Agricultural Benefit Statement

For the application of beneficial wastes to fields at:

Pentwyn Farm, Three Cocks, Brecon, Powys, LD3 0SW

12th March 2026

1 Person with appropriate technical expertise and permit details

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

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

Verified by 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:	Pentwyn Farm, Three Cocks, Brecon, Powys, LD3 0SW	
Stockpile grid reference:	Refer to Table 4.	
Area of the receiving land:	49.24ha	
Quantity to be stored at any one time:	Stackable: NA	Non-Stackable: 1,250t
Total maximum quantity to be spread:	11,532t	
Location map document reference:	PF-02	

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 Elan Valley	Non-stackable ferric liquid sludge
2.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Talybont	Non-stackable alum based liquid sludge
3.	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Llyswen	Non-stackable alum based liquid sludge
4.	19 06 06	Liquid digestate from anaerobic treatment of source segregated biodegradable waste.	Biogen Digestate	
5.	19 06 06	Liquid digestate from anaerobic treatment of source segregated biodegradable waste.	Welsh Water Organic Energy	

4 Operational details

4.1 Cropping details

Table 3. Cropping details

Current crop including projected yield if known:	Refer to tables 6-10
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 6-10
When do you intend to apply this waste, e.g. post-harvest – pre-ploughing, during seed bed cultivations, on the stubble over winter:	Spreading will only take place subject to ground conditions and following the Code of Good Agricultural Practice (Defra, 2011), NVZ regulations and the permit holder's Environmental Management System (EMS). Spreading activities will also comply with The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021. Targeted periods of spreading on grass fields will occur between February-May, and after silage cuts, June through October. This is to allow for grassland fields to have use of late autumn grazing.

	No spreading will occur outside of the target periods unless agreed upon by the local area officer and only taking place if weather and ground conditions permit the farmer to do so. No more than 50t/ha of liquid sludge 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. Frequency of spreading will coincide with the total tonnage amount found on tables 6-10 and in accordance with CoGap with no more than 50t/ha being applied in any 3-week period therefore applications will be made in split applications.

4.2 Waste storage.

Table 4. Waste storage.

How is the waste to be stored? *e.g. mobile tank, field heap, spread on delivery*	Lagoon
Where is the waste to be stored prior to spreading? *Details regarding storage:*	Lagoon - SO 19347 38049 Only the wastes as specified in this deployment will be stored in the proposed storage location. The lagoon is lined with a clay and butyl liner which provides an impermeable barrier. It was constructed in 2017 and is regularly inspected.
Why were these storage locations chosen?	The storage location is accessible by delivering vehicle, near field entrances so the potential damage to fields by delivering vehicles is minimal. It is not within 10m of any ditch, watercourse, or footpath, not within a SPZ1, and are at least 50m from any well spring or borehole. It is also a safe distance from overhead powerlines.

4.3 Waste application

Table 5. Waste application

How is the waste to be spread and why is it to be spread that way?	The wastes will be surface spread by tractor and tanker using a dribble bar.

How do you plan to incorporate the waste following application?	There is no requirement for incorporation of waste.
With liquid wastes is there any mole draining or sub-soiling planned? *Are there land drains in the field?*	N/A Yes
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 250 t/ha, the total nitrogen loading will be less than 250 kg/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.

Table 6. DCWW Talybont

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**Soil pH**	**SNS**	**Req kg/ha**	***In Wst kg/ha**	**P Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**K Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**Mg Ind**	**Req kg/ha**	***In Wst kg/ha**	**Rate t/ha**	**Totals tonnes**
Pentwyn																					
17 Acres	7.1	6.88	Grass	Grass	6.3	M	220	3.5	1	145	82	33.3	1	210	286	5.6	2	0	4.4	250	**1720**
16 Acres	5.98	5.82	Grass	Grass	6.6	M	220	3.5	2	85	82	66.7*	1	210	286	5.6	2	0	4.4	250	**1455**
Pentwyn Corner	2.56	2.56	Grass	Grass	6.2	M	220	3.5	1	145	82	33.3	2-	170	286	6.2*	2	0	4.4	250	**640**
Bottom Pentwyn	3.37	2.26	Grass	Grass	6.4	M	220	3.5	1	145	82	33.3	0	260	286	5.6	2	0	4.4	250	**565**
Top Pentwyn	4.3	4.13	Grass	Grass	6.4	M	220	3.5	1	145	82	33.3	1	210	286	5.6	2	0	4.4	250	**1033**
Old Gwernyfed																					
Bagder Berry	8.1	8.1	Grass	Grass	6.3	M	220	2.1	3	20	82	40.8*	4	0	286	3.8*	2	0	2.7	153	**1239**
Long Meadow	6.9	6.6	Grass	Grass	6.2	M	220	3.5	2	85	82	66.7*	2+	120	286	6.2*	2	0	4.4	250	**1650**
Sheep Shed	2.6	2.3	Grass	Grass	6.1	M	220	3.5	2	85	82	66.7*	2-	170	286	6.2*	2	0	4.4	250	**575**
Tynllyne																					
Ram Field	7.2	5.58	Grass	Grass	6.3	M	220	3.5	1	145	82	33.3	1	210	286	5.6	2	0	4.4	250	**1395**
21 Acre	5.2	5.01	Grass	Grass	6.5	M	220	3.5	2	85	82	66.7*	2-	170	286	6.2*	2	0	4.4	250	**1253**
Ha	**53.31**	**49.24**																			**11524**

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).
SNS calculated for high annual rainfall area (>700mm/annum) with medium soils.
Grass = 2 silage cuts + grazing
Grass silage DM = 25%; Grazing DM = 15-20% DM
Crop use based on **Grass Silage** totalling **38t/ha** yield where **1.7kg/t P_2O_5** and **6kg/t K_2O** removed in offtake plus grazing (**12t/ha**) where **1.4kg/t P2O5** and **4.8kg/t K2O** removed in offtake

*N, P2O5, K2O and Mg stated are **Available** concentrations in kg/ha
****Total** P2O5 and K2O stated where soil indices ≥2
Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 25%
Total N supplied at an application rate of 250t/ha is 144.8kg/ha

Table 7. DCWW Elan Valley

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**Soil pH**	**SNS**	**Req kg/ha**	***In Wst kg/ha**	**P Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**K Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**Mg Ind**	**Req kg/ha**	***In Wst kg/ha**	**Rate t/ha**	**Totals tonnes**
Pentwyn																					
17 Acres	7.1	6.88	Grass	Grass	6.3	M	220	5	1	145	82	46.7	1	210	286	4.7	2	0	3.2	250	**1720**
16 Acres	5.98	5.82	Grass	Grass	6.6	M	220	4.4	2	85	82	82.2*	1	210	286	4.2	2	0	2.8	220	**1280**
Pentwyn Corner	2.56	2.56	Grass	Grass	6.2	M	220	5	1	145	82	46.7	2-	170	286	5.3*	2	0	3.2	250	**640**
Bottom Pentwyn	3.37	2.26	Grass	Grass	6.4	M	220	5	1	145	82	46.7	0	260	286	4.7	2	0	3.2	250	**565**
Top Pentwyn	4.3	4.13	Grass	Grass	6.4	M	220	5	1	145	82	46.7	1	210	286	4.7	2	0	3.2	250	**1033**
Old Gwernyfed																					
Bagder Berry	8.1	8.1	Grass	Grass	6.3	M	220	2.2	3	20	82	40.7*	4	0	286	2.3*	2	0	1.4	109	**883**
Long Meadow	6.9	6.6	Grass	Grass	6.2	M	220	4.4	2	85	82	82.2*	2+	120	286	4.6*	2	0	2.8	220	**1452**
Sheep Shed	2.6	2.3	Grass	Grass	6.1	M	220	4.4	2	85	82	82.2*	2-	170	286	4.6*	2	0	2.8	220	**506**
Tynllyne																					
Ram Field	7.2	5.58	Grass	Grass	6.3	M	220	5	1	145	82	46.7	1	210	286	4.7	2	0	3.2	250	**1395**
21 Acre	5.2	5.01	Grass	Grass	6.5	M	220	4.4	2	85	82	82.2*	2-	170	286	4.6*	2	0	2.8	220	**1102**
Ha	**53.31**	**49.24**																			**10576**

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).
SNS calculated for high annual rainfall area (>700mm/annum) with medium soils.
Grass = 2 silage cuts + grazing
Grass silage DM = 25%; Grazing DM = 15-20% DM
Crop use based on **Grass Silage** totalling **38t/ha** yield where **1.7kg/t P_2O_5** and **6kg/t K_2O** removed in offtake plus grazing (**12t/ha**) where **1.4kg/t P2O5** and **4.8kg/t K2O** removed in offtake

*N, P2O5, K2O and Mg stated are **Available** concentrations in kg/ha
****Total** P2O5 and K2O stated where soil indices ≥2
Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 25%
Total N supplied at an application rate of 250t/ha is 98.6kg/ha

Table 8. DCWW Llyswen

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**Soil pH**	**SNS**	**Req kg/ha**	***In Wst kg/ha**	**P Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**K Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**Mg Ind**	**Req kg/ha**	***In Wst kg/ha**	**Rate t/ha**	**Totals tonnes**
Pentwyn																					
17 Acres	7.1	6.88	Grass	Grass	6.3	M	220	2	1	145	82	33.3	1	210	286	12.8	2	0	13.1	250	**1720**
16 Acres	5.98	5.82	Grass	Grass	6.6	M	220	2	2	85	82	66.6*	1	210	286	12.8	2	0	13.1	250	**1455**
Pentwyn Corner	2.56	2.56	Grass	Grass	6.2	M	220	2	1	145	82	33.3	2-	170	286	14.2*	2	0	13.1	250	**640**
Bottom Pentwyn	3.37	2.26	Grass	Grass	6.4	M	220	2	1	145	82	33.3	0	260	286	12.8	2	0	13.1	250	**565**
Top Pentwyn	4.3	4.13	Grass	Grass	6.4	M	220	2	1	145	82	33.3	1	210	286	12.8	2	0	13.1	250	**1033**
Old Gwernyfed																					
Bagder Berry	8.1	8.1	Grass	Grass	6.3	M	220	1.2	3	20	82	41*	4	0	286	8.8*	2	0	8	154	**1247**
Long Meadow	6.9	6.6	Grass	Grass	6.2	M	220	2	2	85	82	66.6*	2+	120	286	14.2*	2	0	13.1	250	**1650**
Sheep Shed	2.6	2.3	Grass	Grass	6.1	M	220	2	2	85	82	66.6*	2-	170	286	14.2*	2	0	13.1	250	**575**
Tynllyne																					
Ram Field	7.2	5.58	Grass	Grass	6.3	M	220	2	1	145	82	33.3	1	210	286	12.8	2	0	13.1	250	**1395**
21 Acre	5.2	5.01	Grass	Grass	6.5	M	220	2	2	85	82	66.6*	2-	170	286	14.2*	2	0	13.1	250	**1253**
Ha	**53.31**	**49.24**																			**11532**

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).
SNS calculated for high annual rainfall area (>700mm/annum) with medium soils.
Grass = 2 silage cuts + grazing
Grass silage DM = 25%; Grazing DM = 15-20% DM
Crop use based on **Grass Silage** totalling **38t/ha** yield where **1.7kg/t P_2O_5** and **6kg/t K_2O** removed in offtake plus grazing (**12t/ha**) where **1.4kg/t P2O5** and **4.8kg/t K2O** removed in offtake

*N, P2O5, K2O and Mg stated are **Available** concentrations in kg/ha
****Total** P2O5 and K2O stated where soil indices ≥2
Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 25%
Total N supplied at an application rate of 250t/ha is 127.8kg/ha

Table 9. Biogen Digestate

						N			P_2O_5				K_2O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**Soil pH**	**SNS**	**Req kg/ha**	***In Wst kg/ha**	**P Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**K Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**Mg Ind**	**Req kg/ha**	***In Wst kg/ha**	**Rate t/ha**	**Totals tonnes**
Pentwyn																					
17 Acres	7.1	6.88	Grass	Grass	6.3	M	220	161.5	1	145	82	16.5	1	210	286	84.5	2	0	0.2	20	**138**
16 Acres	5.98	5.82	Grass	Grass	6.6	M	220	161.5	2	85	82	33*	1	210	286	84.5	2	0	0.2	20	**116**
Pentwyn Corner	2.56	2.56	Grass	Grass	6.2	M	220	161.5	1	145	82	16.5	2-	170	286	93.9*	2	0	0.2	20	**51**
Bottom Pentwyn	3.37	2.26	Grass	Grass	6.4	M	220	161.5	1	145	82	16.5	0	260	286	84.5	2	0	0.2	20	**45**
Top Pentwyn	4.3	4.13	Grass	Grass	6.4	M	220	161.5	1	145	82	16.5	1	210	286	84.5	2	0	0.2	20	**83**
Old Gwernyfed																					
Bagder Berry	8.1	8.1	Grass	Grass	6.3	M	220	121.2	3	20	82	24.8*	4	0	286	70.4*	2	0	0.2	15	**122**
Long Meadow	6.9	6.6	Grass	Grass	6.2	M	220	161.5	2	85	82	33*	2+	120	286	93.9*	2	0	0.2	20	**132**
Sheep Shed	2.6	2.3	Grass	Grass	6.1	M	220	161.5	2	85	82	33*	2-	170	286	93.9*	2	0	0.2	20	**46**
Tynllyne																					
Ram Field	7.2	5.58	Grass	Grass	6.3	M	220	161.5	1	145	82	16.5	1	210	286	84.5	2	0	0.2	20	**112**
21 Acre	5.2	5.01	Grass	Grass	6.5	M	220	161.5	2	85	82	33*	2-	170	286	93.9*	2	0	0.2	20	**100**
Ha	**53.31**	**49.24**																			**944**

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).
SNS calculated for high annual rainfall area (>700mm/annum) with medium soils.
Grass = 2 silage cuts + grazing
Grass silage DM = 25%; Grazing DM = 15-20% DM
Crop use based on **Grass Silage** totalling **38t/ha** yield where **1.7kg/t P_2O_5** and **6kg/t K_2O** removed in offtake plus grazing (**12t/ha**) where **1.4kg/t P2O5** and **4.8kg/t K2O** removed in offtake

*N, P2O5, K2O and Mg stated are **Available** concentrations in kg/ha
****Total** P2O5 and K2O stated where soil indices ≥2
Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 25%
Total N supplied at an application rate of 20t/ha is 214kg/ha

Table 10. Welsh Water Organic Energy Digestate

						N			P_2O_5				K$_2$O				Mg				
Field Reference	**Total Area**	**Sprd Area**	**Previous Crop**	**Next Crop**	**Soil pH**	**SNS**	**Req kg/ha**	***In Wst kg/ha**	**P Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**K Ind**	**Req kg/ha**	**Crop Use kg/ha**	***In Wst kg/ha**	**Mg Ind**	**Req kg/ha**	***In Wst kg/ha**	**Rate t/ha**	**Totals tonnes**
Pentwyn																					
17 Acres	7.1	6.88	Grass	Grass	6.3	M	220	140.7	1	145	82	26.1	1	210	286	82.5	2	0	0.7	25	**172**
16 Acres	5.98	5.82	Grass	Grass	6.6	M	220	140.7	2	85	82	52.2*	1	210	286	82.5	2	0	0.7	25	**146**
Pentwyn Corner	2.56	2.56	Grass	Grass	6.2	M	220	140.7	1	145	82	26.1	2-	170	286	91.7*	2	0	0.7	25	**64**
Bottom Pentwyn	3.37	2.26	Grass	Grass	6.4	M	220	140.7	1	145	82	26.1	0	260	286	82.5	2	0	0.7	25	**57**
Top Pentwyn	4.3	4.13	Grass	Grass	6.4	M	220	140.7	1	145	82	26.1	1	210	286	82.5	2	0	0.7	25	**103**
Old Gwernyfed																					
Bagder Berry	8.1	8.1	Grass	Grass	6.3	M	220	106.9	3	20	82	39.6*	4	0	286	69.7*	2	0	0.5	19	**154**
Long Meadow	6.9	6.6	Grass	Grass	6.2	M	220	140.7	2	85	82	52.2*	2+	120	286	91.7*	2	0	0.7	25	**165**
Sheep Shed	2.6	2.3	Grass	Grass	6.1	M	220	140.7	2	85	82	52.2*	2-	170	286	91.7*	2	0	0.7	25	**58**
Tynllyne																					
Ram Field	7.2	5.58	Grass	Grass	6.3	M	220	140.7	1	145	82	26.1	1	210	286	82.5	2	0	0.7	25	**140**
21 Acre	5.2	5.01	Grass	Grass	6.5	M	220	140.7	2	85	82	52.2*	2-	170	286	91.7*	2	0	0.7	25	**125**
Ha	**53.31**	**49.24**																			**1182**

Nutrient requirement based on values described in the nutrient management guide (RB209 2023).
SNS calculated for high annual rainfall area (>700mm/annum) with medium soils.
Grass = 2 silage cuts + grazing
Grass silage DM = 25%; Grazing DM = 15-20% DM
Crop use based on **Grass Silage** totalling **38t/ha** yield where **1.7kg/t P_2O_5** and **6kg/t K_2O** removed in offtake plus grazing (**12t/ha**) where **1.4kg/t P2O5** and **4.8kg/t K2O** removed in offtake

*N, P2O5, K2O and Mg stated are **Available** concentrations in kg/ha
****Total** P2O5 and K2O stated where soil indices ≥2
Availablity of nutrients in waste - N measured as NH_4, P_2O_5 50%, K_2O 90%, Mg 25%
Total N supplied at an application rate of 25t/ha is 212.5kg/ha

5 Compliance with NVZ regulations

Table 8. 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: Biogen & WWOE digestates

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>Please refer to tables 6-10.</td></tr>
<tr><td>Previous applications:</td><td>Refer to supplement document labelled previous spreading.</td></tr>
</table>

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

6.1 Receiving soils

The nutrient status of individual fields to be registered are provided in tables 6-10 above. General soil type(s) for the fields to be registered are:

Table 9. Soil type

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

The soil analyses (**Soil Analysis**) show the soils to have sufficient background concentrations of Mg (*i.e.* ADAS Index 2). Mg additions are minimal with the proposed waste applications, but will aid in maintaining soil Mg indices over the course of the cropping cycle. Mg index maintenance is crucial in grazing systems to reduce the risk of hypomagnesemia in livestock.

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 6-10.

The application of all wastes are limited by the total phosphate in soils. In some cases, they is also limited by the max application rate of 250t/ha.

The application therefore has been amended so that the amount of phosphate added from the waste does not exceed the crop offtake. 50% of crop offtake has been used where fields present a P index of 3 to ensure run down. In the case where the field K index is 4 for Badger Burry, 25% of the offtake has not bee exceeded.

Digestate application rates are limited by the total N content.

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 sludges. In this case, all wastes are liquids. Please refer to table 2 (page 2) which includes details of the physical state of each waste.

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 6-10 are based on the crop requirement and soil analysis.

Clean water treatment sludges and digestate 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.

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

7.1 Potentially Toxic Elements (PTEs)

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

The potable water treatment sludges contain varying amounts of Al and Fe due to the flocculation process in the water treatment. At low pH (<6.0), aluminium can potentially transform into the toxic Al^{3+} species, it is therefore necessary to avoid spreading Al flocculated wastes on fields with pH <6.0. 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 pH 6.0 – 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 and with P Index below target level has been avoided (please refer to table 7 above).

7.2 Other waste characteristics

The pH levels in the wastes range from 6.6- 8.8

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 6.1 and 6.6, 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. 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.

8 Sensitive human and environmental receptors

Please refer to site specific risk assessment. Locations of sensitive receptors are shown in the spreading maps **PF-02.** Prevailing winds are south easterly.

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

Mitigation measures (in addition to permit requirements and following the EMS) to reduce potential negative impacts of the proposed spreading operation will be as follows:

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

10 Contingency planning

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

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

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

In circumstances where the wastes cannot be stored or spread beyond normal capacities, wastes will be diverted to a local alternative deployment or DCWW sewage treatment works.