

Agricultural Benefit Statement

For the application of beneficial wastes to fields at:

Blaen Y Coed, Ysbyty Ifan, Betws-y-Coed, Gwynedd, LL24 0NY

28th May 2025

1 Person with appropriate technical expertise and permit details

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

- B.Agric – Plant production
- PGDip – Agronomy
- MSc - Sustainable Agriculture
- 3 years of agronomic experience
- 4R Group Deployment Training Course

Verified by: Esther Koroma, (Environmental Consultant at 4R Group) FACTS FQA: FE/7273

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

<i>Farm address:</i>	Blaen Y Coed, Ysbyty Ifan, Betws-y-Coed, Gwynedd, LL24 0NY	
<i>Stockpile grid reference:</i>	Refer to Table 4	
<i>Area of the receiving land:</i>	18 ha	
<i>Quantity to be stored at any one time:</i>	Stackable (temporary field stockpile): N/A	Non-Stackable: 1,250t
	No more than 1,250 t will be stored at any one time.	
<i>Total maximum quantity to be spread:</i>	4,505 t	

Location map document reference:	2. Spreading Maps_Blaenycoed (2025)
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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	Potable water treatment sludges from water clarification process	DCWW Bala	Non-stackable alum liquid sludge
2	19 09 02	Potable water treatment sludges from water clarification process	DCWW Bryn Cowlyd	Non-stackable ferric liquid sludge
3	19 09 02	Potable water treatment sludges from water clarification process	DCWW Cilfor	Non-stackable alum liquid sludge
4	19 09 02	Potable water treatment sludges from water clarification process	DCWW Eithin Fynydd	Non-stackable alum liquid sludge
5	19 09 02	Potable water treatment sludges from water clarification process	DCWW Garreglwyd	Non-stackable ferric liquid sludge
6	19 09 02	Potable water treatment sludges from water clarification process	DCWW Gwastadgoed	Non-stackable ferric liquid sludge
7	19 09 02	Potable water treatment sludges from water clarification process	DCWW Llyn Conwy	Non-stackable ferric liquid sludge
8	19 09 02	Potable water treatment sludges from water clarification process	DCWW Penycefn	Non-stackable alum liquid sludge
9	19 09 02	Potable water treatment sludges from water clarification process	DCWW Penybont	Non-stackable alum liquid sludge
10	19 09 02	Potable water treatment sludges from water clarification process	DCWW Rhiw Goch	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	Spreading will only take place subject to ground conditions and following the Code of Good Agricultural Practice

seed bed cultivations, on the stubble over winter:	(Defra, 2018), NVZ regulations and the permit holder's Environmental Management System (EMS). Spreading activities will also comply with the Spreading activities will also comply with The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021. Targeted periods of spreading on grass fields are from February, through May and after cutting of silage (June-October) as per the RB209 (2023). No more than 50t/ha of waste 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. The number of times a waste will be spread will be dependent on the total tonnage divided by the max application rate (50t/ha in 3 weeks).
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4.2 Waste storage

Table 4. Waste storage

<i>How is the waste to be stored?</i> <i>e.g., mobile tank, field heap, spread on delivery</i>	Storage lagoon or spread on delivery.
<i>Where is the waste to be stored prior to spreading?</i>	Lagoon: A: SH 81649 46016
<i>Why were these storage locations chosen?</i>	The storage location is accessible by delivering vehicle, near field entrances so the potential damage to fields by delivering vehicles is minimal, and liquid storage facilities are secure on farm. The storage location is not within 10m of any ditch, watercourse, or footpath, nor within a SPZ1, and are at least 50m from any well, spring or borehole. It is also a safe distance from overhead powerlines. The lagoon will only hold wastes in this deployment and will be empty and clean before storing wastes from this deployment.

4.3 Waste application

Table 5. Waste application

<i>How is the waste to be spread and why is it to be spread that way?</i>	The wastes will be surface spread by tractor and tanker using dribble bar. This equipment is readily available to the farmer/contractor and the most appropriate for the material and application rates used.
<i>How do you plan to incorporate the waste following application?</i>	There is no requirement for further incorporation of wastes on grass fields due to low ammonia content and minimal odour.
<i>With liquid wastes is there any mole draining or sub-soiling planned?</i> <i>Are there land drains in the field?</i>	No to both.
<i>Other relevant operational information:</i>	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. Only fields which have soil pH 6 or above can receive alum-based sludge. Therefore, there will be no application of alum-based sludge on fields 2, 7 and 8 in this deployment.

Table 6. DCWW Bala

						N			P ₂ O ₅				K ₂ O				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
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	1.5	3	30	75	6.7*	3	105	248	0.6*	3	0	4.3	250	733
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	3	30	75	0	3	105	248	0	3	0	0	0	0
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	1.5	3	30	75	6.7*	3	105	248	0.6*	2	0	4.3	250	370
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	0	3	30	75	0	2+	180	248	0	3	0	0	0	0
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	2	97	75	0	2-	255	248	0	2	0	0	0	0
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	1.5	3	30	75	6.7*	2-	255	248	0.6*	2	0	4.3	250	293
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	1.5	3	30	75	6.7*	1	270	248	0.6	2	0	4.3	250	485
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	1.5	3	30	75	6.7*	1	270	248	0.6	2	0	4.3	250	1190
Ha	27.05	18.0																			3070

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

**Total P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 250t/ha is 69.9kg/ha

Table 7. DCWW Bryn Cowlyd

						N			P ₂ O ₅				K ₂ O				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
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	1.5	3	30	75	4*	3	105	248	1.4*	3	0	0.9	250	733
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	1.5	3	30	75	4*	3	105	248	1.4*	3	0	0.9	250	560
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	1.5	3	30	75	4*	3	105	248	1.4*	2	0	0.9	250	370
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	1.5	3	30	75	4*	2+	180	248	1.4*	3	0	0.9	250	300
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	1.5	2	97	75	4*	2-	255	248	1.4*	2	0	0.9	250	575
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	1.5	3	30	75	4*	2-	255	248	1.4*	2	0	0.9	250	293
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	1.5	3	30	75	4*	1	270	248	1.3	2	0	0.9	250	485
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	1.5	3	30	75	4*	1	270	248	1.3	2	0	0.9	250	1190
Ha	27.05	18.0																			4505

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

**Total P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 250t/ha is 38.7kg/ha

Table 8. DCWW Cilfor

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P ₂ O ₅				K ₂ O				Mg			Rate t/ha	Totals tonnes
						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		
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	1	3	30	75	37.3*	3	105	248	0.4*	3	0	1.8	82	240
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	3	30	75	0	3	105	248	0	3	0	0	0	0
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	1	3	30	75	37.3*	3	105	248	0.4*	2	0	1.8	82	121
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	0	3	30	75	0	2+	180	248	0	3	0	0	0	0
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	2	97	75	0	2-	255	248	0	2	0	0	0	0
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	1	3	30	75	37.3*	2-	255	248	0.4*	2	0	1.8	82	96
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	1	3	30	75	37.3*	1	270	248	0.4	2	0	1.8	82	159
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	1	3	30	75	37.3*	1	270	248	0.4	2	0	1.8	82	390
Ha	27.05	18.0																			1007

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

****Total** P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 82t/ha is 35.4kg/ha

Table 9. DCWW Eithin Fynydd

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P ₂ O ₅				K ₂ O				Mg			Rate	Totals
						SNS	Req	*In	P	Req	Crop Use	*In	K	Req	Crop Use	*In	Mg	Req	*In		
							kg/ha	kg/ha	Ind	kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha	t/ha	tonnes
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	1.2	3	30	75	37.5*	3	105	248	1.5*	3	0	0.9	204	598
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	3	30	75	0	3	105	248	0	3	0	0	0	0
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	1.2	3	30	75	37.5*	3	105	248	1.5*	2	0	0.9	204	302
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	0	3	30	75	0	2+	180	248	0	3	0	0	0	0
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	2	97	75	0	2-	255	248	0	2	0	0	0	0
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	1.2	3	30	75	37.5*	2-	255	248	1.5*	2	0	0.9	204	239
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	1.2	3	30	75	37.5*	1	270	248	1.3	2	0	0.9	204	396
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	1.2	3	30	75	37.5*	1	270	248	1.3	2	0	0.9	204	971
Ha	27.05	18.0																			2505

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

**Total P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 204t/ha is 59.7kg/ha

Table 10. DCWW Garreglwyd

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P ₂ O ₅				K ₂ O				Mg			Rate t/ha	Totals tonnes
						SNS	Req kg/ha	*In kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In kg/ha	Mg Ind	Req kg/ha	*In kg/ha		
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	1.5	3	30	75	33.9*	3	105	248	1.4*	3	0	2.5	250	733
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	1.5	3	30	75	33.9*	3	105	248	1.4*	3	0	2.5	250	560
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	1.5	3	30	75	33.9*	3	105	248	1.4*	2	0	2.5	250	370
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	1.5	3	30	75	33.9*	2+	180	248	1.4*	3	0	2.5	250	300
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	1.5	2	97	75	33.9*	2-	255	248	1.4*	2	0	2.5	250	575
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	1.5	3	30	75	33.9*	2-	255	248	1.4*	2	0	2.5	250	293
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	1.5	3	30	75	33.9*	1	270	248	1.2	2	0	2.5	250	485
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	1.5	3	30	75	33.9*	1	270	248	1.2	2	0	2.5	250	1190
Ha	27.05	18.0																			4505

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

****Total** P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 250t/ha is 78.1kg/ha

Table 11. DCWW Gwastadgoed

						N			P ₂ O ₅				K ₂ O				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	*In Wst kg/ha	K Ind	Req kg/ha	Crop Use	*In Wst kg/ha	Mg Ind	Req kg/ha	*In Wst kg/ha	Rate t/ha	Totals tonnes
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	1	3	30	75	37.4*	3	105	248	1.2*	3	0	1.2	163	478
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	1	3	30	75	37.4*	3	105	248	1.2*	3	0	1.2	163	365
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	1	3	30	75	37.4*	3	105	248	1.2*	2	0	1.2	163	241
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	1	3	30	75	37.4*	2+	180	248	1.2*	3	0	1.2	163	196
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	1.5	2	97	75	57.4*	2-	255	248	1.8*	2	0	1.9	250	575
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	1	3	30	75	37.4*	2-	255	248	1.2*	2	0	1.2	163	191
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	1	3	30	75	37.4*	1	270	248	1.1	2	0	1.2	163	316
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	1	3	30	75	37.4*	1	270	248	1.1	2	0	1.2	163	776
Ha	27.05	18.0																			3137

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

****Total** P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 250t/ha is 47.5kg/ha

Table 12. DCWW Llyn Conwy

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P ₂ O ₅				K ₂ O				Mg			Rate	Totals
						SNS	Req	*In	Ind	Req	Crop Use	*In	Ind	Req	Crop Use	*In	Mg Ind	Req	*In		
							kg/ha	kg/ha		kg/ha	kg/ha	kg/ha		kg/ha	kg/ha	kg/ha		kg/ha	kg/ha	t/ha	tonnes
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	0.1	3	30	75	16.1*	3	105	248	1*	3	0	1.1	250	733
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	0.1	3	30	75	16.1*	3	105	248	1*	3	0	1.1	250	560
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	0.1	3	30	75	16.1*	3	105	248	1*	2	0	1.1	250	370
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	0.1	3	30	75	16.1*	2+	180	248	1*	3	0	1.1	250	300
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	0.1	2	97	75	16.1*	2-	255	248	1*	2	0	1.1	250	575
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	0.1	3	30	75	16.1*	2-	255	248	1*	2	0	1.1	250	293
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	0.1	3	30	75	16.1*	1	270	248	0.9	2	0	1.1	250	485
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	0.1	3	30	75	16.1*	1	270	248	0.9	2	0	1.1	250	1190
Ha	27.05	18.0																			4505

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

****Total** P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 250t/ha is 50.3kg/ha

Table 13. DCWW Penycefn

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P ₂ O ₅				K ₂ O				Mg			Rate t/ha	Totals tonnes
						SNS	Req kg/ha	*In kg/ha	P Ind	Req kg/ha	Crop Use kg/ha	*In kg/ha	K Ind	Req kg/ha	Crop Use kg/ha	*In kg/ha	Mg Ind	Req kg/ha	*In kg/ha		
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	1.2	3	30	75	37.5*	3	105	248	0.6*	3	0	1.1	195	571
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	3	30	75	0	3	105	248	0	3	0	0	0	0
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	1.2	3	30	75	37.5*	3	105	248	0.6*	2	0	1.1	195	289
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	0	3	30	75	0	2+	180	248	0	3	0	0	0	0
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	2	97	75	0	2-	255	248	0	2	0	0	0	0
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	1.2	3	30	75	37.5*	2-	255	248	0.6*	2	0	1.1	195	228
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	1.2	3	30	75	37.5*	1	270	248	0.5	2	0	1.1	195	378
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	1.2	3	30	75	37.5*	1	270	248	0.5	2	0	1.1	195	928
Ha	27.05	18.0																			2395

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

****Total** P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 195t/ha is 72.1kg/ha

Table 14. DCWW Penybont

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P ₂ O ₅			K ₂ O			Mg			Rate t/ha	Totals tonnes
						SNS	Req	*In	P	Req	Crop Use	*In	K	Req	Crop Use	*In	Mg		
						kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	0.7	3	30	75	37.4*	3	105	248	0.7*	3	0	1.3
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	3	30	75	0	3	105	248	0	3	0	0
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	0.7	3	30	75	37.4*	3	105	248	0.7*	2	0	1.3
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	0	3	30	75	0	2+	180	248	0	3	0	0
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	0	2	97	75	0	2-	255	248	0	2	0	0
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	0.7	3	30	75	37.4*	2-	255	248	0.7*	2	0	1.3
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	0.7	3	30	75	37.4*	1	270	248	0.6	2	0	1.3
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	0.7	3	30	75	37.4*	1	270	248	0.6	2	0	1.3
Ha	27.05	18.0																	1375

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

**Total P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 112t/ha is 25.8kg/ha

Table 15. DCWW Rhiw Goch

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	Soil pH	N			P ₂ O ₅				K ₂ O				Mg			Rate	Totals
						SNS	Req	*In	P	Req	Crop Use	*In	K	Req	Crop Use	*In	Mg	Req	*In		
							kg/ha	kg/ha		kg/ha	kg/ha	kg/ha		kg/ha	kg/ha	kg/ha		kg/ha	kg/ha	t/ha	tonnes
1	3.5	2.93	Grass	Grass(2 cuts & grazing)	6.5	M	220	0.8	3	30	75	37.4*	3	105	248	0.7*	3	0	1	130	381
2	3.1	2.24	Grass	Grass(2 cuts & grazing)	5.9	M	220	0.8	3	30	75	37.4*	3	105	248	0.7*	3	0	1	130	291
3	3.6	1.48	Grass	Grass(2 cuts & grazing)	6	M	220	0.8	3	30	75	37.4*	3	105	248	0.7*	2	0	1	130	192
7	3.3	1.2	Grass	Grass(2 cuts & grazing)	5.6	M	220	0.8	3	30	75	37.4*	2+	180	248	0.7*	3	0	1	130	156
8	4.3	2.3	Grass	Grass(2 cuts & grazing)	5.9	M	220	1.5	2	97	75	72*	2-	255	248	1.3*	2	0	1.9	250	575
20	1.9	1.17	Grass	Grass(2 cuts & grazing)	6.1	M	220	0.8	3	30	75	37.4*	2-	255	248	0.7*	2	0	1	130	152
21	2.3	1.94	Grass	Grass(2 cuts & grazing)	6.4	M	220	0.8	3	30	75	37.4*	1	270	248	0.6	2	0	1	130	252
22	5.05	4.76	Grass	Grass(2 cuts & grazing)	6	M	220	0.8	3	30	75	37.4*	1	270	248	0.6	2	0	1	130	619
Ha	27.05	18.0																			2619

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).

Phosphate and Potash requirements based on **Grass Silage, 2 Cuts with aftermath grazing (38t/ha)**.

Crop use based on **Grass** totalling **38t/ha** yield (25% DM) where **1.7kg/t P₂O₅** and **6kg/t K₂O** removed in offtake

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, P₂O₅, K₂O and Mg stated are **Available** concentrations in kg/ha

**Total P₂O₅ and K₂O stated where soil indices ≥2

Availability of nutrients in waste - N measured as NH₄, P₂O₅ 50%, K₂O 90%, Mg 25%

Total N supplied at an application rate of 250t/ha is 67.8kg/ha

5 Compliance with NVZ regulations

Table 16. Compliance with NVZ regulations

<i>Does the site fall within a designated NVZ?</i>	Y ☒ N ☐ (Please skip to section 6)																														
<i>Do closed periods apply for the wastes to be applied?</i>	Y ☐ N ☒ Applicable to: All wastes < 30% RAN If yes, please indicate the appropriate period: <table border="1"> <thead> <tr> <th>Start Date</th><th>End Date</th><th>Land Use</th><th>Soil Type</th><th></th></tr> </thead> <tbody> <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> </tbody> </table> *For Tillage Land with crops sown on or before 15th September If no, applications will be carried out as per CoGAP <i>i.e.</i>, when ground conditions are suitable and when no heavy rain is forecast.	Start Date	End Date	Land Use	Soil Type		1st Aug	31st Dec	Tillage Land	Shallow/Sandy	☐	1st Sept	31st Dec	Grassland	Shallow/Sandy	☐	16th Sept	31st Dec	Tillage Land*	Shallow/Sandy	☐	1st Oct	31st Jan	Tillage Land	All Other Soils	☐	15th Oct	31st Jan	Grassland	All Other Soils	☐
Start Date	End Date	Land Use	Soil Type																												
1st Aug	31st Dec	Tillage Land	Shallow/Sandy	☐																											
1st Sept	31st Dec	Grassland	Shallow/Sandy	☐																											
16th Sept	31st Dec	Tillage Land*	Shallow/Sandy	☐																											
1st Oct	31st Jan	Tillage Land	All Other Soils	☐																											
15th Oct	31st Jan	Grassland	All Other Soils	☐																											
<i>Will application rates comply with crop requirement and field/whole farm limit?</i>	Yes, refer to Tables 6 - 15																														
<i>Previous applications:</i>	Refer to previous spreading in application form.																														

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**) show the soils to have ample background concentrations of Mg (*i.e.*, ADAS Index of 2-3). It is therefore unlikely that the crop will require any additional input of Mg over the course of the cropping cycle.

The concentrations of PTEs in these materials are very low and indicate that there is not a risk of a build-up of harmful substances in the soil. Therefore, heavy metals analysis on the soils are not required for this deployment as all PTE additions are well below upper limits.

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 total phosphate where P index is ≥ 2 or the maximum rate of 250t/ha.

****Please note, DCWW report all their analysis on a dry matter basis, including the liquid treatment sludges, unless otherwise stated.***

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. 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**.

The potable water treatment sludges contain varying amounts of Al and Fe due to the flocculation process in the water treatment. At low pH (<6.0), aluminium can potentially transform into the toxic Al^{3+} species, it is therefore necessary to avoid spreading Al flocculated wastes on fields with pH <6.0 as this can cause stunt root growth and induced phosphate deficiency in crops. Additionally, care will be taken to prevent the waste entering a watercourse because aluminium can harm aquatic life. This will be achieved through observing buffer zones as per the location plan. Also, watercourses will be checked before, during and following spreading.

Iron flocculated wastes also have potential disbenefits if applied to inappropriate soils. Spreading high Fe wastes onto soils with pH < 5.0 is not recommended. Spreading onto fields with soil pH between 5.0- 5.5 requires consideration and possible mitigation. Due to potential for Fe-oxide formation which can reduce P_2O_5 mobility, spreading of Fe-flocculated wastes onto fields that are pH 5.0-5.5 has been avoided.

7.2 Other waste characteristics

The pH levels in the wastes range from 5.6 to 6.9. 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 ≥ 5.6 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. Liquid wastes will be surface spread, applied using a dribble bar.
2. 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.

3. Sampling methods will be consistent with those set out in the RB209, and the analysis for PTEs are consistent with the code of agricultural practice.
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. Sufficient buffer capacity has been added to the spreading maps to minimise risk and ensure the protection of the monument located near field 8.

8 Sensitive human and environmental receptors

Please refer to site specific risk assessment. Locations of sensitive receptors are shown in **Location Plan**. Prevailing winds are south-westerly.

Non-spreading buffers have been applied to areas protected under the NERC Act to SAP species and habitats. The following were all taken from NT records and included in maps:

- Buffer along eastern boundaries of part of field 1 and all of field 2. This is to protect area with records of small pearl-bordered fritillary. There are also records of Devil's bit scabious (*Succisa pratensis*), Water mint (*Mentha aquatica*), Water forget me not (*Myosotis scorpioides*), Lesser spearwort (*Ranunculus flammula*), Marsh bird's foot trefoil (*Lotus pedunculatus*) and Marsh violet (*Viola cucullata*) in the marshy areas together with drier banks including Knapweed (*Centaurea nigra*), Pignut (*Conopodium majus*) and Meadow vetchling (*Lathyrus pratensis*).
- Flushed bank in south-western area of field 2 includes Mouse ear hawkweed (*Hieracium pilosella*), Cat's ear (*Hypochaeris radicata*), Harebell (*Campanula rotundifolia*), Heath spotted orchid (*Dactylorhiza maculate*) and Lousewort (*Pedicularis sylvatica*).
- Fields 20, 21 and 22's boundaries encroach on high flood risk areas. In order to prevent runoff into the river should flooding occur, no spreading will take place prior to, or immediately following periods of high rainfall.

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 **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 the 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 enough trained staff available to ensure that the operation continues throughout operational hours (*i.e.*, there will be sufficient cover for illness, holiday *etc.*).

In prolonged adverse weather, waste will not be collected from the producer unless suitably permitted storage is available, or 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.