

Agricultural Benefit Statement

For the application of beneficial wastes to fields at;

Bryn Cnewyllyn Farm, Hiraddug Road, Dyserth, Rhyl, LL18 6HS

23rd January 2026

1 Person with appropriate technical expertise and permit details

This benefit statement has been compiled by Dawn Loos (Lead 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 (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

<i>Farm address:</i>	Bryn Cnewyllyn Farm, Hiraddug Road, Dyserth, Rhyl, LL18 6HS	
<i>Stockpile grid reference:</i>	Refer to Table 4	
<i>Area of the receiving land:</i>	32.33 ha	
<i>Quantity to be stored at any one time:</i>	Stackable: 3000	Non-Stackable: NA
<i>Total maximum quantity to be spread:</i>	3,840 t	
<i>Location map document reference:</i>	BC_01a-f	

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 Alwen	Stackable ferric sludge cake
2	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Glascoed	Stackable ferric sludge cake
3	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Alaw	Stackable alum sludge cake
4	02 07 02	Wastes from spirits distillation.	Aber Falls Distillery	

4 Operational details

4.1 Cropping details

Table 3. Cropping details

<i>Current crop including projected yield if known:</i>	Refer to tables 6-9
<i>Is straw removed?</i>	Y <input checked="" 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 6-9
<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, 2011), Farming Rules for Water, NVZ regulations and the permit holder's Environmental Management System (EMS).</p> <p>Spreading will also comply with the Water Resources (Control of Agricultural Pollution) Wales Regulations 2021,</p> <p>Targeted periods of spreading DCWW wastes on grass fields are from February, through May and after cutting of silage (June-October) as per the RB209 (2023). For winter wheat, applications will be made in spring (Feb-May) if there is capacity and crop requirement and while within the deployment's validity period.</p> <p>No more than 50t/ha of sludge will be spread on a field in any 3-week period in accordance with CoGAP, and no</p>

	<p>more than 250t/ha will be spread within any 12-month period.</p> <p>Wastes application will commence from the deployment issue date, as soon as ground, weather, and crop conditions are favourable. For wastes with application rates higher than 50 tons per hectare (see tables 6-7), this will be split into applications of 50 tons per hectare, as explained above, until the capacity is reached. This is in order to reduce the chances of run off.</p> <p>Notification will be given prior to the commencement of spreading.</p>
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4.2 Waste storage

Table 4. Waste storage

<p><i>How is the waste to be stored?</i></p> <p><i>e.g. mobile tank, field heap, spread on delivery</i></p>	<p>Field stockpiles for solid wastes. Liquids spread on delivery.</p>
<p><i>Where is the waste to be stored prior to spreading?</i></p>	<p>Field stockpiles</p> <ul style="list-style-type: none"> A. SJ 06774 78879 B. SJ 06840 79034 C. SJ 07456 79639 D. SJ 07503 79662 E. SJ 05887 76467 F. SJ 06336 76572 G. SJ 05935 76394 H. SJ 06253 76288 I. SJ 06173 76210
<p><i>Why were these storage locations chosen?</i></p>	<p>The stockpile locations were chosen due to their suitable location relative to the spreading fields and availability for use. It is not within 10m of any ditch, watercourse, or footpath, not within a SPZ1, and is at least 50m from any well spring or borehole.</p>
<p><i>Additional storage information</i></p>	<p>Only waste as specified in this deployment will be stored in the proposed storage location.</p> <p>Different waste types will not be mixed.</p>

4.3 Waste application

Table 5. Waste application

<p><i>How is the waste to be spread and why is it to be spread that way?</i></p>	<p>DCWW sludges will be surface spread by rear discharge spreader.</p> <p>The liquid waste will be applied by trailing shoe/ trailing hose or shallow injection.</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? Are there land drains in the field?</i></p>	<p>No Yes</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>

Table 6. DCWW Glascoed

Nutrient Requirements for Land at Bryn Cnewyllyn

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	pH	N			P ₂ O ₅				K ₂ O				Mg			Rate t/ha	Totals tonnes		
						SNS	Req	*In	Ind	Req	Crop Use	*In	Wst	Ind	Req	Crop Use	*In	Wst	Ind			Req	*In
						kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha			kg/ha	kg/ha
1	3.35	2.74	Grass	Grass	6.1	M	200	1.4	0	187	75	73.5	2-	255	248	44.7*	3	0	31.4	221	606		
2	3.49	2.94	Beans	WW	7.8	2	190	0.3	3	0	56	27.9*	2+	55	84	8.5*	3	0	6	42	123		
3	3.4	3.4	Grass	Grass	6.8	M	200	0.3	3	30	75	37.3*	2+	180	248	11.3*	3	0	8	56	190		
4	4.51	4.47	WW	Grass	7.2	L	180	0.3	3	30	75	37.3*	1	270	248	10.2	3	0	8	56	250		
6	2.35	2.05	Grass	Grass	6.7	M	200	0.7	2	97	75	74.5*	1	270	248	20.4	2	0	15.9	112	230		
7	5.2	5.2	Grass	Grass	6.6	M	200	1.4	1	142	75	74.5*	0	300	248	40.3	2	0	31.4	221	1149		
8	3.18	3.17	Grass	Grass	6.6	M	200	0.7	2	97	75	74.5*	0	300	248	20.4	2	0	15.9	112	355		
9	2.85	2.85	Grass	Grass	6.8	M	200	0.7	2	97	75	74.5*	0	300	248	20.4	2	0	15.9	112	319		
10	3.42	3.17	Grass	Grass	6.8	M	200	0.7	2	97	75	74.5*	1	270	248	20.4	2	0	15.9	112	355		
11	2.51	2.34	Grass	Grass	6.7	M	200	0.7	2	97	75	74.5*	0	300	248	20.4	2	0	15.9	112	262		
Ha	34.26	32.33																			3840		

Grass = 2 cut silage with aftermath grazing

WW = Winter wheat

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 P₂O₅ and 6.0kg/t K₂O removed in offtake (RB209, 2023)

Winter wheat expected yields of 8t/ha where 7kg/t P₂O₅ and 10.5kg/t K₂O removed in offtake (RB209, 2023)

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 units of kg/ha

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

Total N supplied at an application rate of 221t/ha is 249.9kg/ha

Table 7. DCWW Alwen

Nutrient Requirements for Land at Bryn Cnewyllyn

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	pH	N			P ₂ O ₅			K ₂ O			Mg			Rate t/ha	Totals tonnes		
						SNS	Req	*In	P	Crop Use	*In	K	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	kg/ha	kg/ha				
1	3.35	2.74	Grass	Grass	6.1	M	200	1.2	0	187	75	64.5	2-	255	248	10.1*	3	0	3.7	197	540
2	3.49	2.94	Beans	WW	7.8	2	190	0.3	3	0	56	27.5*	2+	55	84	2.2*	3	0	0.8	42	123
3	3.4	3.4	Grass	Grass	6.8	M	200	0.3	3	30	75	37.3*	2+	180	248	2.9*	3	0	1.1	57	194
4	4.51	4.47	WW	Grass	7.2	L	180	0.3	3	30	75	37.3*	1	270	248	2.6	3	0	1.1	57	255
6	2.35	2.05	Grass	Grass	6.7	M	200	0.7	2	97	75	74.6*	1	270	248	5.3	2	0	2.1	114	234
7	5.2	5.2	Grass	Grass	6.6	M	200	1.2	1	142	75	64.5	0	300	248	9.1	2	0	3.7	197	1024
8	3.18	3.17	Grass	Grass	6.6	M	200	0.7	2	97	75	74.6*	0	300	248	5.3	2	0	2.1	114	361
9	2.85	2.85	Grass	Grass	6.8	M	200	0.7	2	97	75	74.6*	0	300	248	5.3	2	0	2.1	114	325
10	3.42	3.17	Grass	Grass	6.8	M	200	0.7	2	97	75	74.6*	1	270	248	5.3	2	0	2.1	114	361
11	2.51	2.34	Grass	Grass	6.7	M	200	0.7	2	97	75	74.6*	0	300	248	5.3	2	0	2.1	114	267
Ha	34.26	32.33																			3684

Grass = 2 cut silage with aftermath grazing

WW = Winter wheat

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 P₂O₅ and 6.0kg/t K₂O removed in offtake (RB209, 2023)

Winter wheat expected yields of 8t/ha where 7kg/t P₂O₅ and 10.5kg/t K₂O removed in offtake (RB209, 2023)

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 units of kg/ha

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

Total N supplied at an application rate of 198t/ha is 249.7kg/ha

Table 8. DCWW Alaw

Nutrient Requirements for Land at Bryn Cnewyllyn

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	pH	N			P ₂ O ₅			K ₂ O			Mg			Rate t/ha	Totals tonnes		
						SNS	Req	*In	P	Crop Use	*In	K	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	kg/ha	kg/ha				
1	3.35	2.74	Grass	Grass	6.1	M	200	9.4	0	187	75	48.2	2-	255	248	8.5*	3	0	3	144	395
2	3.49	2.94	Beans	WW	7.8	2	190	2.7	3	0	56	27.5*	2+	55	84	2.4*	3	0	0.9	41	121
3	3.4	3.4	Grass	Grass	6.8	M	200	3.6	3	30	75	37.5*	2+	180	248	3.3*	3	0	1.2	56	190
4	4.51	4.47	WW	Grass	7.2	L	180	3.6	3	30	75	37.5*	1	270	248	3	3	0	1.2	56	250
6	2.35	2.05	Grass	Grass	6.7	M	200	7.3	2	97	75	75*	1	270	248	6	2	0	2.3	112	230
7	5.2	5.2	Grass	Grass	6.6	M	200	9.4	1	142	75	48.2	0	300	248	7.7	2	0	3	144	749
8	3.18	3.17	Grass	Grass	6.6	M	200	7.3	2	97	75	75*	0	300	248	6	2	0	2.3	112	355
9	2.85	2.85	Grass	Grass	6.8	M	200	7.3	2	97	75	75*	0	300	248	6	2	0	2.3	112	319
10	3.42	3.17	Grass	Grass	6.8	M	200	7.3	2	97	75	75*	1	270	248	6	2	0	2.3	112	355
11	2.51	2.34	Grass	Grass	6.7	M	200	7.3	2	97	75	75*	0	300	248	6	2	0	2.3	112	262
Ha	34.26	32.33																			3226

Grass = 2 cut silage with aftermath grazing

WW = Winter wheat

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 P₂O₅ and 6.0kg/t K₂O removed in offtake (RB209, 2023)

Winter wheat expected yields of 8t/ha where 7kg/t P₂O₅ and 10.5kg/t K₂O removed in offtake (RB209, 2023)

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 units of kg/ha

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

Total N supplied at an application rate of 144t/ha is 249kg/ha

Table 9. Aber Falls

Nutrient Requirements for Land at Bryn Cnewyllyn

Field Reference	Total Area	Sprd Area	Previous Crop	Next Crop	pH	N			P ₂ O ₅			K ₂ O			Mg			Rate t/ha	Totals tonnes		
						SNS	Req	*In	P	Crop Use	*In	K	Crop Use	*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	3.35	2.74	Grass	Grass	6.1	M	200	13.3	0	187	75	25.7	2-	255	248	20.4*	3	0	1.3	23	63
2	3.49	2.94	Beans	WW	7.8	2	190	7	3	0	56	26.8*	2+	55	84	10.7*	3	0	0.7	12	35
3	3.4	3.4	Grass	Grass	6.8	M	200	9.3	3	30	75	35.8*	2+	180	248	14.2*	3	0	0.9	16	54
4	4.51	4.47	WW	Grass	7.2	L	180	9.3	3	30	75	35.8*	1	270	248	12.8	3	0	0.9	16	72
6	2.35	2.05	Grass	Grass	6.7	M	200	13.3	2	97	75	51.4*	1	270	248	18.4	2	0	1.3	23	47
7	5.2	5.2	Grass	Grass	6.6	M	200	13.3	1	142	75	25.7	0	300	248	18.4	2	0	1.3	23	120
8	3.18	3.17	Grass	Grass	6.6	M	200	13.3	2	97	75	51.4*	0	300	248	18.4	2	0	1.3	23	73
9	2.85	2.85	Grass	Grass	6.8	M	200	13.3	2	97	75	51.4*	0	300	248	18.4	2	0	1.3	23	66
10	3.42	3.17	Grass	Grass	6.8	M	200	13.3	2	97	75	51.4*	1	270	248	18.4	2	0	1.3	23	73
11	2.51	2.34	Grass	Grass	6.7	M	200	13.3	2	97	75	51.4*	0	300	248	18.4	2	0	1.3	23	54
Ha	34.26	32.33																			656

Grass = 2 cut silage with aftermath grazing

WW = Winter wheat

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 P₂O₅ and 6.0kg/t K₂O removed in offtake (RB209, 2023)

Winter wheat expected yields of 8t/ha where 7kg/t P₂O₅ and 10.5kg/t K₂O removed in offtake (RB209, 2023)

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 units of kg/ha

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

Total N supplied at an application rate of 23t/ha is 248.4kg/ha

5 Compliance with NVZ regulations

Table 14. 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"/> (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:</p> <p>If yes, please indicate the appropriate period:</p> <table border="1" data-bbox="706 632 1344 856"> <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 table 6 – 9</p>																														
<p><i>Previous applications:</i></p>	<p>Refer to online form</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 6-9 above. General soil type(s) for the fields to be registered are:

Table 15. 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) show the soils to have moderate background concentrations of Mg (i.e. ADAS Index of 2-3). The low levels of addition of Mg from the proposed wastes will add an easily available source for the rapidly growing winter wheat plants but is insufficient to have any effect on the Mg Index. For livestock management, if grass magnesium concentration is low, animals can be at risk of hypomagnesaemia, so applying more Mg to the soil can raise herbage Mg content to safer levels.

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 6-9 above.

Limiting factors for the different wastes are as follows:

- Total max N application rate (250kg/ha): DCWW Alwen, DCWW Alaw, Aber Falls and DCWW Glascoed
- Phosphorous: DCWW Alwen, DCWW Alaw, DCWW Glascoed and Aber Falls

Important information

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

- DCWW Alwen - The reservoir has high colour and organics content which is an exception in these regards. In recent years DCWW have been required by the DWI and evolving water quality standards to minimise the amount of these organics passing through into the final water so they only have a few parts per million at the most of organic carbon in the final water. This is achieved by adding ferric sulphate to the raw water (already at low pH) which reduces the pH further and then is increased straight away with lime. At pH 4.8 DCWW achieves optimum organics removal and flocculation. The flocks which create the sludge are therefore at this low pH unfortunately. If the pH is increased, more ferric is needed and the organics removal is not as good

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 6-9 are based on the crop requirement and soil analysis.

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.

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

7.1 Potentially Toxic Elements (PTEs)

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 4.2-6.9.

It is unlikely that soil pH will decrease following the application detailed here due to the buffering capacity of the receiving soils. The pH levels of the receiving soils are between 6.1-7.8, 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.

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 and the SSRA. 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 P₂O₅ mobility, spreading of Fe-flocculated wastes onto fields that are pH 5.0-5.5 has been avoided.

7.3 Operational factors

1. Wastes will be spread according to the methods outlined in table 5.
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.

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

All sensitive receptors have been marked as no spread zones with sufficient buffering for the prevention of potential negative impacts. The wastes intended to be spread are low risk in terms of odour and being carried by wind.

Please see SSRA for descriptions.

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. 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.
5. Machinery turns will not be executed in the buffer strips.
6. Waste deliveries to field/stores will be supervised.
7. All spillages will be reported immediately to the EA.

9 Contingency planning

Replacement spreading machinery will be available to prevent waste being retained in faulty machinery. Hire vehicles will be used if required. All machinery will be fully serviced.

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

In adverse weather, storage is available until ground/weather conditions become favourable for land application.

In circumstances where the wastes cannot be stored or spread beyond normal capacities, wastes will be diverted to a local alternative deployment or point of origin.