Agricultural Benefit Statement

For the application of beneficial wastes to fields at;

Tylebrithos Farm, Cantref, Brecon. LD3 8LR
Maesmawr Farm, Talybont-On-Usk, Brecon. LD3 7YP

6th September 2021

1 Person with appropriate technical expertise and permit details

This benefit statement has been compiled by Dr Emily Marr (Consultant at 4R Group) who has the following qualifications and experience;

- PhD in Plant and Agricultural Sciences
- BA (Hons) cantab. In Natural Sciences

Verified by; Dr Chris Ash

Permit number under which this deployment application is being made: EPR/ GP3792SK

2 Where the waste is to be spread

Table 1. Where the waste is to be spread

Farm address:	Tylebrithos Farm, Cantref, Brecon. LD3 8LR Maesmawr Farm, Talybont-On-Usk, Brecon. LD3 7YP	
Stockpile grid reference:	Refer to Table 4	
Area of the receiving land:	46.9 ha	
Quantity to be stored at any one time:	Stackable: N/A	Non-Stackable: 1,250t
Total maximum quantity to be spread:	11,725t	
Location map document reference:	T&M Maps	

3 What is the waste to be spread

Table 2. Description of waste(s) to be applied

Waste	***EWC Code***	***Description***	***Waste Producer***	***Additional Information***
1	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Bryngwyn	Non-stackable ferric liquid sludge
2	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Capel Dewi	Non-stackable ferric liquid sludge
3	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Cefn Dryscoed	Non-stackable alum liquid sludge
4	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Crai	Non-stackable ferric liquid sludge
5	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Elan	Non-stackable ferric liquid sludge
6	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Hirwaun	Non-stackable ferric liquid sludge
7	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Llyswen	Non-stackable alum liquid sludge
8	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Pontsticill	Non-stackable alum liquid sludge
9	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Talybont	Non-stackable alum liquid sludge
10	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Whitbourne	Non-stackable ferric liquid sludge

4 Operational details

4.1 Cropping details

Table 3. Cropping details

Current crop including projected yield if known:	Refer to Tables 6-15
Is straw removed?	Y ☒ N ☐ N/A ☐

Following crop and any sensitive crops within rotation which you are amending the soil for in good time:	Refer to Tables 6-15
When do you intend to apply this waste; e.g. post harvest – pre-ploughing, during seed bed cultivations, on the stubble over winter:	Spreading will only take place subject to ground conditions and following the Code of Good Agricultural Practice (Defra, 2011), NVZ regulations and the permit holder's Environmental Management System (EMS). Targeted periods of spreading on grass fields include spring, after cutting of silage, and prior to grazing through summer and autumn. Liquids will be spread on arable fields in early spring. No more than 50t/ha will be spread on a field in any 3-week period in accordance with CoGAP, and no more than 250t/ha will be spread within any 12-month period.

4.2 Waste storage

Table 4. Waste storage

How is the waste to be stored? *e.g. mobile tank, field heap, spread on delivery*	Stackable wastes: N/A Non-stackable wastes: A storage tank is used for liquids and the contractor/farmer is planning a lagoon for storage of the liquid material on this deployment when spreading conditions are unsuitable.
Where is the waste to be stored prior to spreading?	Storage pit for liquids: A. SO 05043 25672
Why were these storage locations chosen?	The storage location is accessible by delivering vehicle, near field entrances so the potential damage to fields by delivering vehicles is minimal. The storage locations are not within 10m of any ditch, watercourse, or footpath, not within a SPZ1, and are at least 50m from any well spring or borehole. They are also a safe distance from overhead powerlines.

4.3 Waste application

Table 5. Waste application

How is the waste to be spread and why is it to be spread that way?	The cake will be spread using conventional rear discharge spreaders as this equipment is readily available to the farmer/contractor and the most appropriate for the material and application rates used.

	Liquid sludges will be spread by tractor and tanker using a dribble bar.
How do you plan to incorporate the waste following application?	There is no requirement for further incorporation of wastes on grass fields and liquids on arable fields.
With liquid wastes is there any mole draining or sub-soiling planned? *Are there land drains in the field?*	No No
Other relevant operational information:	The wastes may be applied separately or in combination. If the wastes are applied in combination the total combined amount applied will not exceed 250t/ha, the total nitrogen loading will be less than 250kg/ha, and the amount of available nitrogen and total or available phosphate and potash (whichever is appropriate) will not exceed the fertiliser recommendation or the amount removed in crop offtake, whichever is the greater. The fields with pH less than 6.0 will not receive alum-based sludge (Cefn Dryscoed, Llyswen, Pontsticill, and Talybont) due to the increased Al toxicity at low pH. Fields under this deployment are located in the Brecon Beacon National Park. Addition care must be taken to avoid unnecessary disturbances in this sensitive area and all contractors and delivery drivers made aware of this. Operational factors to mitigate negative effects on the environment, beyond those stipulated in the permit are laid out in Sections 7.3 and 8. Waste carriers and contractors must be approved by 4R Group and conform to our audited Health, Safety and Environmental Quality Policies.

Table 6. DCWW Bryngwyn

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**Soil pH**	**SNS**	**Req kg/ha**	***In Wst kg/ha**	**P Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**K Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**Mg Ind**	**Req kg/ha**	***In Wst kg/ha**	**Rate t/ha**	**Totals tonnes**
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	6.3	3	20	75	20*	2-	180	248	0.6	3	0	0.8	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2	Mod	235	6.3	3	120	75	20*	1	285	248	0.6	2	0	0.8	250	**1550**
Maesmawr																					
1	4.7	4.4	WB	WB	5.5	1	170	6.3	3	0	55	20*	2-	70	68	0.6	3	0	0.8	250	**1100**
2	2.5	2.3	WB	WB	5	1	170	6.3	4	0	55	20*	1	70	68	0.6	2	0	0.8	250	**575**
10	7.9	7.8	Grass	Grass	5.5	Mod	235	6.3	2	75	75	20*	1	285	248	0.6	2	0	0.8	250	**1950**
11	10.3	10.3	Grass	Grass	5.4	Mod	235	6.3	2	120	75	20*	1	285	248	0.6	2	0	0.8	250	**2575**
16	5.5	4.4	Grass	Grass	5.5	Mod	235	6.3	3	75	75	20*	1	350	248	0.6	3	0	0.8	250	**1100**
Ha	**48.7**	**46.9**																			**11725**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

***Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 50kg/ha

Table 7. DCWW Capel Dewi

Nutrient Requirements for Land at Tylebrithos & Maesmawr

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	1.5	3	20	75	**24.1	2-	170	248	**9.2	3	0	4.0	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2	Mod	235	1.5	3	20	75	**24.1	1	285	248	1.8	2	0	4.0	250	**1550**
Maesmawr																					
1	4.7	4.4	WB	WB	5.5	1	170	1.5	3	20	60	**24.1	2-	45	68	**9.2	3	0	4.0	250	**1100**
2	2.5	2.3	WB	WB	5	1	170	1.5	4	0	60	**24.1	1	75	68	**9.2	2	0	4.0	250	**575**
10	7.9	7.8	Grass	Grass	5.5	Mod	235	1.5	2	75	75	**24.1	1	285	248	1.8	2	0	4.0	250	**1950**
11	10.3	10.3	Grass	Grass	5.4	Mod	235	1.5	2	75	75	**24.1	1	285	248	1.8	2	0	4.0	250	**2575**
16	5.5	4.4	Grass	Grass	5.5	Mod	235	1.5	3	20	75	**24.1	1	285	248	1.8	3	0	4.0	250	**1100**
Ha	**48.7**	**46.9**																			**11725**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 29.9 kg/ha

Table 8. DCWW Cefn Dryscoed

Nutrient Requirements for Land at Tylebrithos & Maesmawr

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	1.6	3	20	75	**7.5	2-	170	248	**5.4	3	0	0.3	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2																
Maesmawr																					
1	4.7	4.4	WB	WB	5.5																
2	2.5	2.3	WB	WB	5																
10	7.9	7.8	Grass	Grass	5.5																
11	10.3	10.3	Grass	Grass	5.4																
16	5.5	4.4	Grass	Grass	5.5																
Ha	**48.7**	**46.9**																			**2875**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 64.7 kg/ha

Table 9. DCWW Crai

Nutrient Requirements for Land at Tylebrithos & Maesmawr

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	1.5	3	20	75	**12.3	2-	170	248	**5.8	3	0	1.0	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2	Mod	235	1.5	3	20	75	**12.3	1	285	248	1.2	2	0	1.4	250	**1550**
Maesmawr																					
1	4.7	4.4	WB	WB	5.5	1	170	1.5	3	20	55	**12.3	2-	45	68	**5.8	4	0	1.4	250	**1100**
2	2.5	2.3	WB	WB	5	1	170	1.5	4	0	55	**12.3	1	75	68	1.2	3	0	1.4	250	**575**
10	7.9	7.8	Grass	Grass	5.5	Mod	235	1.5	2	75	75	**12.3	1	285	248	1.2	3	0	1.4	250	**1950**
11	10.3	10.3	Grass	Grass	5.4	Mod	235	1.5	2	75	75	**12.3	1	285	248	1.2	2	0	1.4	250	**2575**
16	5.5	4.4	Grass	Grass	5.5	Mod	235	1.5	3	20	75	**12.3	1	285	248	1.2	3	0	1.4	250	**1100**
Ha	**48.7**	**46.9**																			**11725**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 51kg/ha

Table 10. DCWW Elan

Nutrient Requirements for Land at Tylebrithos & Maesmawr

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	1.5	3	20	75	**21.7	2-	170	248	**1.4	3	0	8.6	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2	Mod	235	1.5	3	20	75	**21.7	1	285	248	0.3	2	0	8.6	250	**1550**
Maesmawr																					
1	4.7	4.4	WB	WB	5.5	1	170	1.5	3	20	55	**21.7	2-	45	68	**1.4	4	0	8.6	250	**1100**
2	2.5	2.3	WB	WB	5	1	170	1.5	4	0	55	**21.7	1	75	68	0.3	3	0	8.6	250	**575**
10	7.9	7.8	Grass	Grass	5.5	Mod	235	1.5	2	75	75	**21.7	1	285	248	0.3	3	0	8.6	250	**1950**
11	10.3	10.3	Grass	Grass	5.4	Mod	235	1.5	2	75	75	**21.7	1	285	248	0.3	2	0	8.6	250	**2575**
16	5.5	4.4	Grass	Grass	5.5	Mod	235	1.5	3	20	75	**21.7	1	285	248	0.3	3	0	8.6	250	**1100**
Ha	**48.7**	**46.9**																			**11725**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250 t/ha is 96.5 kg/ha

Table 11. DCWW Hirwaun

Nutrient Requirements for Land at Tylebrithos & Maesmawr

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**Soil pH**	**SNS**	**Req kg/ha**	***In Wst kg/ha**	**P Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**K Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**Mg Ind**	**Req kg/ha**	***In Wst kg/ha**	**Rate t/ha**	**Totals tonnes**
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	1.5	3	20	75	**10.5	2-	170	248	**2.3	3	0	1.2	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2	Mod	235	1.5	3	20	75	**10.5	1	285	248	0.5	2	0	0.7	250	**1550**
Maesmawr																					
1	4.7	4.4	WB	WB	5.5	1	170	1.5	3	20	55	**10.5	2-	45	68	**2.3	4	0	0.7	250	**1100**
2	2.5	2.3	WB	WB	5	1	170	1.5	4	0	55	**10.5	1	75	68	0.5	3	0	0.7	250	**575**
10	7.9	7.8	Grass	Grass	5.5	Mod	235	1.5	2	75	75	**10.5	1	285	248	0.5	3	0	0.7	250	**1950**
11	10.3	10.3	Grass	Grass	5.4	Mod	235	1.5	2	75	75	**10.5	1	285	248	0.5	2	0	0.7	250	**2575**
16	5.5	4.4	Grass	Grass	5.5	Mod	235	1.5	3	20	75	**10.5	1	285	248	0.5	3	0	0.7	250	**1100**
Ha	**48.7**	**46.9**																			**11725**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 53.3 kg/ha

Table 12. DCWW Llyswen

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	2.2	3	20	75	22.1*	2-	170	248	5.1**	3	0	3.0	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2															0	
Maesmawr																					
1	4.7	4.4	WB	WB	5.5															0	
2	2.5	2.3	WB	WB	5															0	
10	7.9	7.8	Grass	Grass	5.5															0	
11	10.3	10.3	Grass	Grass	5.4															0	
16	5.5	4.4	Grass	Grass	5.5															0	
																				0	
Ha	**48.7**	**46.9**																			**2875**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 61kg/ha

Table 13. DCWW Pontsticill liquid

Nutrient Requirements for Land at Tylebrithos & Maesmawr

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	1.5	3	20	75	10.2*	2-	170	248	5.1**	3	0	1	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2															0	**0**
Maesmawr																					
1	4.7	4.4	WB	WB	5.5															0	**0**
2	2.5	2.3	WB	WB	5															0	**0**
10	7.9	7.8	Grass	Grass	5.5															0	**0**
11	10.3	10.3	Grass	Grass	5.4															0	**0**
16	5.5	4.4	Grass	Grass	5.5															0	**0**
Ha	**48.7**	**46.9**																			**2875**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250 t/ha is 27.2 kg/ha

Table 14. DCWW Talybont

Nutrient Requirements for Land at Tylebrithos & Maesmawr

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	2.4	3	20	75	**18.9	2-	170	248	**6.5	3	0	1.7	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2																
Maesmawr																					
1	4.7	4.4	WB	WB	5.5																
2	2.5	2.3	WB	WB	5																
10	7.9	7.8	Grass	Grass	5.5																
11	10.3	10.3	Grass	Grass	5.4																
16	5.5	4.4	Grass	Grass	5.5																
Ha	**48.7**	**46.9**																			**2875**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 66.7 kg/ha

Table 15. DCWW Whitbourne

Nutrient Requirements for Land at Tylebrithos & Maesmawr

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P_2O_5				K_2O				Mg			Rate	Totals
						SNS	Req kg/ha	*In Wst kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	t/ha	tonnes
Tylebrithos																					
Abercynrig 2	11.5	11.5	Grass	Grass	6.2	Mod	235	1.5	3	20	75	**5.4	2-	170	248	**3.5	3	0	2	250	**2875**
Abercynrig 10	6.3	6.2	Grass	Grass	5.2	Mod	235	1.5	3	20	75	**5.4	1	285	248	0.7	2	0	2	250	**1550**
Maesmawr																					
1	4.7	4.4	WB	WB	5.5	1	170	1.5	3	20	55	**5.4	2-	45	68	**3.5	4	0	2	250	**1100**
2	2.5	2.3	WB	WB	5	1	170	1.5	4	0	55	**5.4	1	75	68	0.7	3	0	2	250	**575**
10	7.9	7.8	Grass	Grass	5.5	Mod	235	1.5	2	75	75	**5.4	1	285	248	0.7	3	0	2	250	**1950**
11	10.3	10.3	Grass	Grass	5.4	Mod	235	1.5	2	75	75	**5.4	1	285	248	0.7	2	0	2	250	**2575**
16	5.5	4.4	Grass	Grass	5.5	Mod	235	1.5	3	20	75	**5.4	1	285	248	0.7	3	0	2	250	**1100**
Ha	**48.7**	**46.9**																			**11725**

Grass = 2 cut silage with aftermath grazing, WB = winter barley

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) and winter barley described in RB209 (2020)

Expected Grazing yield of 9-12t/ha

Grass crop use based on yield totalling 38t/ha where 1.7kg/t P_2O_5 and 6.0kg/t K_2O removed in offtake (RB209, 2020)

Winter barley crop use based on 6.5t/ha yield where 8.5kg/t P_2O_5 and 10.5kg/t K_2O removed in offtake (RB209, 2020)

To account for aftermath grazing, 1/2 of the P & K requirement for grazing has been added, and 10kg/ha P and 20kg/ha K is added to crop use

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 and K_2O stated where soil indices ≥2

Total N supplied at an application rate of 250t/ha is 59.2 kg/ha

5 Compliance with NVZ regulations

Table 16. Compliance with NVZ regulations

<table>
<tr><td>Does the site fall within a designated NVZ?</td><td>Y ☐ N ☒ (Please skip to section 6)</td></tr>
<tr><td>Do closed periods apply for the wastes to be applied?</td><td>Y ☐ N ☒

Applicable to:

If yes, please indicate the appropriate period:

<table>
<tr><th>Start Date</th><th>End Date</th><th>Land Use</th><th>Soil Type</th><th></th></tr>
<tr><td>1st Aug</td><td>31st Dec</td><td>Tillage Land</td><td>Shallow/Sandy</td><td>☐</td></tr>
<tr><td>1st Sept</td><td>31st Dec</td><td>Grassland</td><td>Shallow/Sandy</td><td>☐</td></tr>
<tr><td>16th Sept</td><td>31st Dec</td><td>Tillage Land*</td><td>Shallow/Sandy</td><td>☐</td></tr>
<tr><td>1st Oct</td><td>31st Jan</td><td>Tillage Land</td><td>All Other Soils</td><td>☐</td></tr>
<tr><td>15th Oct</td><td>31st Jan</td><td>Grassland</td><td>All Other Soils</td><td>☐</td></tr>
</table>

*For Tillage Land with crops sown on or before 15th September

If no, applications will be carried out as per CoGAP i.e. when ground conditions are suitable and when no heavy rain is forecast.</td></tr>
<tr><td>Will application rates comply with crop requirement and field/whole farm limit?</td><td></td></tr>
<tr><td>Previous applications:</td><td></td></tr>
</table>

6 Benefits and nutrients supplied to the soil or crop from this application

6.1 Receiving soils

The nutrient status of individual fields to be registered are provided in Tables 6-15 above. General soil type(s) for the fields to be registered are;

Table 17. Soil type

Light sand soils	Soils which are sand, loamy sand or sandy loam to 40cm depth and are sand or loamy sand between 40 and 80 cm, or over sandstone rock.	☐
Shallow soils	Soils over impermeable subsoils and those where the parent rock (chalk, limestone or other rock) is within 40cm of the soil surface. Sandy soils developed over sandstone rock should be regarded as light sand soils.	☐
Medium soils	Mostly medium-textured mineral soils that do not fall into any other soil category. This includes sandy loams over clay, deep loams, and silty or clayey topsoils that have sandy or loamy subsoils.	☒
Deep clayey soils	Soils with predominantly sandy clay loam, silty clay loam, clay loam, sandy clay, silty clay or clay topsoil overlying clay subsoil to more than 40cm depth. Deep clayey soils normally need artificial field drainage.	☐
Deep silty soils	Soils of sandy silt loam, silt loam or silty clay loam textures to 100 cm depth or more. Silt soils formed on marine alluvium, warp soils (river alluvium) and brickearth soils are in this category. Silty clays of low fertility should be regarded as other mineral soils.	☐
Organic soils	Soils that are predominantly mineral but with between 10 and 20% organic matter to depth. These can be distinguished by darker colouring that stains the fingers black or grey.	☐
Peat soils	Soils that contain more than 20% organic matter derived from sedge or similar peat material.	☐

The soil analyses (**Soil Analysis**) shows the soils to have ample background concentrations of Mg (i.e. ADAS Index of 2-4). It is therefore unlikely that the crop will require any additional input of Mg over the course of the cropping cycle. None of the wastes contain any notable concentration of Mg and therefore applications of these materials will not increase background levels in the receiving soil over time.

6.2 Waste characterisation

Full characterisations of individual wastes with total and available nutrients at the recommended rates for each waste stream are supplied in **Waste Analysis**. This information is further summarised against the nutrient requirements for proposed crops in Tables 6-15 above.

The limiting factors for the different wastes are max rate of 250t/ha

6.3 Summary of benefits

These wastes are a source of essential elements N, P, K, macronutrients Mg, Ca, S and provide trace amounts of micronutrients. Wastes are beneficially used to replace a proportion of the bagged mineral fertiliser used by farmers. The recommended application rates shown in Tables 6-15 are based on the crop requirement and soil analysis.

Clean water treatment sludges contain significant amounts of organic matter, for example, the dry solids in Cefn Dryscoed liquid consist of 57% organic matter. Additions of organic matter to soil will improve soil structural stability, biological activity, water and nutrient holding capacity, i.e. resistance to drought, and reduction of localised flooding, reduced leaching of nutrients, and improved workability in soil. Organic matter is a particularly good source of N and S, and organic acids that aid nutrient solubility and uptake, as well as enhancing microbial activity for enhanced nutrient cycling in soils.

6.4 Additional requirements

Fields may require additional N, P, and K to achieve optimum yield.

7 Potential negative impacts to the soil or crop from this application

7.1 Potentially Toxic Elements (PTEs)

All the wastes contain traces of PTEs, however concentrations applied to the receiving soils are below maximum upper limits for heavy metal applications described in the Sludge (Use in Agriculture) Regulations 1989 (SI, 1989). Refer to interpretations in **Waste Analysis**.

7.2 Other waste characteristics

The pH levels in the wastes range from 5.6 to 7.7.

It is unlikely that soil pH will decrease following the application detailed here due to the extensive buffering capacity of the receiving soils. The pH levels of the receiving soils are ≥ 5.0. Therefore it is unlikely that availability of any naturally occurring heavy metals present in these soils will become more available after application of these wastes.

7.3 Operational factors

1. Solid wastes will be spread using conventional rear discharge spreaders.
2. Liquid wastes will be applied using a dribble bar.
3. Potential compaction of receiving soil will be mitigated by suitable adjustment of tyres/tyre pressure to match soil conditions, direction of spreading and load to be spread.
4. Wastes will be applied when ground and weather conditions are suitable, following CoGAP to avoid soil damage including wheel ruts, compaction, structural damage, erosion and run-off.
5. Where SSSI designated sites borders fields, they will be protected by a 50m non-spreading buffer zone.

8 Sensitive human and environmental receptors

Please refer to site specific risk assessment (**T&M SSRA**). Locations of sensitive receptors are shown in **T&M Maps**. Prevailing winds are south-westerly.

9 Practices to reduce the impacts of the operation on identified sensitive receptors

Mitigation measures to safeguard site-specific high and moderate likelihood of emission detection by sensitive receptors are shown in **T&M SSRA**. Generic measures (in addition to permit requirements and following the EMS) to reduce potential negative impacts of the proposed spreading operation will be as follows;

1. Spreading will only be undertaken when weather conditions are suitable within restrictions outlined in CoGAP and any relevant closed periods.
2. Spreading will not be carried out in any areas of a field that will be sub-soiled.
3. Machinery operations will take account of soil conditions, slopes *etc.*
4. Liquid spreading machinery will be turned off and lifted away from soil prior to turning at the end of each run.
5. Machinery will be checked daily when in use, regularly serviced and spreading equipment calibrated. Umbilical hoses will be regularly checked for damage to prevent leaks.
6. Machinery turns will not be executed in the buffer strips.
7. Waste deliveries to field/stores will be supervised.
8. All spillages will be reported immediately to NRW.

10 Contingency planning

Replacement spreading machinery will be available to prevent waste being retained in faulty machinery. Hire vehicles will be used if required. All machinery will be fully serviced.
There will be a sufficient number of trained staff available to ensure that the operation continues throughout operational hours (*i.e.* there will be sufficient cover for illness, holiday *etc.*).
In adverse weather, storage is available until ground/weather conditions become favourable for land application.
In circumstances where the wastes cannot be stored or spread beyond normal capacities, wastes will be diverted to a local alternative deployment or DCWW sewage treatment works.