



Whiteshore Condensate Agricultural Benefit Report

Client – [REDACTED]
Trading as Whiteshore Cockles
and having place of business
at Whiteshore, Bayhead
North Uist, HS6 5DY

Report Detail – Condensate Agricultural Benefit report

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Instruction

Whiteshore Cockles have engaged C A MacPhail Consulting Limited to independently review the agricultural benefit of applying condensate to grassland and arable crops in North Uist. CA MacPhail Consulting have been tasked with generating a management plan which identifies suitable fields and recommends appropriate application rates to support the Paragraph 7 exemption application.

The report looks solely at the best possible solution for disposing of condensate from an agricultural benefit perspective. It will assess the possible solutions of moving the condensate or applying it to land. The previous condensate spreading investigation report carried out by Ricardo Energy and Environment has covered the environmental considerations associated with the handling and disposal of condensate.

Introduction

██████████ and ██████ team have been working on developing the Whiteshore Cockles fish mort processing facility for the last eight years. The processing of the fish mort produces a liquid condensate waste product which has to be disposed of back to the environment in a safe and efficient manner. This report will assess the best available technique to dispose of the condensate and measure the agricultural benefit of spreading this to land.



Background

The Whiteshore cockles currently handles 4,200t of fish morts and the new processing facility is expected to increase through put to 7,000t of fish morts per annum within the next 2-3 years. Once at full output, this will produce 3,850t of condensate which is the water fraction left over after the drying process. This condensate will require to be disposed of with careful consideration to any environmental impacts.

Th fish morts are a by- product of the fish farming industry which is an important industry in the Western Isles. The new processing facility will generate significant further local employment with 15 full-time processing and management roles and an additional 5 full-time jobs in the transport department and 1 full time employee on spreading/disposal of condensate. This project is of significant importance to the local economy on North Uist, Berneray and Benbecula, therefore finding a safe disposal method for the condensate is a priority for this project.

There has been some work done on the condensate analysis by Ricardo Energy and Environment and this has generated a product analysis which shows low levels of Nitrogen which will provide some agricultural benefit if applied to land.



Condensate Management/disposal options

There are various options for dealing with the condensate waste material and these options have been considered to establish the Best Available Technique (BAT) to minimise emissions and environmental impact when disposing the condensate. An analysis of the condensate has been provided and all agricultural recommendations are based on the analysis in Appendix 3.

Disperse to sea

The option of dispersing the condensate to sea has been investigated but to meet with the required standard as set out under the European directives would require further processing through a treatment plant. The cost of building a treatment plant would be in excess of £800k which makes the whole project unviable.

Transport to the Mainland

Transporting the waste to the mainland has been considered but there are number of barriers which would not make this option possible. The current ferry service is often at capacity with significant reliability issues and the waste product would require more than 150 artic loads to shift the annual output. Also, the transporting, storing, and spreading cost on the mainland are prohibitive due to the double or treble handling of the product. Also, this option would generate a significant carbon footprint per ton of condensate which does not fit with the low carbon approach associated with the project.

Spread on Land

The spreading to land would appear to be the most appropriate option for the safe disposal of the condensate as this would also provide an agricultural benefit. The condensate provides a modest level of Nitrogen at 0.62kg/t which is relatively low in comparison to other organic agricultural fertilisers. The condensate is produced all year round and on Uist, soil temperatures will rarely fall below 4 degrees which means the machair grassland will have demand for the product during the winter months. The condensate production peaks from July through to October when there is higher grass growth and demand for nutrients at Kyles post-harvest. The spreading plan will also take into account the additional land requirement during this period to dispose of the increased condensate volumes and extra land on Vallay



will be factored into the plan to accommodate this. With all of this in mind, there is an opportunity to apply the product little and often throughout the year.

Condensate is a new waste product and from an agricultural perspective, the closest comparison would be livestock slurry and it would be assumed that the application rates for condensate would be similar to cattle slurry at 2,500 -3,000 gallons per acre or 28m³/Ha. Cattle slurry has 2.6kg/N/m³, pig slurry 3.6kg/N/m³ whereas condensate has 0.62kg/N/m³ which makes it less potent in terms of the nitrogen levels being applied at 2,500gallons/acre. At the 2,500gallons per acre or 28m³ per hectare spread rate, each condensate application would provide 17kg/N/ha which is relatively low in comparison to cattle slurry at 73kg/N/ha. Condensate appears to be a milder product which will provide Nitrogen to the crop and still deliver agricultural benefit but have less environmental risk from diffused pollution.

The soil samples, condensate analysis, land areas and cropping plans for Kyles and Vallay have been run through the OMNIA digital farming nutrient management software. OMNIA is an online platform which is subscription based. The soil samples available have been entered as a base for this plan. A nutrient plan is only the starting point to nutrient management, and advice should be sought throughout the year so growing conditions can be assessed and changes made to the advice. The Omnia software has produced a spreading plan which limits the nitrogen applications to the standard maximum 250kg/ha for the land at Kyles and Vallay.

The condensate management plans has an all year round spread pattern to help manage condensate volumes and to provide low levels of nitrogen in the winter and early spring months. There are some winter applications which are permitted out with an NVZ area for slurry and would also be permitted for condensate. As mentioned, condensate has lower N levels and is less potent than slurry and would pose less of a diffused pollution risk.

The spread plan accounts for areas at Kyles which are under silage production from May to July and also looks to minimise haulage of digestate due to the financial implications and also to minimise the carbon footprint of spreading on Vallay. All fields at Kyles and Vallay are flat with minimum slope, out with 50m from any dwelling and are not close to water supplies, water courses or any other notable features. All land is owner occupied on the Single Application Form.



Planning – Risk Assessment for Slurries and Condensate

A risk assessment is an important starting point for planning the application of FYM, slurry and other organic waste products. It identifies the area of land area on the farm that is available for spreading and provides a quick visual reference for farm staff and contractors employed in the spreading of condensate. A desktop risk assessment of the land has been carried out and the farm/crofts fall into the yellow and green category for all the land selected and available for spreading:

| | |
|--------------|---|
| White areas | This includes steading areas, roads, yards etc., where spreading cannot be carried out. |
| Red areas | <p>No spread Zones</p> <ul style="list-style-type: none"> • Land within 10 metres of any surface water i.e. ditch, stream, river, pond or loch • Land within 50 metres of a well or borehole or similar underground facility for the purpose of any water supply. • Areas that are very steeply sloping where the risk of run-off is high throughout the year. • Unimproved land that has not previously received slurry or manure. |
| Orange areas | <p>High Risk Areas.</p> <p>Spreading in these areas presents a potentially high risk that pollution will occur as a direct result of spreading. These areas include:</p> <ul style="list-style-type: none"> • Land that has a slope with a gradient of more than 12°. • Land that has a slope less than 12 degrees and where spreading would represent a high risk to the water environment. • Areas with a risk of flooding more often than one in five years • Fields with drainage installed in previous 12 months • Poorly drained, water-logged or severely compacted land |
| Yellow areas | <p>Moderate Risk Areas.</p> <p>Care will still have to be taken in areas categorised as medium risk. Ground conditions should be checked before spreading. These areas include:-</p> <ul style="list-style-type: none"> • Land that has a slope with gradients of between 4° and 12° • Land sloping towards watercourses or water supplies • Land that is Imperfectly drained or is saturated |
| Green areas | <p>Low Risk Areas.</p> <p>This land presents a lower pollution risk and can be used throughout the year, depending on other factors that could change the spreading risk. These areas include:-</p> <ul style="list-style-type: none"> • Land that has a slope with a gradient of up to 4° • Land with no artificial drainage. |

The PEPFAA code also recommends leaving buffer zones near houses and alongside roads. The risk assessment has taken this into account when calculating the spreadable areas.



Soil Samples

Soils samples were taken by SAC Consulting and these have been included in Appendix 2. As mentioned, selection of fields were sampled and the actual values put through OMNIA.

Current Status and Fertiliser Planning

Current Situation

- The croft/farm is a beef farm, where all cattle are outwintered. Consequently, there is limited FYM available and purchased fertiliser has to be applied to the silage, grazing and crops.
- This is an established business producing pedigree cattle, store and finished cattle. They operate a rotational grazing system. Silage is produced from surplus growth on the machair where grass cover cannot be fully utilised by the cattle fold.
- The business is not currently making use of the Condensate product which can provide Nitrogen to replace purchased fertilisers.

Soil Samples have been taken in 2021 to provide a baseline.

On the basis of the above information, a set of records and plans have been put together in OMNIA to show how nutrients could be applied. Key considerations are: -

1. Making best use of available N in the condensate
2. Targeting all year-round low-level applications to optimise grass growth

As a result, each field has individual recommendations (which can be found in appendix 2) showing a table for each field which takes account of the following:

1. The nutrient requirement of the planned crop in terms of Nitrogen (N)
2. The fertiliser (kg/ha) required to meet the requirements and optimise grass growth from condensate and reduce purchased inorganic fertiliser applications

Each managed field has recommendations generated based on the grassland requirements from RB209, with the soil results included for the fields sampled.



Conclusion

The Whiteshore Cockles fish Mort processing facility offers significant benefits to the local community of North Uist and the disposal of the condensate is a critical part the process which requires a viable solution. The report has looked at the disposal options and it is evident that spreading to land is the only viable and practical option as the cost associated with haulage off island and discharge to the sea are prohibitive.

The justification for disposal to land as a product which can deliver agricultural benefit has been demonstrated in the report. The condensate is a low nitrogen fertiliser product which can deliver agricultural benefit if applied to grassland or crops. As the nitrogen level is relatively low at 0.62kg/m³ compared to over livestock slurries, it also poses less of a threat in winter months from diffused pollution. It offers an alternative to purchased inorganic fertiliser and with multiple targeted applications can replace the need to apply purchased fertiliser.

The nutrient management recommendations (in Appendix 1) show a plan for land at Kyles and Vallay which allows for all year-round spreading. This also keeps transport to a minimum, delivers cost benefits and reduces the carbon footprint. The plan also shows a maximum of 250kg/N/ha applied to the land which is within the recommended guidelines for grassland.

The report demonstrates the agricultural benefit from applying condensate to the land and alongside Paragraph 7 exception approval, this should satisfy the necessary agricultural benefit and ecological improvement requirements.

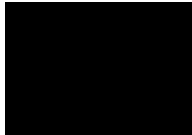
Appendix 1



Condensate
Nutrient Plan.pdf



CA MacPhail Consulting Ltd



Soil ADAS Report



| | |
|------------------------|-----------------|
| Farm Sampled: | |
| Your reference: | S54790 |
| Last Crop: | Grass - grazing |
| Next Crop: | Grass - grazing |
| Soil Type: | Mineral |

| | |
|-----------------------|---------------|
| Sample ID : | 1 |
| Lab sample no: | 21007245 |
| Case no: | ASD-2021-5523 |
| Date received: | 07/10/2021 |
| Date reported: | 18/10/2021 |

| Determination | Result | Units | Status |
|-----------------------------|---------|-------|--------|
| pH | 8.4 | | |
| Lime req (Arable) | 0.0 | t/ha | |
| Lime req (Grass) | 0.0 | t/ha | |
| ADAS Extractable Phosphorus | 13.7 | mg/l | 1 |
| ADAS Extractable Potassium | 11.0 | mg/l | 0 |
| ADAS Extractable Magnesium | 63.5 | mg/l | 2 |
| Aqua Regia Zinc | 26.0 | mg/kg | |
| Aqua Regia Copper | 13.2 | mg/kg | |
| Aqua Regia Nickel | 3.58 | mg/kg | |
| Aqua Regia Cadmium | <0.0751 | mg/kg | |
| Aqua Regia Lead | 4.47 | mg/kg | |
| Aqua Regia Chromium | 9.21 | mg/kg | |
| Aqua Regia Mercury | <0.0168 | mg/kg | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as described

Contact: [Redacted]
Balivanich FRBS

Authorised by [Redacted]





Soil ADAS Report



| | |
|------------------------|-----------------|
| Farm Sampled: | |
| Your reference: | S54790 |
| Last Crop: | Grass - grazing |
| Next Crop: | Grass - grazing |
| Soil Type: | Mineral |

| | |
|-----------------------|---------------|
| Sample ID : | 2 |
| Lab sample no: | 21007246 |
| Case no: | ASD-2021-5523 |
| Date received: | 07/10/2021 |
| Date reported: | 18/10/2021 |

| Determination | Result | Units | Status |
|-----------------------------|---------|-------|--------|
| pH | 8.3 | | |
| Lime req (Arable) | 0.0 | t/ha | |
| Lime req (Grass) | 0.0 | t/ha | |
| ADAS Extractable Phosphorus | 13.3 | mg/l | 1 |
| ADAS Extractable Potassium | 7.41 | mg/l | 0 |
| ADAS Extractable Magnesium | 64.0 | mg/l | 2 |
| Aqua Regia Zinc | 15.8 | mg/kg | |
| Aqua Regia Copper | <3.27 | mg/kg | |
| Aqua Regia Nickel | 3.09 | mg/kg | |
| Aqua Regia Cadmium | <0.0751 | mg/kg | |
| Aqua Regia Lead | 2.56 | mg/kg | |
| Aqua Regia Chromium | 7.86 | mg/kg | |
| Aqua Regia Mercury | <0.0168 | mg/kg | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received.

Contact: [REDACTED]
Ballinach FRBS

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7624

Soil ADAS Report

| | |
|------------------------|-----------------|
| Farm Sampled: | |
| Your reference: | S54790 |
| Last Crop: | Grass - grazing |
| Next Crop: | Grass - grazing |
| Soil Type: | Mineral |

| | |
|-----------------------|---------------|
| Sample ID : | 3 |
| Lab sample no: | 21007247 |
| Case no: | ASD-2021-5523 |
| Date received: | 07/10/2021 |
| Date reported: | 18/10/2021 |

| Determination | Result | Units | Status |
|-----------------------------|---------|-------|--------|
| pH | 8.2 | | |
| Lime req (Arable) | 0.0 | t/ha | |
| Lime req (Grass) | 0.0 | t/ha | |
| ADAS Extractable Phosphorus | 14.7 | mg/l | 1 |
| ADAS Extractable Potassium | 10.2 | mg/l | 0 |
| ADAS Extractable Magnesium | 63.9 | mg/l | 2 |
| Aqua Regia Zinc | 22.8 | mg/kg | |
| Aqua Regia Copper | <3.27 | mg/kg | |
| Aqua Regia Nickel | 3.58 | mg/kg | |
| Aqua Regia Cadmium | 0.0996 | mg/kg | |
| Aqua Regia Lead | 3.19 | mg/kg | |
| Aqua Regia Chromium | 8.83 | mg/kg | |
| Aqua Regia Mercury | <0.0168 | mg/kg | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received

Contact: [REDACTED]
Ballivanich FRBS

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PLANET
NUTRIENT MANAGEMENT

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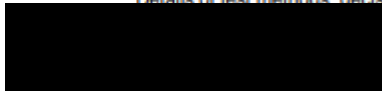
Soil Report



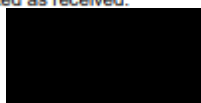
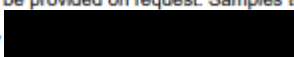
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|-------------------------|---------|----------------------|--------------------|----------------------|---------------|
| Farm Sampled | Uallay | Previous Crop | | Batch Number | S54795 |
| Field Name or ID | Top 1 | Next Crop | | Lab Sample No | 22006124 |
| FID Number | | Date received | 07/07/2022 | Case No | ASD-2022-3466 |
| Soil Type | Mineral | Date reported | 18/07/2022 14:43:0 | | |

| Determination | Result | Units | Target Value | Target Status | Status |
|-----------------------------|--------|-------|--------------|---------------|------------|
| pH | 8.1 | | | 5.0 | 7.0 8.1 |
| ADAS Extractable Phosphorus | 3.77 | mg/l | | | |
| ADAS Extractable Potassium | 28.4 | mg/l | | | |
| ADAS Extractable Magnesium | 94.9 | mg/l | | | |
| Lime req (Arable) | 0.0 | t/ha | | | |
| Lime req (Grass) | 0.0 | t/ha | | | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received.

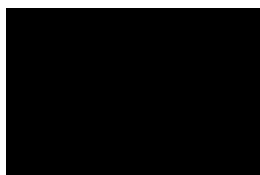


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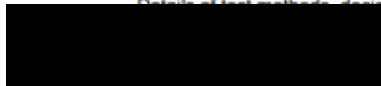
Soil Report



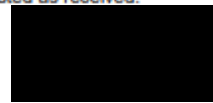
| | | | | | |
|-------------------------|---------|----------------------|--------------------|----------------------|---------------|
| Farm Sampled | Uallay | Previous Crop | | Batch Number | S54795 |
| Field Name or ID | Top 2 | Next Crop | | Lab Sample No | 22006125 |
| FID Number | | Date received | 07/07/2022 | Case No | ASD-2022-3466 |
| Soil Type | Mineral | Date reported | 18/07/2022 14:43:0 | | |

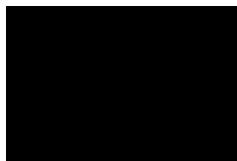
| Determination | Result | Units | Target Value | Target Status | Status |
|-----------------------------|--------|-------|--------------|---------------|------------|
| pH | 8.1 | | | 5.0 | 7.0 8.1 |
| ADAS Extractable Phosphorus | 3.46 | mg/l | | | |
| ADAS Extractable Potassium | 25.3 | mg/l | | | |
| ADAS Extractable Magnesium | 109 | mg/l | | | |
| Lime req (Arable) | 0.0 | t/ha | | | |
| Lime req (Grass) | 0.0 | t/ha | | | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received.



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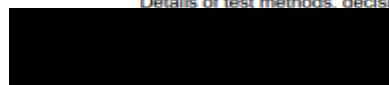
Soil Report



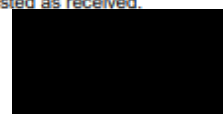
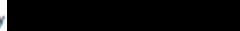
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|-------------------------|---------|----------------------|--------------------|----------------------|---------------|
| Farm Sampled | Uallay | Previous Crop | | Batch Number | S54795 |
| Field Name or ID | Middle | Next Crop | | Lab Sample No | 22006126 |
| FID Number | | Date received | 07/07/2022 | Case No | ASD-2022-3466 |
| Soil Type | Mineral | Date reported | 18/07/2022 14:43:0 | | |

| Determination | Result | Units | Target Value | Target Status | Status |
|-----------------------------|--------|-------|--------------|---------------|--------------------------------------|
| pH | 8.1 | | | | 5.0 7.0 8.1 |
| Extractable Zinc | 1.1 | mg/l | 1.6-10 | M | Very Low Low Moderate High Very High |
| Extractable Copper | 0.0700 | mg/l | 1.6-8.4 | M | |
| * Extractable Manganese | 0.97 | mg/l | 2.6-20 | M | |
| Extractable Sulphur | 5.2 | mg/l | 6.1-10 | M | |
| Extractable Boron | 1.3 | mg/l | 0.6-1.0 | M | Low Moderate High |
| Organic Matter (LOI) | 3.85 | % | 4-10 | M | |
| ADAS Extractable Phosphorus | 10.6 | mg/l | | | |
| ADAS Extractable Potassium | 74.3 | mg/l | | | |
| ADAS Extractable Magnesium | 104 | mg/l | | | |
| Lime req (Arable) | 0.0 | t/ha | | | |
| Lime req (Grass) | 0.0 | t/ha | | | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received.



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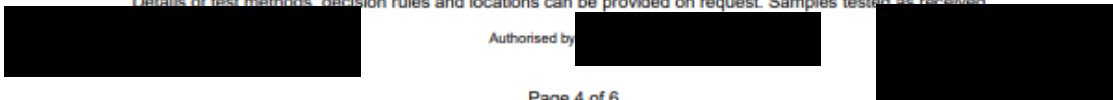
Soil Report



| | | | | | |
|-------------------------|---------|----------------------|--------------------|----------------------|---------------|
| Farm Sampled | Uallay | Previous Crop | | Batch Number | S54795 |
| Field Name or ID | Lower | Next Crop | | Lab Sample No | 22006127 |
| FID Number | | Date received | 07/07/2022 | Case No | ASD-2022-3466 |
| Soil Type | Mineral | Date reported | 18/07/2022 14:43:0 | | |

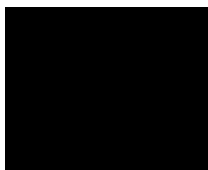
| Determination | Result | Units | Target Value | Target Status | Status |
|-----------------------------|--------|-------|--------------|---------------|-----------|
| pH | 8.2 | | | | 8.2 |
| Extractable Zinc | 1.9 | mg/l | 1.6-10 | M | Very Low |
| Extractable Copper | 0.0500 | mg/l | 1.6-8.4 | M | Low |
| * Extractable Manganese | 1.2 | mg/l | 2.6-20 | M | Moderate |
| Extractable Sulphur | 6.3 | mg/l | 6.1-10 | M | High |
| Extractable Boron | 1.2 | mg/l | 0.6-1.0 | M | Very High |
| Organic Matter (LOI) | 3.57 | % | 4-10 | M | Low |
| ADAS Extractable Phosphorus | 10.8 | mg/l | | | Moderate |
| ADAS Extractable Potassium | 49.4 | mg/l | | | High |
| ADAS Extractable Magnesium | 91.7 | mg/l | | | High |
| Lime req (Arable) | 0.0 | t/ha | | | |
| Lime req (Grass) | 0.0 | t/ha | | | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received.





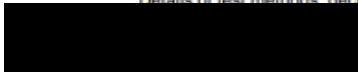
Soil Report

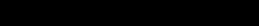


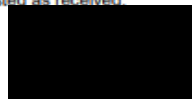
| | | | | | |
|-------------------------|--------------|----------------------|--------------------|----------------------|---------------|
| Farm Sampled | Uallay | Previous Crop | | Batch Number | S54795 |
| Field Name or ID | Lower Fallow | Next Crop | | Lab Sample No | 22006128 |
| FID Number | | Date received | 07/07/2022 | Case No | ASD-2022-3466 |
| Soil Type | Mineral | Date reported | 18/07/2022 14:43:0 | | |

| Determination | Result | Units | Target Value | Target Status | Status |
|-----------------------------|--------|-------|--------------|---------------|---|
| pH | 8.2 | | | | 5.0 7.0 8.2 Very Low Low Moderate High Very High |
| Extractable Zinc | 1.1 | mg/l | 1.6-10 | M | Very Low |
| Extractable Copper | <0.04 | mg/l | 1.6-8.4 | M | Very Low |
| * Extractable Manganese | 1.2 | mg/l | 2.6-20 | M | Low |
| Extractable Sulphur | 2.0 | mg/l | 6.1-10 | M | Low |
| Extractable Boron | 1.0 | mg/l | 0.6-1.0 | M | Moderate High |
| Organic Matter (LOI) | 3.66 | % | 4-10 | M | Low |
| ADAS Extractable Phosphorus | 7.92 | mg/l | | | |
| ADAS Extractable Potassium | 17.1 | mg/l | | | |
| ADAS Extractable Magnesium | 89.2 | mg/l | | | |
| Lime req (Arable) | 0.0 | t/ha | | | |
| Lime req (Grass) | 0.0 | t/ha | | | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received

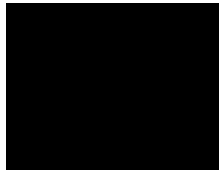


Authorised by 





Soil Report



| | | | | | |
|-------------------------|---------|----------------------|--------------------|----------------------|---------------|
| Farm Sampled | Uallay | Previous Crop | | Batch Number | S54795 |
| Field Name or ID | Kyles | Next Crop | | Lab Sample No | 22006129 |
| FID Number | | Date received | 07/07/2022 | Case No | ASD-2022-3466 |
| Soil Type | Mineral | Date reported | 18/07/2022 14:43:0 | | |

| Determination | Result | Units | Target Value | Target Status | Status |
|-----------------------------|--------|-------|--------------|---------------|--------|
| pH | 8.1 | | | 5.0 | 7.0 |
| ADAS Extractable Phosphorus | 17.1 | mg/l | | | 8.1 |
| ADAS Extractable Potassium | 39.9 | mg/l | | | |
| ADAS Extractable Magnesium | 86.7 | mg/l | | | |
| Lime req (Arable) | 0.0 | t/ha | | | |
| Lime req (Grass) | 0.0 | t/ha | | | |

Summary of Results

Farm Sampled:

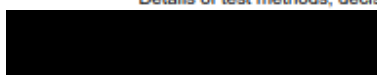
Batch Number:

Report Date: 18/07/2022

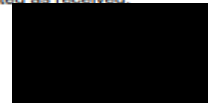
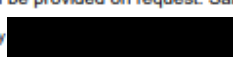
| SAC | SAC Status | Extractable Phosphorus | Extractable Potassium | Extractable Magnesium |
|---|------------|------------------------|-----------------------|-----------------------|
| Scales of Interpretation, results in mg/l | VL | 0 - 1.7 | 0 - 39 | 0 - 19 |
| | L | 1.8 - 4.4 | 40 - 75 | 20 - 60 |
| | M- | 4.5 - 9.4 | 76 - 140 | 61 - 200 |
| | M+ | 9.50 - 13.4 | 141 - 200 | 61 - 200 |
| | H | 13.5 - 30.0 | 201 - 400 | 201 - 1000 |
| | VH | > 30.0 | > 400 | > 1000 |

| ASD Ref | Field Name/Ref | pH | Lime Required | | Extractables | | |
|---------|----------------|----|---------------|-------|--------------|------|------|
| | | | Arable | Grass | P | K | Mg |
| | | | t/ha | | mg/l | mg/l | mg/l |
| | | | | | | | |

Details of test methods, decision rules and locations can be provided on request. Samples tested as received



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Appendix 3



WS Condensate
2020.09.16 (SW Rep.)