Agricultural Benefit Statement

For the application of beneficial wastes to fields at:

Plas Bach, Cerrigceinwen, Bodorgan, LL62 5NS

11th December 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
- FACTS Qualified Advisor (No. FE/7676)

Verified by Jonathan Lloyd; FACTS Qualified Advisor (No. FE/4524)

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:	Plas Bach, Cerrigceinwen, Bodorgan, LL62 5NS	
Stockpile grid reference:	Refer to Table 4	
Area of the receiving land:	33.60 ha	
Quantity to be stored at any one time:	Stackable: NA	Non-Stackable: 1,250
Total maximum quantity to be spread:	8,400 t	
Location map document reference:	PB-01	

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 Alaw	Stackable alum sludge cake
2.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Bryn Cowlyd	Non-stackable ferric liquid sludge
3.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Cefni	Non-stackable alum liquid sludge
4.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Cilfor	Non-stackable alum liquid sludge
5.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Cwellyn	Non-stackable alum liquid sludge
6.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Dolbenmaen	Non-stackable alum liquid sludge
7.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Garreglwyd	Non-stackable Ferric liquid sludge
8.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Llyn Conwy	Non-stackable ferric liquid sludge
9.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Mynydd Llandegai	Non-stackable alum liquid sludge
10.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Rhiwgoch	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), Water Resources (Control of Agricultural Pollution) Wales Regulations 2021, and the permit holder's Environmental Management System (EMS). Targeted periods of spreading on **grass** fields include early spring 2026 (late February – May), after cutting of silage, and prior to grazing through summer (August). **Spring Barley**: Wastes may be applied to be seedbed in Spring 2026, between late Feb – May. 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.

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: Spread on delivery Non-stackable wastes: Lagoon or spread on delivery.
Where is the waste to be stored prior to spreading?	Lagoon: SH 40342 72339
Why were these storage locations chosen?	Storage locations are detailed on the spreading map and consent forms. Please note that the lagoon will be clean and emptied before waste in this deployment is stored in it. Additionally, there will be no mixing of wastes.

	The lagoon has sufficient freeboard when capacity is reached and is built to an acceptable standard and lined.

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 Alaw 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 rates it is to be applied at. Liquid sludges will be surface spread by tractor and tanker using a low-trajectory splash plate. Respect will be given to no spread zones and steeply sloping areas.
How do you plan to incorporate the waste following application?	There is no requirement for further incorporation of wastes on grass fields due to low ammonia content and minimal odour. For spring barley, the waste will be incorporated into the seedbed prior to crop establishment.
With liquid wastes is there any mole draining or sub-soiling planned? *Are there land drains in the field?*	There are some land drains in fields. These are protected by a 10m non-spread buffer zone.
Other relevant operational information:	The waste 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. Fields that are below pH 6 will not receive alum based DCWW sludges. Please refer to tables 6-15 below.

Table 6. DCWW Alaw

Nutrient Requirements for Land at Plas Bach

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	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
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	0.5	2	65	65	64.9*	3	70	228	4*	4	0	2.1	49	**245**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	0.0	2	65	65	0	4	0	228	0	3	0	0.0	0	**0**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	0.2	3	20	65	31.8*	4	0	228	1.8*	3	0	1.0	24	**216**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	1.1	1	75	47	74.8	1	95	66	8.3	3	0	4.8	113	**565**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	0.0	0	105	47	0	1	95	66	0	3	0	0.0	0	**0**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	0.2	3	20	65	31.8*	2-	170	228	1.8*	3	0	1.0	24	**202**
Ha	**37.50**	**33.60**																			**1228**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 113 t/ha is 227.9 kg/ha

Table 7. DCWW Bryn Cowlyd

Nutrient Requirements for Land at Plas Bach

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**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**
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	1.5	2	65	65	4*	3	70	228	1.4*	4	0	0.9	250	**1250**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	1.5	2	65	65	4*	4	0	228	1.4*	3	0	0.9	250	**375**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	1.5	3	20	65	4*	4	0	228	1.4*	3	0	0.9	250	**2250**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	1.5	1	75	47	2	1	95	66	1.3	3	0	0.9	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	1.5	0	105	47	2	1	95	66	1.3	3	0	0.9	250	**1175**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	1.5	3	20	65	4*	2-	170	228	1.4*	3	0	0.9	250	**2100**
Ha	**37.50**	**33.60**																			**8400**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

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

Table 8. DCWW Cefni

Nutrient Requirements for Land at Plas Bach

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**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**
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	3.1	2	65	65	64.9*	3	70	228	5.1*	4	0	1.9	242	**1210**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	0.0	2	65	65	0	4	0	228	0	3	0	0.0	0	**0**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	1.5	3	20	65	32.2*	4	0	228	2.5*	3	0	0.9	120	**1080**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	3.2	1	75	47	33.5	1	95	66	4.7	3	0	2.0	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	0.0	0	105	47	0	1	95	66	0	3	0	0.0	0	**0**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	1.5	3	20	65	32.2*	2-	170	228	2.5*	3	0	0.9	120	**1008**
Ha	**37.50**	**33.60**																			**4548**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 250 t/ha is 77.4 kg/ha

Table 9. DCWW Cilfor

Nutrient Requirements for Land at Plas Bach

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**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**
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	1.5	2	65	65	64.9*	3	70	228	5.1*	4	0	2.5	245	**1225**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	0.0	2	65	65	0	4	0	228	0	3	0	0.0	0	**0**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	0.8	3	20	65	32.6*	4	0	228	2.6*	3	0	1.3	123	**1107**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	1.5	1	75	47	33.1	1	95	66	4.7	3	0	2.6	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	0.0	0	105	47	0	1	95	66	0	3	0	0.0	0	**0**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	0.8	3	20	65	32.6*	2-	170	228	2.6*	3	0	1.3	123	**1033**
Ha	**37.50**	**33.60**																			**4615**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 250 t/ha is 54.1 kg/ha

Table 10. DCWW Cwellyn

Nutrient Requirements for Land at Plas Bach

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**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**
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	2.6	2	65	65	64.8*	3	70	228	5.1*	4	0	2.0	239	**1195**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	0.0	2	65	65	0	4	0	228	0	3	0	0.0	0	**0**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	1.3	3	20	65	32.3*	4	0	228	2.5*	3	0	1.0	119	**1071**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	2.7	1	75	47	33.9	1	95	66	4.8	3	0	2.1	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	0.0	0	105	47	0	1	95	66	0	3	0	0.0	0	**0**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	1.3	3	20	65	32.3*	2-	170	228	2.5*	3	0	1.0	119	**1000**
Ha	**37.50**	**33.60**																			**4516**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 250 t/ha is 129.4 kg/ha

Table 11. DCWW Dolbenmaen

Nutrient Requirements for Land at Plas Bach

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	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
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	3.1	2	65	65	64.8*	3	70	228	5.1*	4	0	1.0	244	**1220**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	0.0	2	65	65	0	4	0	228	0	3	0	0.0	0	**0**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	1.5	3	20	65	32.4*	4	0	228	2.5*	3	0	0.5	122	**1098**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	3.2	1	75	47	33.2	1	95	66	4.7	3	0	1.1	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	0.0	0	105	47	0	1	95	66	0	3	0	0.0	0	**0**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	1.5	3	20	65	32.4*	2-	170	228	2.5*	3	0	0.5	122	**1025**
Ha	**37.50**	**33.60**																			**4593**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 250 t/ha is 92.4 kg/ha

Table 12. DCWW Garreglwyd

Nutrient Requirements for Land at Plas Bach

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**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**
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	1.5	2	65	65	64.9*	3	70	228	5.1*	4	0	2.3	244	**1220**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	1.5	2	65	65	64.9*	4	0	228	5.1*	3	0	2.3	244	**366**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	0.7	3	20	65	32.5*	4	0	228	2.6*	3	0	1.2	122	**1098**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	1.5	1	75	47	33.3	1	95	66	4.7	3	0	2.4	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	1.5	0	105	47	33.3	1	95	66	4.7	3	0	2.4	250	**1175**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	0.7	3	20	65	32.5*	2-	170	228	2.6*	3	0	1.2	122	**1025**
Ha	**37.50**	**33.60**																			**6134**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 250 t/ha is 118.9kg/ha

Table 13. DCWW Llyn Conwy

Nutrient Requirements for Land at Plas Bach

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**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**
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	1.3	2	65	65	22*	3	70	228	1*	4	0	1.2	210	**1050**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	1.3	2	65	65	22*	4	0	228	1*	3	0	1.2	210	**315**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	1.3	3	20	65	22*	4	0	228	1*	3	0	1.2	210	**1890**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	1.3	1	75	47	11	1	95	66	0.9	3	0	1.2	210	**1050**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	1.3	0	105	47	11	1	95	66	0.9	3	0	1.2	210	**987**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	1.3	3	20	65	22*	2-	170	228	1*	3	0	1.2	210	**1764**
Ha	**37.50**	**33.60**																			**7056**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 210 t/ha is 51.4 kg/ha

Table 14. DCWW Mynydd Llandegai

Nutrient Requirements for Land at Plas Bach

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	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
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	1.2	2	65	65	64.9*	3	70	228	4.1*	4	0	1.8	196	**980**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	0.0	2	65	65	0	4	0	228	0	3	0	0.0	0	**0**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	0.6	3	20	65	32.4*	4	0	228	2*	3	0	0.9	98	**882**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	1.5	1	75	47	41.4	1	95	66	4.7	3	0	2.4	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	0.0	0	105	47	0	1	95	66	0	3	0	0.0	0	**0**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	0.6	3	20	65	32.4*	2-	170	228	2*	3	0	0.9	98	**823**
Ha	**37.50**	**33.60**																			**3935**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 250 t/ha is 106.3 kg/ha

Table 15. DCWW Rhiwgoch

Nutrient Requirements for Land at Plas Bach

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**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**
SJC1	6.70	5.00	Grass	Grass	6.4	M	175	0.7	2	65	65	64.7*	3	70	228	2.3*	4	0	0.3	112	**560**
SJC2	2.00	1.50	Grass	Grass	5.8	M	175	0.7	2	65	65	64.7*	4	0	228	2.3*	3	0	0.3	112	**168**
SJC3	10.00	9.00	Grass	Grass	6.0	M	175	0.3	3	20	65	32.3*	4	0	228	1.2*	3	0	0.2	56	**504**
SJC4	5.30	5.00	Turnips	Spring Barley	6.0	1	140	1.5	1	75	47	72.2	1	95	66	4.7	3	0	0.8	250	**1250**
SJC5	4.70	4.70	Turnips	Spring Barley	5.9	1	140	1.5	0	105	47	72.2	1	95	66	4.7	3	0	0.8	250	**1175**
SJC6	8.80	8.40	Grass	Grass	6.1	M	175	0.3	3	20	65	32.3*	2-	170	228	1.2*	3	0	0.2	56	**470**
Ha	**37.50**	**33.60**																			**4127**

Grass = 2 cut silage with aftermath grazing

Nutrient requirement based on values for grass with 2 cuts of silage with aftermath grazing (target DM yield 9-12t/ha) described in RB209 (2023)

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, 2023)

Crop use based on Spring barley with yield of 5.5 t/ha where 8.5 kg/t P2O5 and 12 kg/t K2O removed in offtake (RB209, 2023)

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

Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 20%

Total N supplied at an application rate of 250 t/ha is 63.3 kg/ha

Compliance with NVZ regulations

Table 15. 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>Phosphorus is the limiting factor for fields with a P index of 2 or above. For this reason, the application rates have been limited to ensure the total phosphorus applied does not exceed crop offtake. Where the P Index is 3, the P_2O_5 additions will aim to match the crop requirement which is less than 50 % of the crop offtake. This is done in an effort to run down the index back to target level.

There will be no applications of Alum based sludge on fields with a pH that is < 6. Please refer to tables 6-14.

Also, the applications rate will comply with the Total N requirement for each crop and the maximum total application rate of 250t/ha.</td></tr>
</table>

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

5.1 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 16. 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 3-4). Applying only minimal amounts of magnesium (0.3–4.8 kg/ha) to grassland and spring barley fields with a soil magnesium index of 5–6 is appropriate because these indices indicate that the soil already contains more than adequate plant-available magnesium. However, small maintenance dose is sufficient to replace minor annual removals by crops and livestock, while avoiding unnecessary cost and preventing potential soil or environmental issues associated with over-application.

5.2 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 as follows:

- **Total phosphate :** Alaw, Dolbenmaen, Mynydd Llandegai, Cilfor, Cwellyn, Cefni, Garreglwyd and Rhiwgoch.
- **Total application rate of 250t/ha:** Bryn Cowlyd, Cefni, Cilfor, Cwellyn, Dolbenmaen, Garreglwyd, Mynydd Llandegaai and Rhiwgoch
- **Copper content:** Llyn Conwy

Important information

- DCWW report all their analysis on a dry matter basis, including the liquid treatment sludges, unless otherwise stated.
- The moisture content at time of analysis is indicative of whether the sludge is a cake or a liquid. Typically, the sludge cake samples contain a significantly higher dry matter content than the liquid

Please refer to table 2 (page 2) which includes details of the physical state of the waste stream.

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

6.1 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.

6.2 Other waste characteristics

The pH levels in the wastes range from 5.7 – 7.0.

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 between 5.7 and 6.4, 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.

6.3 Operational factors

1. 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.
2. 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.
3. Sampling methods will be consistent with those set out in the RB209, and the analysis for PTE's are consistent with the code of agricultural practice.
4. With regards to odour management for any potentially odorous material – the materials will only be disturbed when the material is being spread, and application to land will be done under permit conditions, following procedures in our permit EMS to minimise risk of odour emissions.

7 Sensitive human and environmental receptors

There are no identified risks to local potentially sensitive receptors. This is because the risk of emissions produced from the waste activity is low due to waste type and distance to the receptors from the activity.

Locations of sensitive receptors are shown in **PB-01**. Prevailing winds are south-westerly. Note no spread buffers on sloping land >12 degrees.

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

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.

9 Contingency planning

1. 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.
2. 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.*).
3. In adverse weather, storage is available until ground/weather conditions become favourable for land application.
4. 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.