

Agricultural Benefit Statement

**For the application of beneficial wastes to fields at;
Blaenycloed, Ysbyty Ifan, Betws-y-Coed, Gwynedd. LL24 0NY**

17th May 2022

1 Person with appropriate technical expertise and permit details

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

- Ph.D. Fate and Behaviour of Potentially Toxic Elements in Soils
- MSc. Natural Resources and Environment
- BSc. (Hons) Environmental Science
- FACTS Qualified Advisor (No. FE/6324) and Full Member of BASIS Professional Register

Verified by; Esther Koroma

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>	Blaenycloed, Ysbyty Ifan, Betws-y-Coed, Gwynedd. LL24 0NY	
<i>Stockpile grid reference:</i>	Refer to Table 4	
<i>Area of the receiving land:</i>	34.9 ha	
<i>Quantity to be stored at any one time:</i>	Stackable (temporary field stockpile): 3,000t	Non-Stackable: 1,250t
	No more than 3,000t (all wastes) will be stored at any one time	
<i>Total maximum quantity to be spread:</i>	8725 t	
<i>Location map document reference:</i>	Location Plan Blaeny Coed	

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	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Peny Bont	Non-stackable alum liquid sludge
2	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Bala	Non-stackable alum liquid sludge
3	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Peny Cefn	Non-stackable alum liquid sludge
4	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Cilfor	Non-stackable alum liquid sludge
5	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Dolbenmaen	Non-stackable alum liquid sludge
6	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Eithin Fynydd	Non-stackable alum liquid sludge
7	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Garreglwyd	Non-stackable ferric liquid sludge
8	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Rhiwgoch	Non-stackable ferric liquid sludge
9	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Gwastadgoed	Non-stackable ferric liquid sludge
10	19 09 02	Liquid sludges from water clarification. Potable water treatment effluent.	DCWW Llyn Conwy	Non-stackable ferric liquid sludge

4 Operational details

4.1 Cropping details

Table 3. Cropping details

<i>Current crop including projected yield if known:</i>	Refer to Tables 6-15
---	----------------------

<i>Is straw removed?</i>	Y <input type="checkbox"/> N <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
<i>Following crop and any sensitive crops within rotation which you are amending the soil for in good time:</i>	Refer to Tables 6-15
<i>When do you intend to apply this waste; e.g. post-harvest – pre-ploughing, during seed bed cultivations, on the stubble over winter:</i>	<p>Spreading will only take place subject to ground conditions and following the Code of Good Agricultural Practice (Defra, 2018), NVZ regulations and the permit holder's Environmental Management System (EMS).</p> <p>Targeted periods of spreading on grass fields include early spring (late February – April), after cutting of silage, and prior to grazing through summer and autumn.</p> <p>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.</p>

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>	<p>Stackable wastes: N/A</p> <p>Non-stackable wastes: Storage lagoon</p>
<i>Where is the waste to be stored prior to spreading?</i>	<p>Lagoon:</p> <p>A: SH 81649 46016</p>
<i>Why were these storage locations chosen?</i>	<p>The storage locations are 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.</p> <p>The storage locations are not within 10m of any ditch, watercourse, or footpath, nor within a SPZ1, and are at least 50m from any well, spring or borehole. They are also a safe distance from overhead powerlines.</p>

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 cakes will be spread using conventional rear discharge spreaders as this equipment is readily available to the
---	--

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

Table 6. DCWW Peny Bont

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	3.60	3.50	Grass	Grass	5.6	Mod	175		2	65	65		2-	170	228		2	0			0
2	3.20	3.10	Grass	Grass	5.7	Mod	175		3	20	65		2-	170	228		2	0			0
3	4.00	3.60	Grass	Grass	6.8	Mod	175	0.5	1	95	65	33	1	210	228	1	2	0	0.8	183	659
4	2.00	0.80	Grass	Grass	6.4	Mod	175	0.5	3	20	65	65*	2-	170	228	1	3	0	0.8	183	146
7	3.80	3.30	Grass	Grass	6.2	Mod	175	0.5	1	95	65	33	1	210	228	1	2	0	0.8	183	604
8	4.60	4.30	Grass	Grass	6.2	Mod	175	0.5	1	95	65	33	0	260	228	1	2	0	0.8	183	787
12	4.70	4.30	Grass	Grass	6.1	Mod	175	0.5	1	95	65	33	1	210	228	1	2	0	0.8	183	787
20	1.90	1.85	Grass	Grass	6.1	Mod	175	0.5	2	65	65	65*	1	210	228	1	2	0	0.8	183	339
21	2.40	2.30	Grass	Grass	6.2	Mod	175	0.5	1	95	65	33	0	260	228	1	2	0	0.8	183	421
22	5.10	5.05	Grass	Grass	6.0	Mod	175	0.5	1	95	65	33	0	260	228	1	2	0	0.8	183	924
Ha	35.30	32.10																			4667

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 183t/ha is 48.5kg/ha

Table 7. DCWW Bala

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	3.60	3.50	Grass	Grass	5.6	Mod	175		2	65	65		2-	170	228		2	0		0	
2	3.20	3.10	Grass	Grass	5.7	Mod	175		3	20	65		2-	170	228		2	0		0	
3	4.00	3.60	Grass	Grass	6.8	Mod	175	3.6	1	95	65	6	1	210	228	1.9	2	0	2.4	250	900
4	2.00	0.80	Grass	Grass	6.4	Mod	175	3.6	3	20	65	12*	2-	170	228	1.9	3	0	2.4	250	200
7	3.80	3.30	Grass	Grass	6.2	Mod	175	3.6	1	95	65	6	1	210	228	1.9	2	0	2.4	250	825
8	4.60	4.30	Grass	Grass	6.2	Mod	175	3.6	1	95	65	6	0	260	228	1.9	2	0	2.4	250	1075
12	4.70	4.30	Grass	Grass	6.1	Mod	175	3.6	1	95	65	6	1	210	228	1.9	2	0	2.4	250	1075
20	1.90	1.85	Grass	Grass	6.1	Mod	175	3.6	2	65	65	12*	1	210	228	1.9	2	0	2.4	250	463
21	2.40	2.30	Grass	Grass	6.2	Mod	175	3.6	1	95	65	6	0	260	228	1.9	2	0	2.4	250	575
22	5.10	5.05	Grass	Grass	6.0	Mod	175	3.6	1	95	65	6	0	260	228	1.9	2	0	2.4	250	1263
Ha	35.30	32.10																			6375

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 100kg/ha

Table 8. DCWW Peny Cefn

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	3.60	3.50	Grass	Grass	5.6	Mod	175		2	65	65		2-	170	228		2	0		250	0
2	3.20	3.10	Grass	Grass	5.7	Mod	175		3	20	65		2-	170	228		2	0		250	0
3	4.00	3.60	Grass	Grass	6.8	Mod	175	1.5	1	95	65	27	1	210	228	1.4	2	0	0.7	250	900
4	2.00	0.80	Grass	Grass	6.4	Mod	175	1.5	3	20	65	54*	2-	170	228	1.4	3	0	0.7	250	200
7	3.80	3.30	Grass	Grass	6.2	Mod	175	1.5	1	95	65	27	1	210	228	1.4	2	0	0.7	250	825
8	4.60	4.30	Grass	Grass	6.2	Mod	175	1.5	1	95	65	27	0	260	228	1.4	2	0	0.7	250	1075
12	4.70	4.30	Grass	Grass	6.1	Mod	175	1.5	1	95	65	27	1	210	228	1.4	2	0	0.7	250	1075
20	1.90	1.85	Grass	Grass	6.1	Mod	175	1.5	2	65	65	54*	1	210	228	1.4	2	0	0.7	250	463
21	2.40	2.30	Grass	Grass	6.2	Mod	175	1.5	1	95	65	27	0	260	228	1.4	2	0	0.7	250	575
22	5.10	5.05	Grass	Grass	6.0	Mod	175	1.5	1	95	65	27	0	260	228	1.4	2	0	0.7	250	1263
Ha	35.30	32.10																			6375

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 76kg/ha

Table 9. 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	*In	P	Req	Crop Use	*In	K	Req	Crop Use	*In	Mg			Req	*In
						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	3.60	3.50	Grass	Grass	5.6	Mod	175		2	65	65		2-	170	228		2	0		250	0
2	3.20	3.10	Grass	Grass	5.7	Mod	175		3	20	65		2-	170	228		2	0		250	0
3	4.00	3.60	Grass	Grass	6.8	Mod	175	1.9	1	95	65	10	1	210	228	1.2	2	0	2.9	250	900
4	2.00	0.80	Grass	Grass	6.4	Mod	175	1.9	3	20	65	19*	2-	170	228	1.2	3	0	2.9	250	200
7	3.80	3.30	Grass	Grass	6.2	Mod	175	1.9	1	95	65	10	1	210	228	1.2	2	0	2.9	250	825
8	4.60	4.30	Grass	Grass	6.2	Mod	175	1.9	1	95	65	10	0	260	228	1.2	2	0	2.9	250	1075
12	4.70	4.30	Grass	Grass	6.1	Mod	175	1.9	1	95	65	10	1	210	228	1.2	2	0	2.9	250	1075
20	1.90	1.85	Grass	Grass	6.1	Mod	175	1.9	2	65	65	19*	1	210	228	1.2	2	0	2.9	250	463
21	2.40	2.30	Grass	Grass	6.2	Mod	175	1.9	1	95	65	10	0	260	228	1.2	2	0	2.9	250	575
22	5.10	5.05	Grass	Grass	6.0	Mod	175	1.9	1	95	65	10	0	260	228	1.2	2	0	2.9	250	1263
Ha	35.30	32.10																			6375

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 104kg/ha

Table 10. DCWW Dolbenmaen

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	*In	K	Req	*In	Mg	Req	*In				
						kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha	Ind	kg/ha	kg/ha	Ind	kg/ha	kg/ha				
1	3.60	3.50	Grass	Grass	5.6	Mod	175		2	65	65		2-	170	228		2	0		250	0
2	3.20	3.10	Grass	Grass	5.7	Mod	175		3	20	65		2-	170	228		2	0		250	0
3	4.00	3.60	Grass	Grass	6.8	Mod	175	10.8	1	95	65	18	1	210	228	2.2	2	0	0.4	250	900
4	2.00	0.80	Grass	Grass	6.4	Mod	175	10.8	3	20	65	35*	2-	170	228	2.2	3	0	0.4	250	200
7	3.80	3.30	Grass	Grass	6.2	Mod	175	10.8	1	95	65	18	1	210	228	2.2	2	0	0.4	250	825
8	4.60	4.30	Grass	Grass	6.2	Mod	175	10.8	1	95	65	18	0	260	228	2.2	2	0	0.4	250	1075
12	4.70	4.30	Grass	Grass	6.1	Mod	175	10.8	1	95	65	18	1	210	228	2.2	2	0	0.4	250	1075
20	1.90	1.85	Grass	Grass	6.1	Mod	175	10.8	2	65	65	35*	1	210	228	2.2	2	0	0.4	250	463
21	2.40	2.30	Grass	Grass	6.2	Mod	175	10.8	1	95	65	18	0	260	228	2.2	2	0	0.4	250	575
22	5.10	5.05	Grass	Grass	6.0	Mod	175	10.8	1	95	65	18	0	260	228	2.2	2	0	0.4	250	1263
Ha	35.30	32.10																			6375

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 105kg/ha

Table 11. 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 t/ha	Totals tonnes		
						SNS	Req	*In	P	Req	Crop Use	*In	K	Req	Crop Use	*In	Mg			Req	*In
						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	3.60	3.50	Grass	Grass	5.6	Mod	175		2	65	65		2-	170	228		2	0		0	
2	3.20	3.10	Grass	Grass	5.7	Mod	175		3	20	65		2-	170	228		2	0		0	
3	4.00	3.60	Grass	Grass	6.8	Mod	175	2.3	1	95	65	28	1	210	228	1.5	2	0	0.3	250	900
4	2.00	0.80	Grass	Grass	6.4	Mod	175	2.3	3	20	65	56*	2-	170	228	1.5	3	0	0.3	250	200
7	3.80	3.30	Grass	Grass	6.2	Mod	175	2.3	1	95	65	28	1	210	228	1.5	2	0	0.3	250	825
8	4.60	4.30	Grass	Grass	6.2	Mod	175	2.3	1	95	65	28	0	260	228	1.5	2	0	0.3	250	1075
12	4.70	4.30	Grass	Grass	6.1	Mod	175	2.3	1	95	65	28	1	210	228	1.5	2	0	0.3	250	1075
20	1.90	1.85	Grass	Grass	6.1	Mod	175	2.3	2	65	65	56*	1	210	228	1.5	2	0	0.3	250	463
21	2.40	2.30	Grass	Grass	6.2	Mod	175	2.3	1	95	65	28	0	260	228	1.5	2	0	0.3	250	575
22	5.10	5.05	Grass	Grass	6.0	Mod	175	2.3	1	95	65	28	0	260	228	1.5	2	0	0.3	250	1263
Ha	35.30	32.10																			6375

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 67kg/ha

Table 12. 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	*In	P	Req	Crop Use	*In	K	Req	Crop Use	*In	Mg			Req	*In
						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	3.60	3.50	Grass	Grass	5.6	Mod	175	2	2	65	65	10*	2-	170	228	1.4	2	0	1.2	250	875
2	3.20	3.10	Grass	Grass	5.7	Mod	175	2	3	20	65	10*	2-	170	228	1.4	2	0	1.2	250	775
3	4.00	3.60	Grass	Grass	6.8	Mod	175	2	1	95	65	5	1	210	228	1.4	2	0	1.2	250	900
4	2.00	0.80	Grass	Grass	6.4	Mod	175	2	3	20	65	10*	2-	170	228	1.4	3	0	1.2	250	200
7	3.80	3.30	Grass	Grass	6.2	Mod	175	2	1	95	65	5	1	210	228	1.4	2	0	1.2	250	825
8	4.60	4.30	Grass	Grass	6.2	Mod	175	2	1	95	65	5	0	260	228	1.4	2	0	1.2	250	1075
12	4.70	4.30	Grass	Grass	6.1	Mod	175	2	1	95	65	5	1	210	228	1.4	2	0	1.2	250	1075
20	1.90	1.85	Grass	Grass	6.1	Mod	175	2	2	65	65	10*	1	210	228	1.4	2	0	1.2	250	463
21	2.40	2.30	Grass	Grass	6.2	Mod	175	2	1	95	65	5	0	260	228	1.4	2	0	1.2	250	575
22	5.10	5.05	Grass	Grass	6.0	Mod	175	2	1	95	65	5	0	260	228	1.4	2	0	1.2	250	1263
Ha	35.30	32.10																			8025

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 110kg/ha

Table 13. DCWW Rhiwgoch

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			Req	*In
						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	3.60	3.50	Grass	Grass	5.6	Mod	175	2	2	65	65	65*	2-	170	228	0.7	2	0	1.0	83	291
2	3.20	3.10	Grass	Grass	5.7	Mod	175	2	3	20	65	65*	2-	170	228	0.7	2	0	1.0	83	257
3	4.00	3.60	Grass	Grass	6.8	Mod	175	2	1	95	65	32	1	210	228	0.7	2	0	1.0	83	299
4	2.00	0.80	Grass	Grass	6.4	Mod	175	2	3	20	65	65*	2-	170	228	0.7	3	0	1.0	83	66
7	3.80	3.30	Grass	Grass	6.2	Mod	175	2	1	95	65	32	1	210	228	0.7	2	0	1.0	83	274
8	4.60	4.30	Grass	Grass	6.2	Mod	175	2	1	95	65	32	0	260	228	0.7	2	0	1.0	83	357
12	4.70	4.30	Grass	Grass	6.1	Mod	175	2	1	95	65	32	1	210	228	0.7	2	0	1.0	83	357
20	1.90	1.85	Grass	Grass	6.1	Mod	175	2	2	65	65	65*	1	210	228	0.7	2	0	1.0	83	154
21	2.40	2.30	Grass	Grass	6.2	Mod	175	2	1	95	65	32	0	260	228	0.7	2	0	1.0	83	191
22	5.10	5.05	Grass	Grass	6.0	Mod	175	2	1	95	65	32	0	260	228	0.7	2	0	1.0	83	419
Ha	35.30	32.10																			2664

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 83t/ha is 123kg/ha

Table 14. DCWW Gwastadgoed

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	Wst	K	Req	Crop Use	*In	Wst	Mg			Req	*In
						kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha	kg/ha	kg/ha	Ind	kg/ha	kg/ha	kg/ha	kg/ha	Ind			kg/ha	kg/ha
1	3.60	3.50	Grass	Grass	5.6	Mod	175	0.1	2	65	65	54*	2-	170	228	1.1	2	0	0.5	250	875		
2	3.20	3.10	Grass	Grass	5.7	Mod	175	0.1	3	20	65	54*	2-	170	228	1.1	2	0	0.5	250	775		
3	4.00	3.60	Grass	Grass	6.8	Mod	175	0.1	1	95	65	27	1	210	228	1.1	2	0	0.5	250	900		
4	2.00	0.80	Grass	Grass	6.4	Mod	175	0.1	3	20	65	54*	2-	170	228	1.1	3	0	0.5	250	200		
7	3.80	3.30	Grass	Grass	6.2	Mod	175	0.1	1	95	65	27	1	210	228	1.1	2	0	0.5	250	825		
8	4.60	4.30	Grass	Grass	6.2	Mod	175	0.1	1	95	65	27	0	260	228	1.1	2	0	0.5	250	1075		
12	4.70	4.30	Grass	Grass	6.1	Mod	175	0.1	1	95	65	27	1	210	228	1.1	2	0	0.5	250	1075		
20	1.90	1.85	Grass	Grass	6.1	Mod	175	0.1	2	65	65	54*	1	210	228	1.1	2	0	0.5	250	463		
21	2.40	2.30	Grass	Grass	6.2	Mod	175	0.1	1	95	65	27	0	260	228	1.1	2	0	0.5	250	575		
22	5.10	5.05	Grass	Grass	6.0	Mod	175	0.1	1	95	65	27	0	260	228	1.1	2	0	0.5	250	1263		
Ha	35.30	32.10																			8025		

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 68kg/ha

Table 15. 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 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	3.60	3.50	Grass	Grass	5.6	Mod	175	6	2	65	65	38*	2-	170	228	8	2	0	1.0	250	875
2	3.20	3.10	Grass	Grass	5.7	Mod	175	6	3	20	65	38*	2-	170	228	8	2	0	1.0	250	775
3	4.00	3.60	Grass	Grass	6.8	Mod	175	6	1	95	65	19	1	210	228	8	2	0	1.0	250	900
4	2.00	0.80	Grass	Grass	6.4	Mod	175	6	3	20	65	38*	2-	170	228	8	3	0	1.0	250	200
7	3.80	3.30	Grass	Grass	6.2	Mod	175	6	1	95	65	19	1	210	228	8	2	0	1.0	250	825
8	4.60	4.30	Grass	Grass	6.2	Mod	175	6	1	95	65	19	0	260	228	8	2	0	1.0	250	1075
12	4.70	4.30	Grass	Grass	6.1	Mod	175	6	1	95	65	19	1	210	228	8	2	0	1.0	250	1075
20	1.90	1.85	Grass	Grass	6.1	Mod	175	6	2	65	65	38*	1	210	228	8	2	0	1.0	250	463
21	2.40	2.30	Grass	Grass	6.2	Mod	175	6	1	95	65	19	0	260	228	8	2	0	1.0	250	575
22	5.10	5.05	Grass	Grass	6.0	Mod	175	6	1	95	65	19	0	260	228	8	2	0	1.0	250	1263
Ha	35.30	32.10																			8025

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 (2021)

Crop use based on Grass totalling 38t/ha yield where 1.7kg/t P₂O₅ and 6.0kg/t K₂O removed in offtake

N, P₂O₅, K₂O and Mg stated are **available** concentrations in units of kg/ha

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

Total N supplied at an application rate of 250t/ha is 100kg/ha

5 Compliance with NVZ regulations

Table 16. Compliance with NVZ regulations

<p><i>Does the site fall within a designated NVZ?</i></p>	<p>Y <input checked="" type="checkbox"/> N <input type="checkbox"/> (Please skip to section 6)</p>																														
<p><i>Do closed periods apply for the wastes to be applied?</i></p>	<p>Y <input type="checkbox"/> N <input checked="" type="checkbox"/></p> <p>Applicable to: Wastes <30% RAN</p> <p>If yes, please indicate the appropriate period:</p> <table border="1" data-bbox="686 705 1364 952"> <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><input type="checkbox"/></td> </tr> <tr> <td>1st Sept</td> <td>31st Dec</td> <td>Grassland</td> <td>Shallow/Sandy</td> <td><input type="checkbox"/></td> </tr> <tr> <td>16th Sept</td> <td>31st Dec</td> <td>Tillage Land*</td> <td>Shallow/Sandy</td> <td><input type="checkbox"/></td> </tr> <tr> <td>1st Oct</td> <td>31st Jan</td> <td>Tillage Land</td> <td>All Other Soils</td> <td><input type="checkbox"/></td> </tr> <tr> <td>15th Oct</td> <td>31st Jan</td> <td>Grassland</td> <td>All Other Soils</td> <td><input type="checkbox"/></td> </tr> </tbody> </table> <p>*For Tillage Land with crops sown on or before 15th September</p> <p>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.</p>	Start Date	End Date	Land Use	Soil Type		1st Aug	31st Dec	Tillage Land	Shallow/Sandy	<input type="checkbox"/>	1st Sept	31st Dec	Grassland	Shallow/Sandy	<input type="checkbox"/>	16th Sept	31st Dec	Tillage Land*	Shallow/Sandy	<input type="checkbox"/>	1st Oct	31st Jan	Tillage Land	All Other Soils	<input type="checkbox"/>	15th Oct	31st Jan	Grassland	All Other Soils	<input type="checkbox"/>
Start Date	End Date	Land Use	Soil Type																												
1st Aug	31st Dec	Tillage Land	Shallow/Sandy	<input type="checkbox"/>																											
1st Sept	31st Dec	Grassland	Shallow/Sandy	<input type="checkbox"/>																											
16th Sept	31st Dec	Tillage Land*	Shallow/Sandy	<input type="checkbox"/>																											
1st Oct	31st Jan	Tillage Land	All Other Soils	<input type="checkbox"/>																											
15th Oct	31st Jan	Grassland	All Other Soils	<input type="checkbox"/>																											
<p><i>Will application rates comply with crop requirement and field/whole farm limit?</i></p>	<p>Yes, refer to Tables 6 - 15</p>																														
<p><i>Previous applications:</i></p>	<p>Refer to LPD1.</p>																														

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.	<input type="checkbox"/>
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.	<input type="checkbox"/>
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.	<input checked="" type="checkbox"/>
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.	<input type="checkbox"/>
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.	<input type="checkbox"/>
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.	<input type="checkbox"/>
Peat soils	Soils that contain more than 20% organic matter derived from sedge or similar peat material.	<input type="checkbox"/>

The soil analyses (**Soil Analysis**) shows 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. 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.

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.

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**.

7.2 Other waste characteristics

The pH levels in the wastes range from 3.85 to 6.6. 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. Solid wastes will be spread using conventional rear discharge spreaders.
2. Liquid wastes will be surface spread, 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. 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.
5. 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.

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;

- Large portion of field **5** with records of Butterwort (*Pinguicula vulgaris*), Sundew (*Drosera rotundifolia*) and of most note; Lesser clubmoss (*Selaginella selaginoides*) indicating base richness.
- 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 cucullate*) 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*).

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.