

1. Appropriate Technical Expertise

- This agricultural benefit statement has been prepared by Ryan Griffiths-Patel of Trade Effluent Services Ltd.
- Relevant Experience & Qualifications
- Land spreading of non-farm wastes course (2 day course – Feb 2021)
- Understanding Grassland Management (March 2021)
- FACTs Trained March 2022
- BSC. (Hons) Geography
- MSc Environmental Informatics
- 2 Years experience of waste to land recycling operations

2. Location of Activity

- It is proposed to spread Ahlstrom via surface application on 50 hectares of land at two different sites. Winfields Outdoors, Burgess Drive, Sealand, Chester, Flintshire, Wales, CH1 6EB, United Kingdom and Seahill Road, Sealand, Flintshire, North West England, Wales, CH1 6BJ, United Kingdom.
- This deployment application is for the application of waste to 10 fields at the farm - field sizes and OS National Grid references are shown in Table 1 below. A site plan is shown in Appendix A.

Field	Field Size (ha)	Grid Reference
Birchenfields 1	9	SJ 36422 67735
Birchenfields 2	8	SJ 36164 67625
Birchenfields 3	8	SJ 35950 67684
Birchenfields 5	11	SJ 35803 68023
Saughall 1	3	SJ 35641 69233
Saughall 2	2	SJ 35837 69172
Saughall 3	1	SJ 35988 69127
Saughall 4	2	SJ 35826 69086
Saughall 5	3	SJ 35641 69233
Birchenfields 4	3	SJ 36142 67879

Table 1 – Spreadable area and OSGR

- All fields to be spread are inside an NVZ designated area, and spreading will comply with NVZ regulations. Nitrogen applications for land within a designated NVZ is 170 kg/ha/yr on a whole farm basis and 250kg/ha/yr on a field basis.
- Waste will be delivered to site by road tanker and stored in a lagoon at grid reference SJ 36177 67764. Ahlstrom Black Liquor will be surface applied using tractor mounted spreader bar or splash plate due to the low application rates. Applications of the black liquor may be split where required to mitigate the risk of crop scorch.

3. Soils

- The soils were sampled in May 2022 in accordance with the sampling procedures described in Section 1 of the RB209 (9th Edition). Analysis was carried out by NRM Ltd for pH, major plant nutrients, and potentially toxic elements (PTES) described in the Sludge (Use in Agriculture) Regulations.
- The NRM Ltd report is attached to Appendix B and summarised in Table 6.
- Soils were typically found to be medium loam and are categorised in accordance with RB209 (9th edition) as mineral soils for crop recommendations.
- The soil pH ranges from 7.9 to 7.3, and are generally above the target value, although it shouldn't affect crop performance.
- The soil P index ranges from 6 to 4, and the soils are generally at or above the guideline target index of 2. Where the index is 3 or above the nutrient applications will be limited to no more than crop offtake in the current rotation to ensure that there is increase in soil P index. The Ahlstrom waste provides negligible amounts of P and so will not have an increasing affect to the index.
- Soil potassium levels ranged from index 1 to 4.
- The magnesium index for all fields was satisfactory.
- PTE concentrations for all fields is low and within the typical range of uncontaminated soil.
- The soils proposed to be spread are suitable to receive an application of sludge as detailed within this application.

4. Waste To Be Spread

- It is proposed to spread Ahlstrom waste to land. The waste arises from the cellulose extraction process and contains moderate levels of potash and sulphur and trace amounts of nitrogen, phosphate and magnesium.

- A summary of the waste description and EWC code is show in Table 2.

Waste Producer	EWC Code	Waste Description	Total Amount being spread(Tonnes)
Ahlstrom	03 03 11	Black Liquor produced as a by product of cellulose fibre extraction	1300
Total Hectares	50		

Table 2 – Waste description

- The liquor has been analysed by NRM Ltd for major plant nutrients, including nitrogen, phosphate and potash and will provide agricultural benefit through the addition of these nutrients to receiving soil.
- A copy of the analysis and waste evaluation for the liquor is included as an appendix to this document.
- Waste will be delivered to the site by road tanker and off loaded to the storage location. The black liquor will be surface applied by umbilical supplied tractor mounted spreader bar to reduce travelling weight and risk of compaction across fields.
- The waste will be applied while the leaf is short or after cuts of silage for grass field and as a split. The waste is anticipated to be spread in Summer 2022, although this may change due to weather conditions and farmer requirements. If the spreading is not completed by September 2022 then spreading will occur between February and end of deployment 2023.

5. Previous Nutrients Applied

- An application of FYM in 2021 - details are shown in Table 3.
- Nutrients applied in the previous application have been taken into account when calculating crop requirement.

Field	Waste Applied	Application Rate (t/ha)	Nitrogen		Phosphate		Potash	
			Total	Available	Total	Available	Total	Available
Birchenfields 1	FYM	3	6	2	9.6	5.7	28.2	25.5
Birchenfields 2	FYM	3	6	2	9.6	5.7	28.2	25.5
Birchenfields 3	FYM	3	6	2	9.6	5.7	28.2	25.5
Birchenfields 5	FYM	3	6	2	9.6	5.7	28.2	25.5
Saughall 1	FYM	3	6	2	9.6	5.7	28.2	25.5
Saughall 2	FYM	3	6	2	9.6	5.7	28.2	25.5
Saughall 3	FYM	3	6	2	9.6	5.7	28.2	25.5
Saughall 4	FYM	3	6	2	9.6	5.7	28.2	25.5
Saughall 5	FYM	3	6	2	9.6	5.7	28.2	25.5
Birchenfields 4	FYM	3	6	2	9.6	5.7	28.2	25.5

Table 3 – Previous nutrients applied

6. Agricultural Benefit Of Waste Application

- The Ahlstrom will be used to provide plant nutrients which will replace a proportion of the fertiliser that the farmer would normally apply to their crop. The liquor will also provide benefit through the addition of organic matter and trace elements. Crop fertiliser requirements are based on figures from the RB209 (9th Edition).
- Table 4 shows the crop fertiliser requirement for the fields based on the proposed crop rotation and soil analysis.

Field	Field Size (ha)	Grid Reference	Soil Type	Current Crop	Next Crop	Expected Yield (t/ha)	Nitrogen kg/ha	Phosphate kg/ha	Potash kg/ha
Birchenfields 1	9	SJ 36422 67735	Clay Loam	2nd cut silage and grazing	2nd cut silage and grazing	38	210	64.6	310
Birchenfields 2	8	SJ 36164 67625	Clay Loam	2nd cut silage and grazing	2nd cut silage and grazing	38	210	64.6	Offtake 228

Birchenfields 3	8	SJ 35950 67684	Clay Loam	Maize	2nd cut silage and grazing	38	210	64.6	Offtake 228
Birchenfields 5	11	SJ 35803 68023	Clay Loam	Fodder Beet	2nd cut silage and grazing	38	210	64.6	Offtake 228
Saughall 1	3	SJ 35641 69233	Clay Loam	Maize	2nd cut silage and grazing	38	210	64.6	120
Saughall 2	2	SJ 35837 69172	Clay Loam	2nd cut silage and grazing	2nd cut silage and grazing	38	210	64.6	120
Saughall 3	1	SJ 35988 69127	Clay Loam	2nd cut silage and grazing	2nd cut silage and grazing	38	210	64.6	170
Saughall 4	2	SJ 35826 69086	Clay Loam	2nd cut silage and grazing	2nd cut silage and grazing	38	210	64.6	310
Saughall 5	3	SJ 35641 69233	Clay Loam	2nd cut silage and grazing	2nd cut silage and grazing	38	210	64.6	120
Birchenfields 4	3	SJ 36142 67879	Clay Loam	2nd cut silage and grazing	2nd cut silage and grazing	38	210	64.6	Offtake 228

Table 4 Fertiliser Requirements (*Crop offtake figures)

– Assessment of the waste is attached in Appendix C.

Waste Name	Application Rate t/ha	pH	Nitrogen kg/ha		Phosphorous kg/ha		Potassium kg/ha		Magnesium kg/ha	Sulphur kg/ha	Sodium kg/ha
			Total	Available (7.5%)	Total	Available (50%)	Total	Available (90%)	Total	Total	Total
Ahlstrom	26	9.07	8	6	1	0	83	75	0	945	689

Table 5 – Application rate and nutrient input**Nitrogen**

- The analysis shows that the nitrate and ammoniacal nitrogen in the liquor are relatively low, indicating low immediate availability of nitrogen. The remaining total nitrogen applied will become available to the crop through mineralisation throughout following seasons as is typical from organic manures and biosolids.
- The rate of nitrogen release will be affected by several factors including soil type, climate, and timing and method of application.

Phosphorus

- The Ahlstrom contains trace levels of phosphorus and at the proposed application rate will apply less than 1kg/ha of phosphate. With P indexes of 3 the land owner should look to reduce the P index over the coming seasons, as at an application rate of 26t/ha, Ahlstrom will supply trace amounts of phosphate.

Potash

- The black liquor applied will not meet the crop requirements for potash for all fields; however it will allow the landowner to significantly reduce the amount of chemical fertiliser required to meet the crop need.
- The application of Ahlstrom at the proposed application rate will provide nutrients at or below crop requirement or offtake values, and will not result in an increase in soil nutrient reserves.

Organic Matter

- The application of liquor will also provide a small increase in soil organic matter, which can help to improve soil structure and water & nutrient holding capacity.

Sulphur

- With the soils being medium loam at Birchenfields Farm, the sulphur will be less likely to leach as it will be bound to the organic matter in the soil.
- The risk of leaching from an application of Ahlstrom is relatively small as the majority of the sulphur present is in the form of lignosulphates, which will be organically bound to the soil. These stable compounds have been used as soil conditioners as they promote soil aggregation.
- The levels of sulphur will be monitored over the coming season to ensure that a continued build-up of sulphur will not have a detrimental impact on the environment, and total sulphur and conductivity will be analysed after spreading.

- The fields are relatively flat with drainage and at an application rate of 26t/ha, a total of 945kg of sulphur will be applied per field. There has been a heavy winter for the past 2 years and which means the crops will benefit from a higher amount of sulphur.

7. Pollution Risk Assessment

- The Ahlstrom analysis has an elevated conductivity caused by the presence of soluble salts, in particular sodium. If applied in very dry soil conditions this might lead to a risk of temporary scorch, in particular grass or above ground herbage, and might affect germination of small seeded crops, particularly on light textured soils. Care will therefore be required to ensure that the waste is applied to short, cut or grazed grass and to soils that aren't too dry or light textured. This will be mitigated by the soil types at this farm which are of medium loams and the high rainfall in this area (>700mm/yr). Previous detailed plant growth trials using this waste have shown that electrical conductivity of the soil will return to normal after a period of 10-12 weeks of application and that conductivity or soil structural instability is unlikely to be an issue when applying this waste at 26t/ha.
- Hazards have been identified on the site plan shown in Appendix A and relevant control measures and buffer zones have been identified. Operations are to be carried out in accordance with the company generic risk assessment for landspreading.
- There are a number of properties within 500m of the fields proposed to be spread. Operation will be carried out in accordance within normal agricultural hours to minimise the risk of odour/noise complaints.
- There are footpaths crossing the fields to be spread, and care will be taken not to spread these when spreading the fields.
- There are several watercourses at the site which have been identified on the site plan. In order to protect the watercourses, a 10m buffer zone will be observed adjacent to all watercourses and are highlighted on the attached plan.
- No boreholes or wells have been identified within the spreading area.
- The site is not within 500m of a statutory designated environmentally sensitive area as defined by Magic.go.uk.
- The flood risk maps show that the land to be spread is not within flood prone areas and the land is not within a groundwater source protection zone. The liquor will be spread in appropriate conditions with weather and field conditions constantly monitored.

8. Contingency Planning

- In the event of machinery breakdown or failure, mobile mechanics are available to attend sites and replacement vehicles and equipment are available or can be hired from current suppliers.
- There are sufficient trained staff to maintain general sickness and holiday cover.
- During prolonged periods of adverse weather, planned spreading may be postponed or cancelled. An extensive land bank throughout North West/North Wales allows vehicles to be re-routed if conditions become unsuitable for spreading.

Supporting documents

Appendix A – Site Plan

Appendix B – Soil Analysis

Appendix C – Waste Evaluation

Appendix D – Table 6

Appendix E – Benefit Statement

Field	Soil pH	Phosphate		Potash		Magnesium		SNS
	pH	mg/l	Index	mg/l	Index	mg/l	Index	Index
Birchenfields 1	7.9	83.4	5	277	1	130	3	Moderate
Birchenfields 2	7.8	76.6	5	436	4	105	3	Moderate
Birchenfields 3	7.5	83.4	5	529	4	111	3	Moderate
Birchenfields 5								Moderate
	7.4	99.4	5	346	3	103	5	
Saughall 1	7.7	89.6	5	226	2+	76.2	2	Moderate
Saughall 2	7.5	92.8	5	223	2+	82.6	2	Moderate
Saughall 3	7.6	65.8	4	166	2-	74.3	2	Moderate
Saughall 4	7.6	69.4	4	118	1	76.4	2	Moderate
Saughall 5	7.6	71.4	5	193	2+	111	3	Moderate
Birchenfields 4	7.3	92.4	6	378	4	121	3	Moderate

**Crop offtake figures*





