point:	n/a
Boiling point or boiling range:	n/a
Flash point:	n/a
Evaporation rate:	n/a
Flammability:	Combustible
Upper/lower flammability or explosive limits:	n/a
Vapour pressure:	n/a
Vapour density:	n/a
Bulk density:	700 -1000 kg/m³.
Solubility:	Solubility in water limited by viscosity
Partition coefficient: n-octanol/water:	n/a
Auto-ignition temperature:	n/a
Decomposition temperature:	Approx. 200°C
Viscosity:	n/a
Explosive properties:	n/a
Oxidising properties:	None

9.2 Other information

None available.

Section 10: Stability and reactivity

10.1 Reactivity

Not likely to react adversely if stored and handled as prescribed.
No corrosive effect on metals.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

No hazardous reactions are likely if stored and handled as prescribed. However the build-up of product can lead to a risk of dust explosions.

10.4 Conditions to avoid

Moisture and extreme temperatures.
Dust formation, electrostatic discharges and sources of ignition.

10.5 Incompatible materials

Strong acids, strong bases, strong oxidising agents.

10.6 Hazardous decomposition products

Evolution of oxides of carbon and nitrogen is possible when exposed to excessive heat.

Section 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity:	**Oral**	**Dermal**	**Inhalation**
Similar product	Rat LD50 >5000 mg/kg	-	-

Irritation:	Very low expectation of irritation to skin. May cause slight irritation to eyes, and mucous membranes.
Corrosivity:	Not reported.
Sensitisation:	Not reported.
Repeated dose toxicity:	Not reported.
Carcinogenity:	Not reported.
Mutagenicity:	Not reported.
Toxicity for reproduction:	Not reported.

Section 12: Ecological information

12.1 Toxicity

Aquatic toxicity:	Fish	Invertebrates	Aquatic plants
Similar product	Oncorhynchus mykiss LC50(96h) >100mg/l	Daphnia magna EC50(48h) >100mg/l	-

12.2 Persistence and degradability

Not readily biodegradable.

12.3 Bioaccumulative potential

Not expected to bioaccumulate.

12.4 Mobility in soil

Adsorption to solid phase is expected.

12.5 Results of PBT and vPvB assessment

Not applicable.

12.6 Other adverse effects

Not expected to cause long-term adverse effects in aquatic environment.

Section13: Disposal considerations

13.1 Waste treatment methods

Disposal of product: Must be disposed of in accordance with local and national regulations.

Disposal of packaging: Packaging should be emptied as far as possible then sent for recycling or disposed of as for the product.

Section 14: Transport information

This product is not classified as dangerous for carriage by, road, sea or air.

Section 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of substances and mixtures.
Regulation (EC) No. 1907/2006 on Registration, Evaluation, Authorisation and Restriction of Chemicals.

15.2 Chemical safety Assessment

A Chemical Safety Assessment has not been carried out on this product.

Section 16: Other information

This safety data sheet is produced in accordance with Commission Regulation (EU) No. 453/2010 which amends Regulation (EC) No. 1907/2006.

It is revision 04 and replaces revision 03 issued on 06.03.15.

Changes have been made to sections 2, 3, 4 and 15.

There are no risk phrases or hazard statements not written in full in section 3.

The abbreviation n/a = not applicable or not available.

The information given in this document is based on current knowledge and experience and is given in good faith. No warranty expressed or implied is made, and data is only relevant to the use for which the product is supplied.

APPENDIX 3
WATER QUALITY ASSESSMENT DATA

MASS BALANCE CALCULATION:
MONTE CARLO METHOD

Version 2.5

Calculations done on 01/07/2019 at 12.17

Name of discharge	Cambrian Pet Foods
Name of river	Afon Tywi
Name of determinand	
	BOD

INPUT DATA

UPSTREAM RIVER DATA	
Mean flow	19.09
95% exceedence flow	3.97
Mean quality	0.93
Standard deviation of quality	0.34
90-percentile	1.38
DISCHARGE DATA	
Mean flow	0.01
Standard deviation of flow	0.00
Mean quality	21.00
Standard deviation of quality	10.00
... or 95-percentile	39.88

RESULTS

RIVER DOWNSTREAM OF DISCHARGE	
Mean quality	0.95
Standard deviation of quality	0.34
90-percentile quality	1.38
95-percentile quality	1.57
99-percentile quality	2.00
DISCHARGE QUALITY	
Mean quality	21.42
Standard deviation of quality	9.89
95-percentile quality	40.26
99-percentile quality	53.39
99.5-percentile quality	57.64

MASS BALANCE CALCULATION:
MONTE CARLO METHOD

Version 2.5

Calculations done on 26/06/2019 at 14.42

Name of discharge	Cambrian Pet Foods
Name of river	Afon Tywi
Name of determinand	
	BOD

INPUT DATA

UPSTREAM RIVER DATA	
Mean flow	19.09
95% exceedence flow	3.97
Mean quality	0.93
Standard deviation of quality	0.34
90-percentile	1.38
DISCHARGE DATA	
Mean flow	0.01
Standard deviation of flow	0.00
Mean quality	20.00
Standard deviation of quality	6.00
... or 95-percentile	31.05

RESULTS

RIVER DOWNSTREAM OF DISCHARGE	
Mean quality	0.95
Standard deviation of quality	0.34
90-percentile quality	1.38
95-percentile quality	1.57
99-percentile quality	2.00
DISCHARGE QUALITY	
Mean quality	20.27
Standard deviation of quality	5.97
95-percentile quality	31.24
99-percentile quality	37.52
99.5-percentile quality	39.43

MASS BALANCE CALCULATION:
MONTE CARLO METHOD

Version 2.5

Calculations done on 26/06/2019 at 14.45

Name of discharge	Cambrian Pet Foods
Name of river	Afon Tywi
Name of determinand	Nitrogen

INPUT DATA

RESULTS

UPSTREAM RIVER DATA		**RIVER DOWNSTREAM OF DISCHARGE**	
Mean flow	19.09	Mean quality	0.04
95% exceedence flow	3.97	Standard deviation of quality	0.02
Mean quality	0.02	90-percentile quality	0.07
Standard deviation of quality	0.02	95-percentile quality	0.08
90-percentile	0.04	99-percentile quality	0.11

DISCHARGE DATA		**DISCHARGE QUALITY**	
Mean flow	0.01	Mean quality	20.27
Standard deviation of flow	0.00	Standard deviation of quality	5.97
Mean quality	20.00	95-percentile quality	31.24
Standard deviation of quality	6.00	99-percentile quality	37.52
... or 95-percentile	31.05	99.5-percentile quality	39.43

MASS BALANCE CALCULATION:
MONTE CARLO METHOD

Version 2.5

Calculations done on 26/06/2019 at 15.13

Name of discharge	Cambrian Pet Foods
Name of river	Afon Tywi
Name of determinand	Phosphorus

INPUT DATA

UPSTREAM RIVER DATA

Mean flow	19.09
95% exceedence flow	3.97
Mean quality	0.09
Standard deviation of quality	0.01
90-percentile	0.10

DISCHARGE DATA

Mean flow	0.01
Standard deviation of flow	0.00
Mean quality	14.44
Standard deviation of quality	10.56
... or 95-percentile	34.21

RESULTS

RIVER DOWNSTREAM OF DISCHARGE

Mean quality	0.10
Standard deviation of quality	0.02
90-percentile quality	0.12
95-percentile quality	0.13
99-percentile quality	0.16

DISCHARGE QUALITY

Mean quality	14.81
Standard deviation of quality	10.28
95-percentile quality	34.68
99-percentile quality	52.19
99.5-percentile quality	58.30

MASS BALANCE CALCULATION:
MONTE CARLO METHOD

Version 2.5

Calculations done on 01/07/2019 at 13.50

Name of discharge	Cambrian Pet Foods
Name of river	Afoin Tywi
Name of determinand	Phosphate (as P)

INPUT DATA

UPSTREAM RIVER DATA

Mean flow	19.09
95% exceedence flow	3.97
Mean quality	0.09
Standard deviation of quality	0.01
90-percentile	0.10

DISCHARGE DATA

Mean flow	0.01
Standard deviation of flow	0.04
Mean quality	15.00
Standard deviation of quality	11.00
... or 95-percentile	35.59

RESULTS

RIVER DOWNSTREAM OF DISCHARGE

Mean quality	0.09
Standard deviation of quality	0.02
90-percentile quality	0.11
95-percentile quality	0.12
99-percentile quality	0.17

DISCHARGE QUALITY

Mean quality	15.39
Standard deviation of quality	10.70
95-percentile quality	36.08
99-percentile quality	54.34
99.5-percentile quality	60.72

MASS BALANCE CALCULATION: MONTE CARLO METHOD

Version 2.5

Calculations done on 01/07/2019 at 14.15

Name of discharge	Cambrian Pet Foods
Name of river	Afon Tywi
Name of determinand	Suspended Solids

INPUT DATA

UPSTREAM RIVER DATA

Mean flow	19.09
95% exceedence flow	3.97
Mean quality	6.70
Standard deviation of quality	14.10
90-percentile	15.22

DISCHARGE DATA

Mean flow	0.01
Standard deviation of flow	0.00
Mean quality	50.00
Standard deviation of quality	16.66
... or 95-percentile	80.89

RESULTS

RIVER DOWNSTREAM OF DISCHARGE

Mean quality	6.99
Standard deviation of quality	16.60
90-percentile quality	15.04
95-percentile quality	24.22
99-percentile quality	58.90

DISCHARGE QUALITY

Mean quality	50.74
Standard deviation of quality	16.56
95-percentile quality	81.44
99-percentile quality	99.73
99.5-percentile quality	105.36