Application for an environmental permit:
Part LPD1 – Application for a deployment

Use this form for deployments for the landspreading of waste where the operator holds a permit for any of the following standard rules:

- SR2010No4 Mobile plant for landspreading (land treatment resulting in agricultural or ecological benefit);
- SR2010No5 Use of mobile plant for land reclamation, restoration or improvement of land;
- SR2010No6 Mobile plant for landspreading of sewage sludge; or a
- Bespoke mobile plant permit for landspreading or land reclamation.

Please check that this is the latest version of the form available from our website.

Please read through this form and the guidance notes that come with it. All relevant guidance documents can be found on our website.

Where you see the term 'document reference' on the form, give the document references and send the documents with the application form when you've completed it.

Contents

1 About the permit

1a Discussions before your application

If you have had discussions with us before your application, give us the case reference or details on a separate sheet.

Case or document reference

1b Permit number

Permit number this application relates to GP3792SK

1c What type of permit do you want to deploy under? (Please tick)

SR2010No4 Mobile plant for landspreading (land treatment resulting in agricultural or ecological benefit) ☒

SR2010No5 Use of mobile plant for land reclamation, restoration or improvement of land ☐

SR2010No6 Mobile plant for landspreading of sewage sludge ☐

Bespoke mobile plant permit for landspreading or reclamation, restoration or improvement of land ☐

2 About you

Please give us details of the permit holder. For companies, the details must match Companies House.

Organisation name (if relevant) ByProduct Recovery Ltd

Title

First name

Last name

Address Control House

	A1 Business Park
	Knottingley
	West Yorkshire
Postcode	WF11 0BU
Telephone - mobile	07824 323 318
Telephone - office	0113 232 2418
Email address	info@4r-group.co.uk

If you are applying as an organisation of individuals, every partner needs to give us their details, including their title. If necessary, continue on a separate sheet and tell us the reference you have given the sheet.

Document reference	

3 Contact details

Who can we talk to about your application? This can be someone acting as a consultant or 'agent' for you.

Title	Mr	
First name	Adam	
Last name	Stone	
Telephone - mobile	07508 322259	
Telephone - office		
Email address	adam.stone@4r-group.co.uk / info@4r-group.co.uk	

4 About the deployment

4a Multiple deployments for one area of land

You may spread more than 10 waste streams on the same area of land, provided you submit additional fully completed deployment forms listing the additional wastes. Your benefit statement must take into account the total benefit to the land of all wastes to be spread.

Is this deployment one of a batch (multiple deployments) for the same area of land?

No ☒ *Go to section 4b*

Yes ☐ How many deployments are in the batch?

4b Nominated competent person

4b1 Give us details of the nominated competent person. This is the person who will be responsible for compliance with the permit for this deployment. See the guidance notes on LPD1 for further details.

Title	Mr	
First name	Richard	
Last name	Evans	

Telephone - mobile	07506 672839
Telephone - office	
Email address	richard.evans@4r-group.co.uk / info@4r-group.co.uk

4b2 What evidence are you using to show the nominated competent person has suitable technical skills and knowledge to manage the activity?

An approved technical scheme ☐ *Go to section 4b3*

Documented in-house training ☒ You must provide evidence – see below.

You must provide evidence to show the documented in-house training meets the requirements set out in technical guidance. See the guidance notes on LPD1 for further details and give us the document reference.

Document reference: 4R Training Certificate Waste to Land - RE *Go to section 4c*

4b3 Which approved scheme are you using to show you have the suitable technical skills and knowledge to manage your facility?

CIWM / WAMITAB ☐

ESA / EU ☐

4b4 Tick to confirm you've included all original *and* continuing competence evidence. ☐

4c Which risk band does the activity fall within?

Please complete Table 1 below to indicate which risk band your activity falls within. This is a combination of waste types and proximity to sensitive receptors.

Once you have selected the risk band your activity falls within, the form guidance tells you what additional information you need to send with the application.

The risk banding affects the fee you need to send with your deployment application. See section 6.

Table 1 – risk band

Permit type	**Lower risk location** - Not in an SPZ 2, and/or - Over 500 meters from: • European site, and/or • Ramsar, and/or • SSSI	**High risk location** - In a Source Protection Zone 2, and/or - 500 meters or less from: • European site, and/or • Ramsar, and/or • SSSI **You *must* submit a site specific risk assessment.**
SR2010No4 List A wastes (Lower risk)	Low risk deployment ☐	Medium risk (2) deployment ☐
SR2010No4 List B wastes (Higher risk)	Medium risk (1) deployment ☐	High risk deployment ☒
SR2010No5 (Any waste listed)	Medium risk (1) deployment ☐	High risk deployment ☐
SR2010No6 (Any waste listed)	Medium risk (1) deployment ☐	High risk deployment ☐

Bespoke mobile plant permit	Low risk deployment ☐	Medium risk deployment ☐	High risk deployment ☐

4d Additional information on sensitive receptors

Is the deployment within an SPZ 2 and/or 500m of a European site, Ramsar or SSSI, or being made under a

bespoke permit?

No ☐

Yes ☒ You must submit a site specific risk assessment (see question 4e).

4e Site specific risk assessment

Your site specific risk assessment must show how you intend to prevent any harm to any SPZ 2, European site, Ramsar or SSSI. For more information on risk-assessment please see the accompanying guidance to LPD1 and Technical Guidance Note 'TGN 8.01'.

Please tick a box below to indicate which type of risk-assessment you have submitted.

I have attached a site-specific risk-assessment as the deployment is within and SPZ 2 and/or 500m of a European site, Ramsar or SSSI. I have also addressed risks to other receptors in the risk assessment ☒

I am not within an SPZ 2 and/or 500 m of a European site, Ramsar or SSSI but have addressed risks to other receptors in my benefit statement. ☐

I am deploying under a bespoke permit and have attached a site-specific risk assessment (regardless of location). ☐

4f About the waste

Please list all the individual waste streams you want to spread/use under this deployment, in Table 2 below. We've included an example to help you.

Please note: You can only spread/use 10 waste types per deployment.

Table 2 – waste types

	List of Waste code (6 digit)	**Waste description**	**Physical form**	**Waste producer**	**Total amount being spread/used** (tonnes)
e.g.	03 03 05	De-inked paper	Sludge	Smith's Newsprint	500
1	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Bolton Hill	2550
2	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Bontgoch	10875
3	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Bryngwyn	10875
4	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Cefn Dryscoed	2550
5	19 09 02	Potable water treatment sludge	Sludge cake	DCWW Crai	4916
6	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Crai	10875
7	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Hirwaun	10875
8	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Portis	10875
9	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Preseli	2550
10	19 09 02	Potable water treatment sludge	Liquid sludge	DCWW Strata Florida	2550
				Total tonnage	10875

4g About the land you want to treat

4g1 Please give details of the main address of the land to be treated.

Address	Bailea
	Heol Senni
	Brecon
	Powys
Postcode	LD3 8ST
National grid reference (12 digit)	SN 92858 24169

4g2 What type of land do you want to treat?

Agricultural land ☒ Please give your County/ Parish/ Holding number 52/035/0004

Non-agricultural land ☐

4h The parcels of land you want to treat

Please list all the individual areas (parcels) of land you want to include this deployment, in Table 3 below.

Please note: the total area to be treated must not be more than 50 hectares.

Table 3 – parcels of land

	Field name/ number/ reference	**Grid reference - centre of field** (12 digit)	**Waste types to be spread/used** (List of Waste code) Separate using commas.	**Size** (hectares)
1	**Please refer to LPD1**			
2	**Supplement**			
3				
4				
5				
6				
7				
8				
9				
10				
			Total hectares	

4i Is the permit holder the owner or occupier of the land you want to spread on/treat?

Yes ☐ *Go to section 4k*

No ☒ You must give us details of the land owner or occupier, below.

Organisation name (if relevant)	
Title	Mr
First name	Matthew
Last name	Jones

Address	Bailea
	Heol Senni
	Brecon
	Powys
Postcode	LD3 8ST
Telephone - mobile	07967 509445
Telephone - office	
Email address	

If there is more than one owner or occupant for the area covered by this deployment, you must give us details of each. Please continue on a separate sheet and tell us the reference you have given the sheet.

Document reference	LPD1 Supplement

4j Do you have the consent of the owner or occupier to carry out the activity?

Yes ☒ *Go to section 4k*

No ☐ You must tell us why you think you can carry out the activity without the consent of the occupier. Please give an explanation in the box, below. Continue on a separate sheet if needed.

Explanation

4k Previous land treatment

Has any of the land listed in Table 3 been treated with other wastes, sewage sludge, slurries or manures etc. in the last 12 months?

No ☐ *Go to section 4l*

Yes ☒ You must give us details in Table 4 below *and* account for them in your benefit statement.

Table 4 – previous land treatment

	Field name/ number/ reference	**Describe the waste spread** (in last 12 months)	**Person/ company who spread the waste**	**Quantity spread per hectare** (in tonnes)	**Deployment/ other reference** (if known)
e.g.	East field	Digested sewage sludge cake	Eastern Waters	20	PAN 000000
1	Please refer to LPD1				
2	Supplement				
3					

4					
5					
6					
7					
8					
9					
10					

4l Waste storage

Are you proposing to store waste in connection with this deployment?

No ☐ *Go to section 5*

Yes ☒ You must give us details in Table 5 below.

Table 5 – waste storage details

	Grid reference (12 digit)	**Waste type being stored** (6 digit List of Waste code)	**Storage method**	**Quantity stored at any one time** (in tonnes)
1	SN 92857 24250	19 09 02	Field heap for cake	509
2	SN 93090 25274	19 09 02	Field heap for cake	1729
3	SN 93356 25258	19 09 02	Field heap for cake	1729
4	SN 90809 25020	19 09 02	Field heap for cake	1187
5	SN 91145 24933	19 09 02	Field heap for cake	1187
6	SN 84471 14444	19 09 02	Field heap for cake	215
7	SN 84414 12482	19 09 02	Field heap for cake	1492
8	SN 85040 12394	19 09 02	Field heap for cake	1492
9				
10	No more than 3000t shall	be stored across the storage	options at any one time.	

5 Payment

5a Tick an option below to show how you will pay for the application.

Electronic transfer (for example, BACS) ☒ *Go to section 5b*

Cheque ☐ *Go to section 5c*

Postal order ☐ *Go to section 5d*

Credit or debit card ☐ *Go to section 5e*

5b Paying by electronic transfer

If you choose to pay by electronic transfer use the following information to make your payment.

Company name: Natural Resources Wales

Company address: Income Dept., PO BOX 663, Cardiff, CF24 0TP

Bank: RBS

Address: National Westminster Bank Plc, 2 ½ Devonshire Square, London, EC2M 4BA

Sort code: 60-70-80

Account number: 10014438

Reference number

You can use any reference number but we prefer the number to be 'EPDEP' followed by the first five letters of your organisation name followed by a four-digit number.

For example, for a company named Joe Bloggs Ltd, the reference number might be EPDEPJOEBL0001. (Remember you can use any four-digit number at the end.)

The reference number you will provide will appear on our bank statements so we can check your payment. We may need to contact your bank to make sure the reference number is quoted correctly.

You should also email your payment details and payment reference number to banking.team@naturalresourceswales.gov.uk / banking.team@cyfoethnaturiolcymru.gov.uk or fax it to 0300 065 3001 and enter it in the space provided below.

BACS reference	PSCAPPBYPRO0549
Amount paid	£994.00

Making payments from outside the UK

These details have changed. If you are making your payment from outside the United Kingdom (which must be received in sterling), our IBAN number is GB70 NWBK6070 8010 0144 38 and our SWIFT/BIC number is NWBKGB2L.

If you do not quote your payment reference number, there may be a delay in processing your payment and application.

5c Paying by cheque or postal order

You should make cheques or postal orders payable to Natural Resources Wales and they should be marked 'A/c Payee'. We will not accept post-dated cheques (cheques with a future date written on them).

Cheque/ postal order number	
Amount paid	

5d Paying by credit or debit card

If you are paying by credit or debit card, please fill in the separate form CC1.

You can download this from our Website or you can ask for one of our customer service providers to send one by post. We will destroy your card details once we have processed your payment. We can accept payments by Visa, MasterCard or Maestro UK card only.

6 Supporting documents

You must provide all relevant documents to support your application. The information we need depends on the type of deployment application you're making. If you don't provide us with all the information we need, we won't be able to assess your proposal and the application may be rejected.

Better quality deployments result in shorter processing times. If we don't need to come back to you for more information, we'll be able to give you a decision quicker.

6a What supporting evidence do you need to send?

Are you applying to spread/use waste under a SR2010 No4 standard rule set permit?

Yes	☒	Complete the checklist in Table 6 *and* Table 7	*Go to section 6b*
No	☐	Complete the checklist in Table 7 only.	*Go to section 6c*

6b Checklist for deployments under SR2010 No4 only

Complete the checklist in Table 6, below. Tick to confirm you've completed the action.

Table 6	
Do the grid references (for fields and storage areas) match the map locations?	☒
Are the grid references in the correct format i.e. AB 12345 67890?	☒
Have details of previous land treatment been provided?	☒
Have you included a location map?	☒
Does the map include all the relevant features as set out in the guidance?	☒
Have you included a waste analysis?	☒
Is the waste analysis for each waste less than 12 months old?	☒
Does the waste analysis include pH, Nitrogen (N), Phosphorus (P), Potassium (K), % dry matter and Potentially Toxic Elements (PTE's)?	☒
Have you included a soil analysis?	☒
Is the soil analysis less for each field than 4 years old?	☒
Does the soil analysis provide the soil pH, Potassium (K), Phosphorus (P), Magnesium (Mg) and PTEs if they are high in the waste?	☒
Have the soil indices for P, K and Mg for each field been provided?	☒
Have you included a Certificate of Agricultural Benefit?	☒
Has the proposed cropping regime been stated?	☒
Has the waste application rate been stated?	☒
Has the timing of application been stated and is it appropriate for the cropping regime?	☒
Has the intended method of waste application been stated?	☒
Have the total nutrients supplied by the waste been stated and have they been provided in oxide format?	☒
Has the nutrient requirement for the proposed crop been provided?	☒
Has the soil nitrogen supply (SNS) for each field been provided?	☒
If the land has been treated with other wastes, sewage sludge, slurries manures etc. in the last 12 months, has relevant information been provided?	☒
If more than one waste stream is to be applied to the land; has the benefit for each individual waste stream been demonstrated?	☒
Have you included a site specific risk assessment? (where relevant)	☒
Does the Site Specific Risk Assessment; consider all potential receptors, identify all risks from the activity, and include information on all measures you'll use to minimise or mitigate the impact and why they're suitable.	☒

6c Checklist for all types of deployment application.

Complete the checklist in Table 7, below. Tick to confirm you've completed the action.

Table 7		
Item	**Complete**	**Your document reference/ description**
Location map (required for all deployments)	☒	CF Maps
Benefit statement (required for all deployments)	☒	CF ABS
Waste analysis (required for all deployments)	☒	Waste Analysis

Receiving soil analysis (required for all deployments)	☒	Soil Analysis
Site-specific risk assessment (in accordance with 4e)	☒	CF SSRA
Any other additional information	N/A	LPD1 Supplement
	N/A	4R Training Certificate Waste to Land - RE
	N/A	
	N/A	

7 The data Protection Act 1998

We, the Natural Resources Body for Wales (hereafter "Natural Resources Wales"), will process the information you provide so that we can:

- deal with your application;
- make sure you keep to the conditions of the licence, permit or registration;
- process renewals; and
- keep the public registers up to date.

We may also process or release the information to:

- offer you documents or services relating to environmental matters;
- consult the public, public organisations and other organisations (for example, the Health and Safety Executive, local authorities, the emergency services, the Department for Environment, Food and Rural Affairs) on environmental issues;
- carry out research and development work on environmental issues;
- provide information from the public register to anyone who asks;
- prevent anyone from breaking environmental law, investigate cases where environmental law may have been broken, and take any action that is needed;
- assess whether customers are satisfied with our service, and to improve our service; and
- respond to requests for information under the Freedom of Information Act 2000 and the Environmental Information Regulations 2004 (if the Data Protection Act allows).

We may pass the information on to our agents or representatives to do these things for us.

8 Confidentiality and national security

We will normally put all the information in your application on a public register of environmental information. However, we may not include certain information in the public register if this is in the interests of national security, or because the information is confidential.

You can ask for information to be made confidential by ticking the box below and enclosing a letter with your application giving your reasons. If we agree with your request, we will tell you and not include the information in the public register. If we do not agree with your request, we will let you know how to appeal against our decision, or you can withdraw your application.

Please treat the information in my application as confidential. ☐

You can tell the Secretary of State that you believe including information on a public register would not be in the interests of national security. You must enclose a letter with your application telling us that you have told the Welsh Ministers and you must still include the information in your application. We will not include the information in the public register unless the Welsh Ministers decides that it should be included.

Only tick the box below if you are certain that you wish to claim confidentiality or national security for your application. This may delay your application.

I attach a letter stating that I have written to the Welsh Ministers explaining why my information should not be included on the public register for national security reasons ☐

9 Declaration

You must read this section before making the declaration and sending your form to us.

A relevant person should make the declaration. You must be a relevant person or have the authority of a relevant person to sign this application on their behalf.

Relevant people means each applicant, and in the case of a company, a director, manager, company secretary or any similar officer or employee listed on current appointments in Companies House. In the case of a Limited Liability Partnership (LLP), it includes any partner. If the permit holder is an organisation of individuals, each individual (or individual trustee) must complete the declaration.

To simplify and speed up the application process we recommend that the declaration is filled in by an officer of a company or one of the partners in a Limited Liability Partnership (LLP).

If you wish a manager, employee or consultant etc. to sign the declaration on behalf of a relevant person, we will need written confirmation from a relevant person; that is, an officer of the company, a partner in the LLP or the individual, confirming that the person has the authority to fill in the declaration.

If you are joint permit holders you should each fill in your own declaration. We have provided a separate sheet for this.

Where the operator is the subject of any insolvency procedure, the declaration must be filled in by the official receiver/appointed insolvency practitioner.

9a Are you signing the form on *behalf of* a relevant person?

If you are *not* a relevant person, but want to sign the application on their behalf, you must include confirmation that you can do this.

I have included written confirmation from a relevant person to confirm I can sign on their behalf. ☐

9b Does your deployment application relate to a standard facility permit?

If your deployment application is being made in relation to a standard facility permit (SRP), you also need to confirm that you are able to meet all relevant criteria of the standard rule set/sets under which you are applying.

I confirm that my activity/activities will fully meet the rules of the permit deployment I have applied for. ☒

9c Sign to confirm you understand the declaration.

If you knowingly or recklessly make a statement which is false or misleading to help you get an environmental permit (for yourself or another person), you are committing an offence under the Environmental Permitting (England and Wales) Regulations 2016.

I declare that the information in this application is true to the best of my knowledge and belief. I understand that this application may be refused or approval withdrawn if I give false or incomplete information.

I understand that if I knowingly or recklessly make a false or misleading statement:

- **I may be prosecuted; and**
- **if convicted, I may have to pay a fine and/or go to prison.**

By signing below, you are confirming that you understand and agree with the declaration above.

Title	Mr	
First name	Jon	
Last name	Smith	
On behalf of (if relevant)		
Today's date (DD/MM/YYYY)	07/03/2019	

LPD1 Supplement

4h The parcels of land you want to treat.

Table 3 – parcels of land				
	Field name/ number/ reference	**Grid reference – centre of field** (12 digit)	**Waste types to be spread/used** (List of waste code) separate using commas	**Size** (hectares)
Bailea				
1	**12**	**SN 92900 24393**	19 09 02	4.5
2	**16**	**SN 93149 25482**	19 09 02	4.2
3	**18**	**SN 93535 25300**	19 09 02	1.6
4	**19**	**SN 93710 25259**	19 09 02	1.9
5	**20**	**SN 93691 25170**	19 09 02	3.1
6	**21**	**SN 93335 25198**	19 09 02	4.5
Beili Gwern				
7	**23**	**SN 90920 25080**	19 09 02	1.7
8	**34**	**SN 91167 25080**	19 09 02	2.7
9	**35**	**SN 91089 24945**	19 09 02	1.2
10	**36**	**SN 91175 24821**	19 09 02	1.6
11	**37**	**SN 91123 24699**	19 09 02	1.3
12	**39**	**SN 91285 25033**	19 09 02	1.3
13	**40**	**SN 91211 24946**	19 09 02	0.7
Glynllech Uchaf				
14	**4040**	**SN 84414 14407**	19 09 02	1.2
15	**3724**	**SN 84373 14215**	19 09 02	0.7
16	**9927**	**SN 84993 12295**	19 09 02	3.8
17	**8638**	**SN 84898 12384**	19 09 02	1.2
18	**6133**	**SN 84616 12327**	19 09 02	1.7
19	**7829**	**SN 84779 12291**	19 09 02	0.9
20	**4848**	**SN 84486 12489**	19 09 02	1.4
21	**5441**	**SN 84542 12414**	19 09 02	0.9
22	**4363**	**SN 84418 12641**	19 09 02	1.4
			Total hectares	**43.5**

4i Is the permit holder the owner or occupier of the land you want to spread on/treat?

Other owners and addresses:

Name: H J M & B Price
Address: Beili Gwern, Crai, Brecon, Powys. LD3 8YL
Phone: 01874 636306
CPH: 52-031-0048

Name: W Millward
Address: Glynllech Uchaf, Nantyffin Road, Penycae, Swansea. SA9 1FJ

4k Previous land treatment

Table 4 – previous land treatment					
	Field name/ number/ reference	**Describe the waste spread** (in last 12 months)	**Person/ company who spread the waste**	**Quantity spread per hectare** (in tonnes)	**Deployment/ other reference** (if known)
Bailea					
1	**12**	DCWW	4R Group	23	PAN-002397
2	**16**	DCWW Crai	4R Group	109	PAN-002568
3	**18**	DCWW Crai	4R Group	16	PAN-002568
4	**19**	DCWW Crai	4R Group	14	PAN-002568
5	**20**	DCWW Portis	4R Group	65	PAN-002568
6	**21**	DCWW Portis	4R Group	45	PAN-002568
Beili Gwern					
7	**23**	DCWW Crai	4R Group	15	PAN-002397
8	**34**	DCWW Crai	4R Group	53	PAN-002568
10	**36**	DCWW Portis	4R Group	33	PAN-002568
11	**37**	DCWW Crai	4R Group	29	PAN-002397
12	**39**	DCWW Portis	4R Group	51	PAN-002568
13	**40**	DCWW Crai	4R Group	53	PAN-002568
Glynllech Uchaf					
14	**4040**	DCWW Hirwaun	4R Group	138	PAN-002397
15	**3724**	DCWW Hirwaun	4R Group	130	PAN-002397
16	**9927**	DCWW Crai	4R Group	213	PAN-002397
17	**8638**	DCWW Cefn Dryscoed	4R Group	218	PAN-002397
18	**6133**	DCWW Hirwaun	4R Group	177	PAN-002397
19	**7829**	DCWW Crai	4R Group	132	PAN-002397
20	**4848**	DCWW Hirwaun	4R Group	171	PAN-002397

21	**5441**	DCWW Portis	4R Group	91	PAN-002397
23	**4363**	DCWW Crai	4R Group	167	PAN-002397

Location Plan

Crai Farms

Site:
Bailea
Heol Senni
Brecon
Powys
LD3 8ST

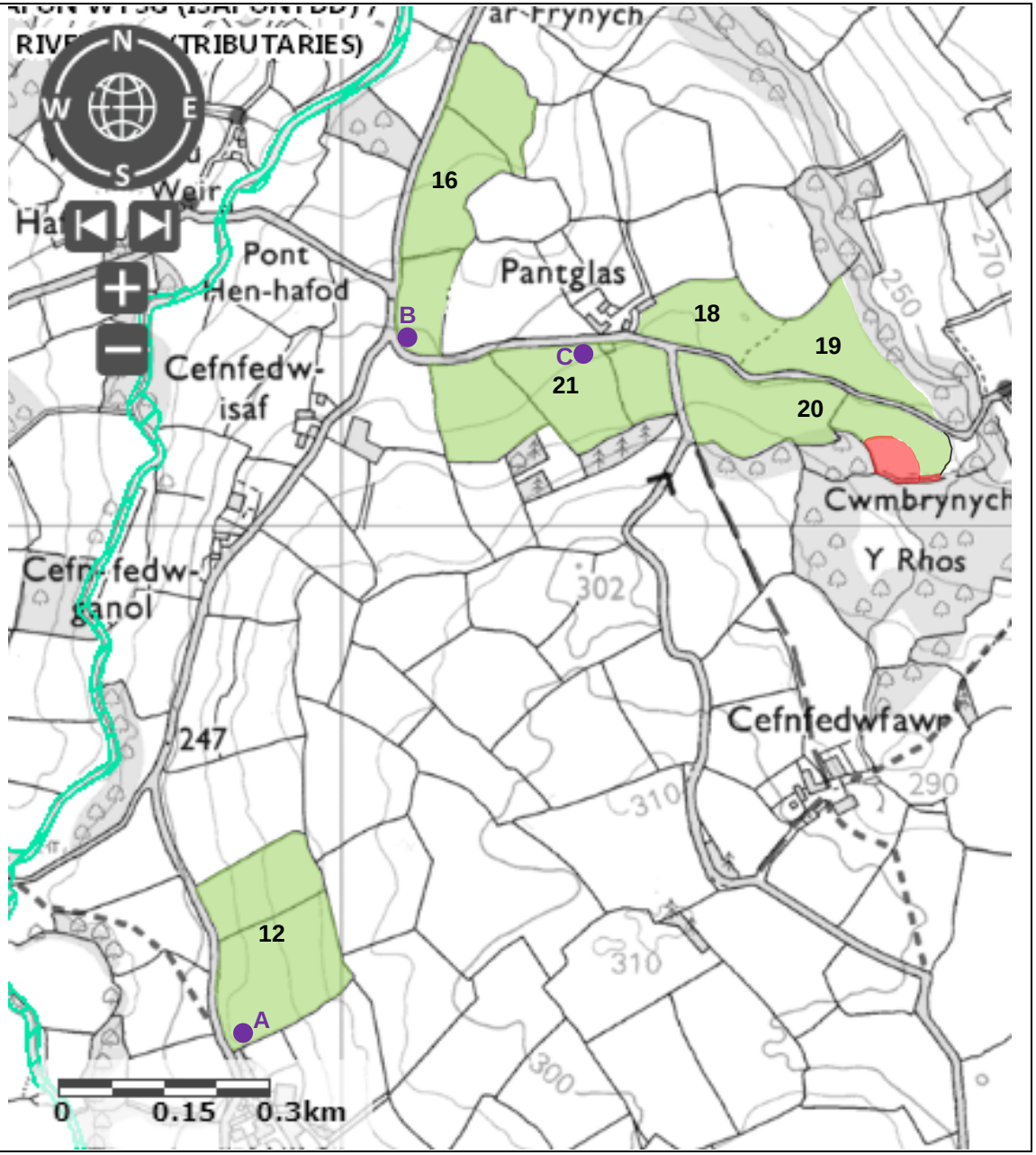
Client:
Dŵr Cymru / Welsh Water

Key:

- Spreading area
- Non-spreading area
- Location tags
- River Usk (Tributaries) SSSI and River Usk SAC

Location tags:
Field heaps for cake

A. SN 92857 24250
B. SN 93090 25274
C. SN 93356 25258



Location Plan

Crai Farms

Site:
Beili Gwern
Crai
Brecon
Powys
LD3 8YL

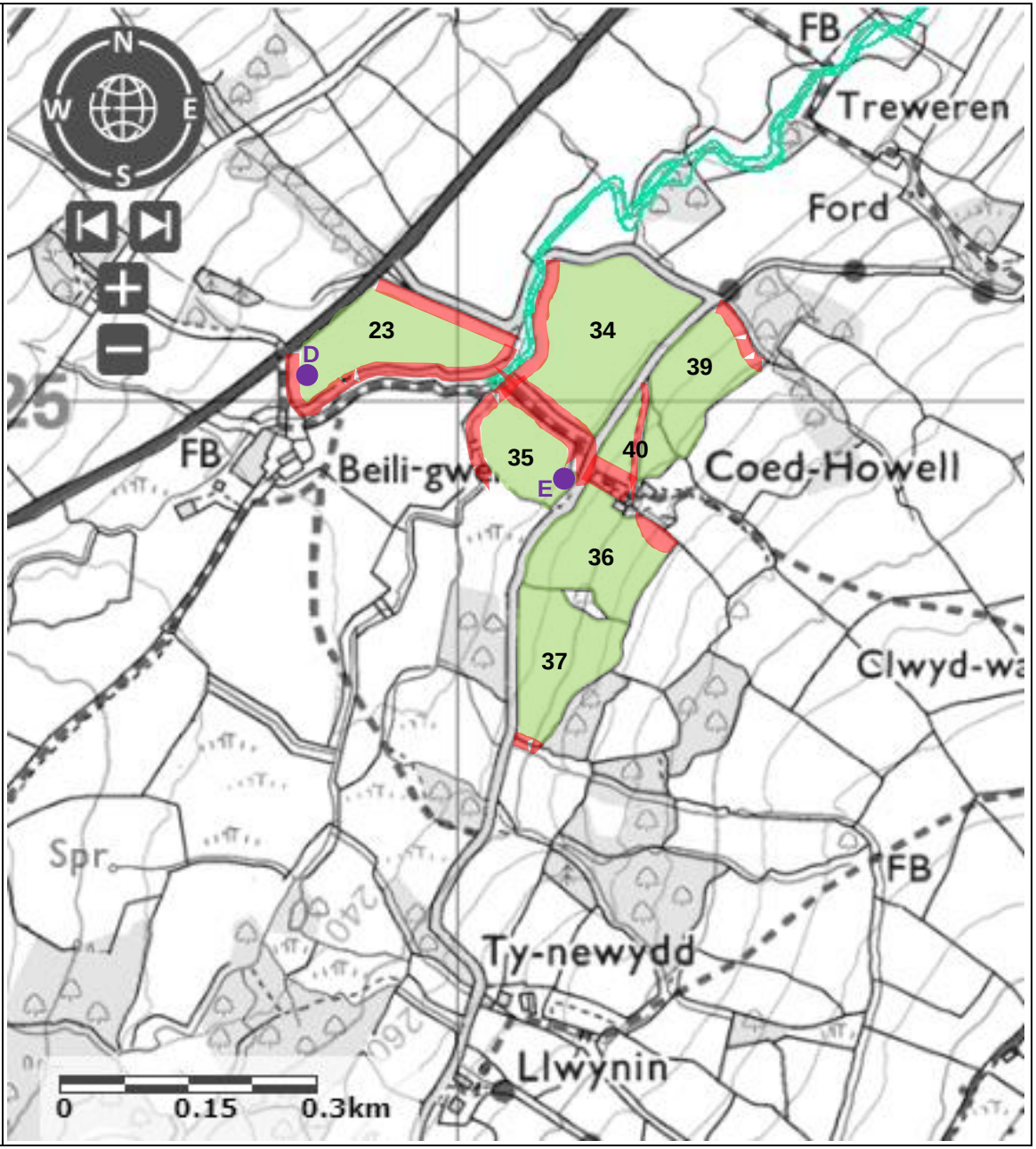
Client:
Dŵr Cymru / Welsh Water

Key:

- Spreading area
- Non-spreading area
- Location tags
- River Usk (Tributaries) SSSI and River Usk SAC

Location tags:
Field heaps for cake

D. SN 90809 25020
E. SN 91145 24933



Location Plan

Crai Farms

Site:
Glynllech Uchaf
Nantyffin Road
Penycae
Swansea
SA9 1FJ

Client:
Dŵr Cymru / Welsh Water

Key:

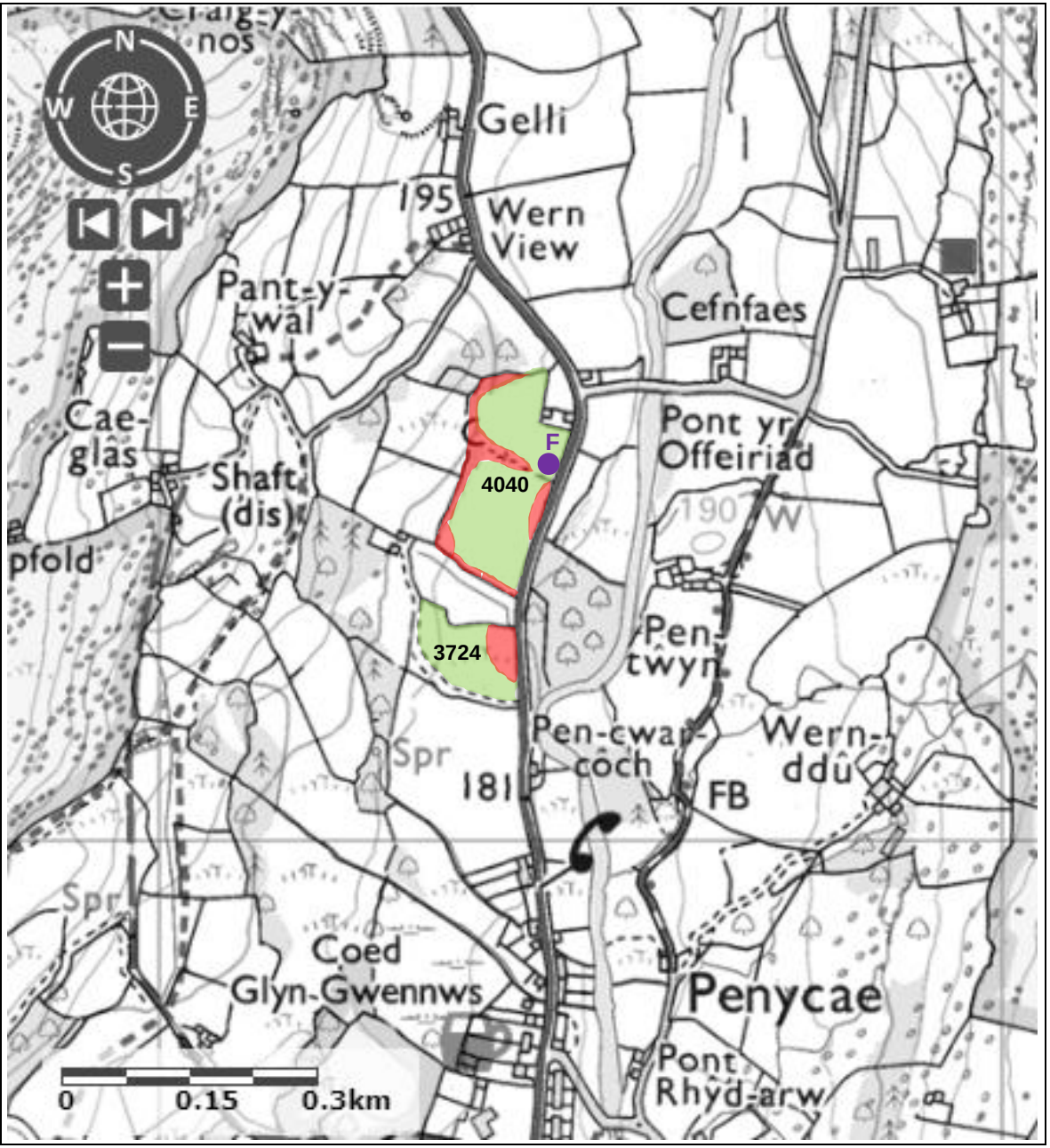
Spreading area

Non-spreading area

Location tags

Location tags:
Field heap for cake

F. SN 84471 14444



Location Plan

Crai Farms

Site:
Glynllech Uchaf
Nantyffin Road
Penycae
Swansea
SA9 1FJ

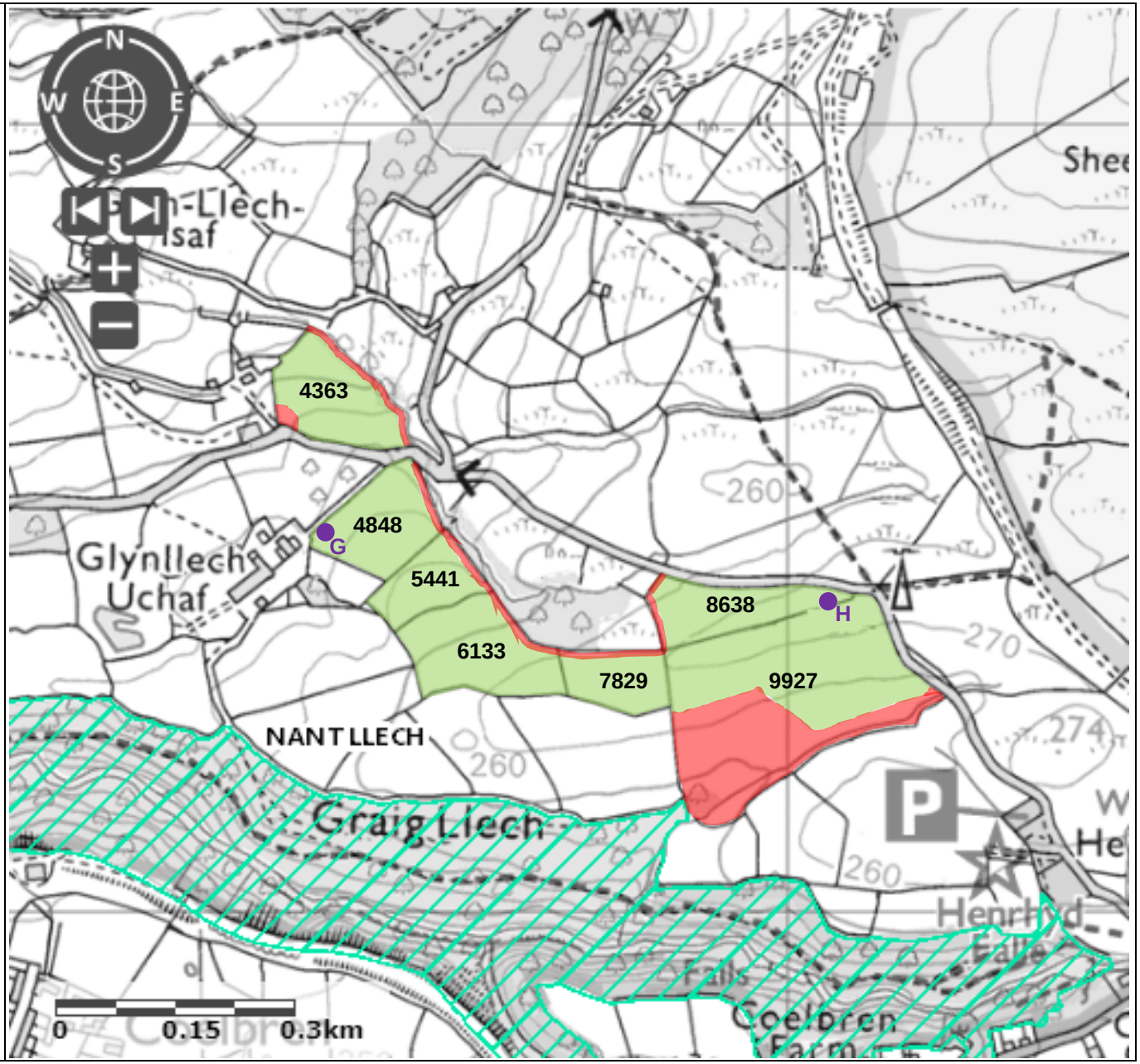
Client:
Dŵr Cymru / Welsh Water

Key:

- Spreading area
- Non-spreading area
- Location tags
- Nant Llech SSSI

Location tags:
Field heaps for cake

G. SN 84414 12482
H. SN 85040 12394



Agricultural Benefit Statement

For the application of beneficial wastes to fields at;

Bailea, Heol Senni, Brecon, Powys. LD3 8ST
Beili Gwern, Crai, Brecon, Powys. LD3 8YL
Glynllech Uchaf, Nantyffin Road, Penycae, Swansea. SA9 1FJ

07th March 2019

1 Person with appropriate technical expertise and permit details

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

- MSc Geoenvironmental Engineering
- BSc (Hons) Physical Geography
- GradMCIWM
- FACTS Qualified Advisor (No. FE/6321) and Full Member of BASIS Professional Register

Verified by; C Ash, FQA FE/6324

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:	Bailea, Heol Senni, Brecon, Powys. LD3 8ST Beili Gwern, Crai, Brecon, Powys. LD3 8YL Glynllech Uchaf, Nantyffin Road, Penycae, Swansea. SA9 1FJ	
Stockpile grid reference:	Refer to Table 4	
Area of the receiving land:	43.5 ha	
Quantity to be stored at any one time:	Stackable: 3,000t	Non-Stackable: 0t
Total maximum quantity to be spread:	10,875t	

Location map document reference:	CF Maps

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 Bolton Hill	Non-stackable alum liquid sludge
2	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Bontgoch	Non-stackable ferric liquid sludge
3	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Bryngwyn	Non-stackable ferric liquid sludge
4	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Cefn Dryscoed	Non-stackable alum liquid sludge
5	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Crai	Stackable ferric sludge cake
6	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Crai	Non-stackable ferric liquid sludge
7	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Hirwaun	Non-stackable ferric liquid sludge
8	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Portis	Non-stackable ferric liquid sludge
9	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Preseli	Non-stackable alum liquid sludge
10	19 09 02	Sludges from water clarification. Potable water treatment effluent.	DCWW Strata Florida	Non-stackable alum liquid sludge

4 Operational details

4.1 Cropping details

Table 3. Cropping details

Current crop including projected yield if known:	Refer to Tables 6-15
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 6-15
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). Targeted periods of spreading on grass fields include spring, after cutting of silage, and prior to grazing through summer and autumn. No more than 50t/ha will be spread on a field in any 3-week period in accordance with CoGAP, and no more than 250t/ha will be spread within any 12-month period.

4.2 Waste storage

Table 4. Waste storage

How is the waste to be stored? *e.g. mobile tank, field heap, spread on delivery*	Stackable wastes: field stockpiles Non-stackable wastes: no liquid storage
Where is the waste to be stored prior to spreading?	Field stockpiles: A. SN 92857 24250 B. SN 93090 25274 C. SN 93356 25258 D. SN 90809 25020 E. SN 91145 24933 F. SN 84471 14444 G. SN 84414 12482 H. SN 85040 12394
Why were these storage locations chosen?	The storage locations are accessible by delivering vehicle, near field entrances so the potential damage to fields by delivering vehicles is minimal, and liquid storage facilities are safe and secure on farm.

	The storage locations are not within 10m of any ditch, watercourse, or footpath, not within a SPZ1, and are at least 50m from any well spring or borehole. They are 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 cake will be spread using conventional rear discharge spreaders as this equipment is readily available to the farmer/contractor and the most appropriate for the material and application rates used. Liquid sludges will be surface spread by tractor and tanker using a splash plate.
How do you plan to incorporate the waste following application?	There is no requirement for further incorporation of wastes on grass fields due to low ammonia content and minimal odour.
With liquid wastes is there any mole draining or sub-soiling planned? *Are there land drains in the field?*	No No
Other relevant operational information:	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. Only fields with soil pH above 6 can receive alum-based sludge (DCWW Bolton Hill, DCWW Cefn Dryscoed, DCWW Preseli, and DCWW Strata Florida).

Table 6. DCWW Bolton Hill

Nutrient Requirements for Land at Crai Farms

Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	N			P_2O_5				K_2O				Mg			pH	Rate	Totals
					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		t/ha	tonnes
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	13	3	20	75	**35	2-	230	248	1.6	2	0	2.5	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.6		
18	1.6	1.6	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
19	1.9	1.9	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
20	3.4	3.1	Grass	Grass	M	235		3	20	75		1	285	248		2	0		5.9		
21	4.5	4.5	Grass	Grass	M	235	13	3	20	75	**35	0	350	248	1.6	2	0	2.5	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235		3	20	75		2-	230	248		3	0		5.7		
34	2.8	2.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
35	1.2	1.2	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
36	1.6	1.6	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
37	1.5	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
39	1.3	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
40	0.8	0.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235		0	135	75		1	285	248		2	0		5.5		
3724	0.9	0.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
9927	5.8	3.8	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
8638	1.3	1.2	Grass	Grass	M	235	13	2	75	75	**35	0	350	248	1.6	2	0	2.5	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
7829	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
4848	1.5	1.4	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
5441	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
4363	1.4	1.4	Grass	Grass	M	235		1	120	75		0	350	248		1	0		5.5		

Ha	**48.7**	**43.5**								**2550**

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 7. DCWW Bontgoch

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	13	3	20	75	**57	2-	230	248	0.6	2	0	0.9	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235	13	3	20	75	**57	1	285	248	0.6	3	0	0.9	5.6	250	**1050**
18	1.6	1.6	Grass	Grass	M	235	13	3	20	75	**57	1	285	248	0.6	3	0	0.9	5.8	250	**400**
19	1.9	1.9	Grass	Grass	M	235	13	3	20	75	**57	1	285	248	0.6	3	0	0.9	5.8	250	**475**
20	3.4	3.1	Grass	Grass	M	235	13	3	20	75	**57	1	285	248	0.6	2	0	0.9	5.9	250	**775**
21	4.5	4.5	Grass	Grass	M	235	13	3	20	75	**57	0	350	248	0.6	2	0	0.9	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235	13	3	20	75	**57	2-	230	248	0.6	3	0	0.9	5.7	250	**425**
34	2.8	2.7	Grass	Grass	M	235	13	2	75	75	**57	1	285	248	0.6	2	0	0.9	5.7	250	**675**
35	1.2	1.2	Grass	Grass	M	235	13	2	75	75	**57	1	285	248	0.6	2	0	0.9	5.7	250	**300**
36	1.6	1.6	Grass	Grass	M	235	13	2	75	75	**57	1	285	248	0.6	2	0	0.9	5.7	250	**400**
37	1.5	1.3	Grass	Grass	M	235	13	2	75	75	**57	1	285	248	0.6	2	0	0.9	5.7	250	**325**
39	1.3	1.3	Grass	Grass	M	235	13	2	75	75	**57	1	285	248	0.6	2	0	0.9	5.7	250	**325**
40	0.8	0.7	Grass	Grass	M	235	13	2	75	75	**57	1	285	248	0.6	2	0	0.9	5.7	250	**175**
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235	13	0	135	75	11	1	285	248	0.6	2	0	0.9	5.5	250	**300**
3724	0.9	0.7	Grass	Grass	M	235	13	1	120	75	11	0	350	248	0.6	2	0	0.9	5.4	250	**175**
9927	5.8	3.8	Grass	Grass	M	235	13	1	120	75	11	0	350	248	0.6	2	0	0.9	5.8	250	**950**
8638	1.3	1.2	Grass	Grass	M	235	13	2	75	75	**57	0	350	248	0.6	2	0	0.9	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235	13	1	120	75	11	0	350	248	0.6	2	0	0.9	5.4	250	**425**
7829	1.0	0.9	Grass	Grass	M	235	13	1	120	75	11	0	350	248	0.6	2	0	0.9	5.4	250	**225**
4848	1.5	1.4	Grass	Grass	M	235	13	1	120	75	11	0	350	248	0.6	2	0	0.9	5.8	250	**350**
5441	1.0	0.9	Grass	Grass	M	235	13	1	120	75	11	0	350	248	0.6	2	0	0.9	5.8	250	**225**
4363	1.4	1.4	Grass	Grass	M	235	13	1	120	75	11	0	350	248	0.6	1	0	0.9	5.5	250	**350**

Ha	48.7	43.5							10875

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

**Total P_2O_5 stated as soil P Index ≥2

Table 8. DCWW Bryngwyn

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**32	2-	230	248	0.5	2	0	3.5	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235	1.5	3	20	75	**32	1	285	248	0.5	3	0	3.5	5.6	250	**1050**
18	1.6	1.6	Grass	Grass	M	235	1.5	3	20	75	**32	1	285	248	0.5	3	0	3.5	5.8	250	**400**
19	1.9	1.9	Grass	Grass	M	235	1.5	3	20	75	**32	1	285	248	0.5	3	0	3.5	5.8	250	**475**
20	3.4	3.1	Grass	Grass	M	235	1.5	3	20	75	**32	1	285	248	0.5	2	0	3.5	5.9	250	**775**
21	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**32	0	350	248	0.5	2	0	3.5	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235	1.5	3	20	75	**32	2-	230	248	0.5	3	0	3.5	5.7	250	**425**
34	2.8	2.7	Grass	Grass	M	235	1.5	2	75	75	**32	1	285	248	0.5	2	0	3.5	5.7	250	**675**
35	1.2	1.2	Grass	Grass	M	235	1.5	2	75	75	**32	1	285	248	0.5	2	0	3.5	5.7	250	**300**
36	1.6	1.6	Grass	Grass	M	235	1.5	2	75	75	**32	1	285	248	0.5	2	0	3.5	5.7	250	**400**
37	1.5	1.3	Grass	Grass	M	235	1.5	2	75	75	**32	1	285	248	0.5	2	0	3.5	5.7	250	**325**
39	1.3	1.3	Grass	Grass	M	235	1.5	2	75	75	**32	1	285	248	0.5	2	0	3.5	5.7	250	**325**
40	0.8	0.7	Grass	Grass	M	235	1.5	2	75	75	**32	1	285	248	0.5	2	0	3.5	5.7	250	**175**
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235	1.5	0	135	75	6.5	1	285	248	0.5	2	0	3.5	5.5	250	**300**
3724	0.9	0.7	Grass	Grass	M	235	1.5	1	120	75	6.5	0	350	248	0.5	2	0	3.5	5.4	250	**175**
9927	5.8	3.8	Grass	Grass	M	235	1.5	1	120	75	6.5	0	350	248	0.5	2	0	3.5	5.8	250	**950**
8638	1.3	1.2	Grass	Grass	M	235	1.5	2	75	75	**32	0	350	248	0.5	2	0	3.5	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235	1.5	1	120	75	6.5	0	350	248	0.5	2	0	3.5	5.4	250	**425**
7829	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	6.5	0	350	248	0.5	2	0	3.5	5.4	250	**225**
4848	1.5	1.4	Grass	Grass	M	235	1.5	1	120	75	6.5	0	350	248	0.5	2	0	3.5	5.8	250	**350**
5441	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	6.5	0	350	248	0.5	2	0	3.5	5.8	250	**225**
4363	1.4	1.4	Grass	Grass	M	235	1.5	1	120	75	6.5	0	350	248	0.5	1	0	3.5	5.5	250	**350**

Ha	48.7	43.5							10875

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 9. DCWW Cefn Dryscoed

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	2.7	3	20	75	**23	2-	230	248	0.3	2	0	2.5	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.6		
18	1.6	1.6	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
19	1.9	1.9	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
20	3.4	3.1	Grass	Grass	M	235		3	20	75		1	285	248		2	0		5.9		
21	4.5	4.5	Grass	Grass	M	235	2.7	3	20	75	**23	0	350	248	0.3	2	0	2.5	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235		3	20	75		2-	230	248		3	0		5.7		
34	2.8	2.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
35	1.2	1.2	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
36	1.6	1.6	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
37	1.5	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
39	1.3	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
40	0.8	0.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235		0	135	75		1	285	248		2	0		5.5		
3724	0.9	0.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
9927	5.8	3.8	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
8638	1.3	1.2	Grass	Grass	M	235	2.7	2	75	75	**23	0	350	248	0.3	2	0	2.5	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
7829	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
4848	1.5	1.4	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
5441	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
4363	1.4	1.4	Grass	Grass	M	235		1	120	75		0	350	248		1	0				

Ha	**48.7**	**43.5**								**2550**

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 10. DCWW Crai cake

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	0.7	3	20	75	**31	2-	230	248	0.4	2	0	1.4	6.1	113	**509**
16	4.2	4.2	Grass	Grass	M	235	0.7	3	20	75	**31	1	285	248	0.4	3	0	1.4	5.6	113	**475**
18	1.6	1.6	Grass	Grass	M	235	0.7	3	20	75	**31	1	285	248	0.4	3	0	1.4	5.8	113	**181**
19	1.9	1.9	Grass	Grass	M	235	0.7	3	20	75	**31	1	285	248	0.4	3	0	1.4	5.8	113	**215**
20	3.4	3.1	Grass	Grass	M	235	0.7	3	20	75	**31	1	285	248	0.4	2	0	1.4	5.9	113	**350**
21	4.5	4.5	Grass	Grass	M	235	0.7	3	20	75	**31	0	350	248	0.4	2	0	1.4	6.3	113	**509**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235	0.7	3	20	75	**31	2-	230	248	0.4	3	0	1.4	5.7	113	**192**
34	2.8	2.7	Grass	Grass	M	235	0.7	2	75	75	**31	1	285	248	0.4	2	0	1.4	5.7	113	**305**
35	1.2	1.2	Grass	Grass	M	235	0.7	2	75	75	**31	1	285	248	0.4	2	0	1.4	5.7	113	**136**
36	1.6	1.6	Grass	Grass	M	235	0.7	2	75	75	**31	1	285	248	0.4	2	0	1.4	5.7	113	**181**
37	1.5	1.3	Grass	Grass	M	235	0.7	2	75	75	**31	1	285	248	0.4	2	0	1.4	5.7	113	**147**
39	1.3	1.3	Grass	Grass	M	235	0.7	2	75	75	**31	1	285	248	0.4	2	0	1.4	5.7	113	**147**
40	0.8	0.7	Grass	Grass	M	235	0.7	2	75	75	**31	1	285	248	0.4	2	0	1.4	5.7	113	**79**
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235	0.7	0	135	75	6.2	1	285	248	0.4	2	0	1.4	5.5	113	**136**
3724	0.9	0.7	Grass	Grass	M	235	0.7	1	120	75	6.2	0	350	248	0.4	2	0	1.4	5.4	113	**79**
9927	5.8	3.8	Grass	Grass	M	235	0.7	1	120	75	6.2	0	350	248	0.4	2	0	1.4	5.8	113	**429**
8638	1.3	1.2	Grass	Grass	M	235	0.7	2	75	75	**31	0	350	248	0.4	2	0	1.4	6.1	113	**136**
6133	1.8	1.7	Grass	Grass	M	235	0.7	1	120	75	6.2	0	350	248	0.4	2	0	1.4	5.4	113	**192**
7829	1.0	0.9	Grass	Grass	M	235	0.7	1	120	75	6.2	0	350	248	0.4	2	0	1.4	5.4	113	**102**
4848	1.5	1.4	Grass	Grass	M	235	0.7	1	120	75	6.2	0	350	248	0.4	2	0	1.4	5.8	113	**158**
5441	1.0	0.9	Grass	Grass	M	235	0.7	1	120	75	6.2	0	350	248	0.4	2	0	1.4	5.8	113	**102**
4363	1.4	1.4	Grass	Grass	M	235	0.7	1	120	75	6.2	0	350	248	0.4	1	0	1.4	5.5	113	**158**

Ha	**48.7**	**43.5**								**4916**

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 11. DCWW Crai liquid

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**0.7	2-	230	248	0.1	2	0	0.5	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	3	0	0.5	5.6	250	**1050**
18	1.6	1.6	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	3	0	0.5	5.8	250	**400**
19	1.9	1.9	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	3	0	0.5	5.8	250	**475**
20	3.4	3.1	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	2	0	0.5	5.9	250	**775**
21	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**0.7	0	350	248	0.1	2	0	0.5	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235	1.5	3	20	75	**0.7	2-	230	248	0.1	3	0	0.5	5.7	250	**425**
34	2.8	2.7	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.5	5.7	250	**675**
35	1.2	1.2	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.5	5.7	250	**300**
36	1.6	1.6	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.5	5.7	250	**400**
37	1.5	1.3	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.5	5.7	250	**325**
39	1.3	1.3	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.5	5.7	250	**325**
40	0.8	0.7	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.5	5.7	250	**175**
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235	1.5	0	135	75	0.1	1	285	248	0.1	2	0	0.5	5.5	250	**300**
3724	0.9	0.7	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.5	5.4	250	**175**
9927	5.8	3.8	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.5	5.8	250	**950**
8638	1.3	1.2	Grass	Grass	M	235	1.5	2	75	75	**0.7	0	350	248	0.1	2	0	0.5	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.5	5.4	250	**425**
7829	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.5	5.4	250	**225**
4848	1.5	1.4	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.5	5.8	250	**350**
5441	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.5	5.8	250	**225**
4363	1.4	1.4	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	1	0	0.5	5.5	250	**350**

Ha	48.7	43.5										10875

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 12. DCWW Hirwaun

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**0.7	2-	230	248	0.1	2	0	0.9	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	3	0	0.9	5.6	250	**1050**
18	1.6	1.6	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	3	0	0.9	5.8	250	**400**
19	1.9	1.9	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	3	0	0.9	5.8	250	**475**
20	3.4	3.1	Grass	Grass	M	235	1.5	3	20	75	**0.7	1	285	248	0.1	2	0	0.9	5.9	250	**775**
21	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**0.7	0	350	248	0.1	2	0	0.9	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235	1.5	3	20	75	**0.7	2-	230	248	0.1	3	0	0.9	5.7	250	**425**
34	2.8	2.7	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.9	5.7	250	**675**
35	1.2	1.2	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.9	5.7	250	**300**
36	1.6	1.6	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.9	5.7	250	**400**
37	1.5	1.3	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.9	5.7	250	**325**
39	1.3	1.3	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.9	5.7	250	**325**
40	0.8	0.7	Grass	Grass	M	235	1.5	2	75	75	**0.7	1	285	248	0.1	2	0	0.9	5.7	250	**175**
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235	1.5	0	135	75	0.1	1	285	248	0.1	2	0	0.9	5.5	250	**300**
3724	0.9	0.7	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.9	5.4	250	**175**
9927	5.8	3.8	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.9	5.8	250	**950**
8638	1.3	1.2	Grass	Grass	M	235	1.5	2	75	75	**0.7	0	350	248	0.1	2	0	0.9	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.9	5.4	250	**425**
7829	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.9	5.4	250	**225**
4848	1.5	1.4	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.9	5.8	250	**350**
5441	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	0.9	5.8	250	**225**
4363	1.4	1.4	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	1	0	0.9	5.5	250	**350**

Ha	**48.7**	**43.5**									**10875**

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 13. DCWW Portis

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**0.5	2-	230	248	0.1	2	0	1.0	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235	1.5	3	20	75	**0.5	1	285	248	0.1	3	0	1.0	5.6	250	**1050**
18	1.6	1.6	Grass	Grass	M	235	1.5	3	20	75	**0.5	1	285	248	0.1	3	0	1.0	5.8	250	**400**
19	1.9	1.9	Grass	Grass	M	235	1.5	3	20	75	**0.5	1	285	248	0.1	3	0	1.0	5.8	250	**475**
20	3.4	3.1	Grass	Grass	M	235	1.5	3	20	75	**0.5	1	285	248	0.1	2	0	1.0	5.9	250	**775**
21	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**0.5	0	350	248	0.1	2	0	1.0	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235	1.5	3	20	75	**0.5	2-	230	248	0.1	3	0	1.0	5.7	250	**425**
34	2.8	2.7	Grass	Grass	M	235	1.5	2	75	75	**0.5	1	285	248	0.1	2	0	1.0	5.7	250	**675**
35	1.2	1.2	Grass	Grass	M	235	1.5	2	75	75	**0.5	1	285	248	0.1	2	0	1.0	5.7	250	**300**
36	1.6	1.6	Grass	Grass	M	235	1.5	2	75	75	**0.5	1	285	248	0.1	2	0	1.0	5.7	250	**400**
37	1.5	1.3	Grass	Grass	M	235	1.5	2	75	75	**0.5	1	285	248	0.1	2	0	1.0	5.7	250	**325**
39	1.3	1.3	Grass	Grass	M	235	1.5	2	75	75	**0.5	1	285	248	0.1	2	0	1.0	5.7	250	**325**
40	0.8	0.7	Grass	Grass	M	235	1.5	2	75	75	**0.5	1	285	248	0.1	2	0	1.0	5.7	250	**175**
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235	1.5	0	135	75	0.1	1	285	248	0.1	2	0	1.0	5.5	250	**300**
3724	0.9	0.7	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	1.0	5.4	250	**175**
9927	5.8	3.8	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	1.0	5.8	250	**950**
8638	1.3	1.2	Grass	Grass	M	235	1.5	2	75	75	**0.5	0	350	248	0.1	2	0	1.0	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	1.0	5.4	250	**425**
7829	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	1.0	5.4	250	**225**
4848	1.5	1.4	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	1.0	5.8	250	**350**
5441	1.0	0.9	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	2	0	1.0	5.8	250	**225**
4363	1.4	1.4	Grass	Grass	M	235	1.5	1	120	75	0.1	0	350	248	0.1	1	0	1.0	5.5	250	**350**

Ha	48.7	43.5									10875

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 14. DCWW Preseli

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**55	2-	230	248	0.2	2	0	0.9	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.6		
18	1.6	1.6	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
19	1.9	1.9	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
20	3.4	3.1	Grass	Grass	M	235		3	20	75		1	285	248		2	0		5.9		
21	4.5	4.5	Grass	Grass	M	235	1.5	3	20	75	**55	0	350	248	0.2	2	0	0.9	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235		3	20	75		2-	230	248		3	0		5.7		
34	2.8	2.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
35	1.2	1.2	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
36	1.6	1.6	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
37	1.5	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
39	1.3	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
40	0.8	0.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235		0	135	75		1	285	248		2	0		5.5		
3724	0.9	0.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
9927	5.8	3.8	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
8638	1.3	1.2	Grass	Grass	M	235	1.5	2	75	75	**55	0	350	248	0.2	2	0	0.9	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
7829	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
4848	1.5	1.4	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
5441	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
4363	1.4	1.4	Grass	Grass	M	235		1	120	75		0	350	248		1	0		5.5		

Ha	**48.7**	**43.5**								**2550**

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

Table 15. DCWW Strata Florida

Nutrient Requirements for Land at Crai Farms

					N			P_2O_5				K_2O				Mg			pH		
Field Reference	Total Area	Sprd Area	Current Crop	Next Crop	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
Bailea																					
12	4.5	4.5	Grass	Grass	M	235	13	3	20	75	**54	2-	230	248	1.0	2	0	0.8	6.1	250	**1125**
16	4.2	4.2	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.6		
18	1.6	1.6	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
19	1.9	1.9	Grass	Grass	M	235		3	20	75		1	285	248		3	0		5.8		
20	3.4	3.1	Grass	Grass	M	235		3	20	75		1	285	248		2	0		5.9		
21	4.5	4.5	Grass	Grass	M	235	13	3	20	75	**54	0	350	248	1.0	2	0	0.8	6.3	250	**1125**
Beili Gwern																					
23	2.2	1.7	Grass	Grass	M	235		3	20	75		2-	230	248		3	0		5.7		
34	2.8	2.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
35	1.2	1.2	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
36	1.6	1.6	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
37	1.5	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
39	1.3	1.3	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
40	0.8	0.7	Grass	Grass	M	235		2	75	75		1	285	248		2	0		5.7		
Glynllech Uchaf																					
4040	2.5	1.2	Grass	Grass	M	235		0	135	75		1	285	248		2	0		5.5		
3724	0.9	0.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
9927	5.8	3.8	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
8638	1.3	1.2	Grass	Grass	M	235	13	2	75	75	**54	0	350	248	1.0	2	0	0.8	6.1	250	**300**
6133	1.8	1.7	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
7829	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.4		
4848	1.5	1.4	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
5441	1.0	0.9	Grass	Grass	M	235		1	120	75		0	350	248		2	0		5.8		
4363	1.4	1.4	Grass	Grass	M	235		1	120	75		0	350	248		1	0		5.5		

Ha	48.7	43.5							2550

Grass = 2 cut silage with aftermath grazing

Nitrogen requirements based on values for 2 cut of grass for silage with aftermath grazing (target DM yield 9-12 t/ha) (Defra, 2017)

Phosphate and potash requirements based on values for 2 cut of grass silage plus 1/2 of the grazing requirement for aftermath grazing (Defra, 2017)

Grass crop use based on 2 cut of silage totalling 38t/ha yield (9-12 t/ha target DM yield) where 1.7 kg/t P_2O_5 and 6.0 kg/t K_2O removed in offtake (Defra 2017)

An extra 10 kg/ha P_2O_5 and 20 kg/ha K_2O added to crop use to allow for offtake from grazing

*N, P_2O_5, K_2O and Mg stated are **available** concentrations in units of kg/ha

****Total** P_2O_5 stated as soil P Index ≥2

5 Compliance with NVZ regulations

Table 16. 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:

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></td></tr>
<tr><td>Previous applications:</td><td></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 6-15 above. General soil type(s) for the fields to be registered are;

Table 17. Soil type

Light sand soils	Soils which are sand, loamy sand or sandy loam to 40cm depth and are sand or loamy sand between 40 and 80 cm, or over sandstone rock.	☐
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**) shows the soils to have sufficient background concentrations of Mg (i.e. ADAS Index 1-3). It is therefore unlikely that the crop will require any additional input of Mg over the course of the cropping cycle.

6.2 Waste characterisation

Full characterisations of individual wastes with total and available nutrients at the recommended rates for each waste stream are supplied in **Waste Analysis**. This information is further summarised against the nutrient requirements for proposed crops in Tables 6-15 above.

The limiting factors for the different wastes are as follows;

- All liquid sludges: max rate of 250t/ha
- Crai cake: arsenic

6.3 Summary of benefits

These wastes are a source of essential elements N, P, K, macronutrients Mg, Ca, S and provide trace amounts of micronutrients. Wastes are beneficially used to replace a proportion of the bagged mineral fertiliser used by farmers. The recommended application rates shown in Tables 6-15 are based on the crop requirement and soil analysis.

Clean water treatment sludges contain significant amounts of organic matter, for example, the dry solids in Cefn Dryscoed sludge consist of >53% organic matter. Additions of organic matter to soil will improve soil structural stability, biological activity, water and nutrient holding capacity, i.e. resistance to drought, and reduction of localised flooding, reduced leaching of nutrients, and improved workability in soil. Organic matter is a particularly good source of N and S and organic acids that aid nutrient solubility and uptake, as well as enhancing microbial activity for enhanced nutrient cycling in soils.

6.4 Additional requirements

Fields require additional N, P, and K to achieve optimum yield.

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

7.1 Potentially Toxic Elements (PTEs)

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

7.2 Other waste characteristics

The pH levels in the wastes range from 5.4 to 6.6.

It is unlikely that soil pH will decrease following the application detailed here due to the extensive buffering capacity of the receiving soils. The pH levels of the receiving soils are ≥ 5.4 therefore it is unlikely that availability of any naturally occurring heavy metals present in these soils will become more available after application of these wastes.

7.3 Operational factors

1. Solid wastes will be spread using conventional rear discharge spreaders.
2. Liquid wastes will be surface spread, applied using a splash plate.
3. Potential compaction of receiving soil will be mitigated by suitable adjustment of tyres/tyre pressure to match soil conditions, direction of spreading and load to be spread.
4. Wastes will be applied when ground and weather conditions are suitable, following CoGAP to avoid soil damage including wheel ruts, compaction, structural damage, erosion and run-off.

8 Sensitive human and environmental receptors

Please refer to site specific risk assessment (**CF SSRA**). Locations of sensitive receptors are shown in **CF Maps**. Prevailing winds are south-westerly.

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

Mitigation measures to safeguard site-specific high and moderate likelihood of emission detection by sensitive receptors are shown in **CF SSRA**. Generic measures (in addition to permit requirements and following the EMS) to reduce potential negative impacts of the proposed spreading operation will be as follows;

1. Spreading will only be undertaken when weather conditions are suitable within restrictions outlined in CoGAP and any relevant closed periods.

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

RICHARD EVANS
4 RECYCLING LTD
CONTROL HOUSE
A1 BUSINESS PARK
KNOTTINGLEY ROAD
KNOTTINGLEY WF11 0BU

V724

Please quote above code for all enquiries

BOLTON HILL WTW
BOLTON HILL
TIERS CROSS
HAVERFORDWEST

SLUDGE

SLUDGE

Sample Reference :

LIQUID SLUDGE

Sample Matrix : SLUDGE

Laboratory References	
Report Number	43225
Sample Number	79037

Date Received	12-FEB-2019
Date Reported	19-FEB-2019

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Oven Dry Solids	1.98	%
Conductivity 1:6	67.0	uS/cm
Total Nitrogen	<0.04	% w/w
Ammonium Nitrogen	<50	mg/kg
Total Phosphorus (P)	61.2	mg/kg
Total Potassium (K)	26.8	mg/kg
Total Magnesium (Mg)	31.8	mg/kg
Total Copper (Cu)	0.98	mg/kg
Total Zinc (Zn)	2.34	mg/kg
Total Sulphur (S)	144	mg/kg

Released by ..... *Darren Whitbread* ..... Date ..... *19/02/19* .....

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

RICHARD EVANS
4 RECYCLING LTD
CONTROL HOUSE
A1 BUSINESS PARK
KNOTTINGLEY ROAD
KNOTTINGLEY WF11 0BU

V724

Please quote above code for all enquiries

BOLTON HILL WTW
BOLTON HILL
TIERS CROSS
HAVERFORDWEST

SLUDGE

SLUDGE

Sample Reference :

LIQUID SLUDGE

Sample Matrix : SLUDGE

Laboratory References	
Report Number	43225
Sample Number	79037

Date Received	12-FEB-2019
Date Reported	19-FEB-2019

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Total Calcium (Ca)	59.7	mg/kg
Total Iron (Fe)	434	mg/kg
Total Lead (Pb)	<0.5	mg/kg
Total Cadmium (Cd)	<0.01	mg/kg
Total Mercury (Hg)	<0.05	mg/kg
Total Nickel (Ni)	0.55	mg/kg
Total Chromium (Cr)	0.51	mg/kg
Total Sodium (Na)	12.5	mg/kg
pH 1:6 [Fresh]	5.38	
Organic Matter LOI	0.70	% w/w

Released by ..... *Darren Whitbread* ..... Date ..... *19/02/19* .....

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

RICHARD EVANS
4 RECYCLING LTD
CONTROL HOUSE
A1 BUSINESS PARK
KNOTTINGLEY ROAD
KNOTTINGLEY WF11 0BU

V724

Please quote above code for all enquiries

BOLTON HILL WTW
BOLTON HILL
TIERS CROSS
HAVERFORDWEST

SLUDGE

SLUDGE

Sample Reference :

LIQUID SLUDGE

Sample Matrix : SLUDGE

Laboratory References	
Report Number	43225
Sample Number	79037

Date Received	12-FEB-2019
Date Reported	19-FEB-2019

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Lime Equivalent as CaCO3	<2	% w/w
Total Aluminium	2770	mg/kg
Total Arsenic (As)	<0.5	mg/kg
Neutralising Value as CaO [TNV]	<1	% w/w

Released by ..... *Darren Whitbread* ..... Date ..... *19/02/19* .....

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

DŴR CYMRU - WELSH WATER

Bolton Hill liquid

Analysis of Water Treatment Works Sludge

Date: 19/02/19

Application rate (t/ha)	**250**	Lab report no. 43225
Application rate (t/acre)	**100**	Lab sample no. 79037
pH	**5.4**	
Dry solids (%)	**1.98**	
Organic matter content (%)	**0.7**	

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.04	%	0.40	100.0	0.05	12.5
Ammonium-N	50	mg/kg	0.05	12.5		
Phosphorus (P)	61.2	mg/kg	0.06			
Phosphate (P_2O_5)			0.14	34.9	0.03	7.0
Potassium (K)	26.8	mg/kg	0.03			
Potash (K_2O)			0.03	8.0	0.01	1.6
Magnesium (Mg)	31.8	mg/kg	0.03			
Magnesium (MgO)			0.05	12.7	0.01	2.5
Sulphur (S)	144	mg/kg	0.14			
Sulphur (SO_3)			0.36	90.0	0.04	9.0

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(g/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	2.34	mg/kg	2.3	0.59	15.00
Copper	0.98	mg/kg	1.0	0.25	7.50
Nickel	0.6	mg/kg	0.6	0.14	3.00
Lead	0.5	mg/kg	0.5	0.13	15.00
Cadmium	0.01	mg/kg	0.0	0.00	0.15
Chromium	0.51	mg/kg	0.5	0.13	15.00
Mercury	0.05	mg/kg	0.1	0.01	0.10
Arsenic	0.50	mg/kg	0.5	0.13	0.70
Other Elements					
Aluminium	2770	mg/kg	2770	693	
Iron	434	mg/kg	434	109	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

ADAM STONE
4R GROUP
12C NEWENT BUS PARK
GLOUCESTER STREET
NEWENT
GLOUCESTERSHIRE GL18 1DZ

V293

Please quote above code for all enquiries

BONTGOCH WTW
ELERCH
CEREDIGION
SY24 5DP

LIQUID SLUDGE

SLUDGE

Sample Reference :

BONTGOCH LIQUID

Sample Matrix : SLUDGE

Laboratory References	
Report Number	91467
Sample Number	64584

Date Received	15-FEB-2018
Date Reported	20-MAR-2018

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Oven Dry Solids	1.34	%
Conductivity 1:6	53.2	uS/cm
Total Nitrogen	<0.04	% w/w
Ammonium Nitrogen	<50	mg/kg
Total Phosphorus (P)	99.3	mg/kg
Total Potassium (K)	<10	mg/kg
Total Magnesium (Mg)	11.6	mg/kg
Total Copper (Cu)	0.34	mg/kg
Total Zinc (Zn)	4.40	mg/kg
Total Sulphur (S)	60.3	mg/kg

Released by ..... *Darren Whitbread* ..... Date ..... *20/03/18* .....

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

ADAM STONE
4R GROUP
12C NEWENT BUS PARK
GLOUCESTER STREET
NEWENT
GLOUCESTERSHIRE GL18 1DZ

V293

Please quote above code for all enquiries

BONTGOCH WTW
ELERCH
CEREDIGION
SY24 5DP

LIQUID SLUDGE

SLUDGE

Sample Reference :

BONTGOCH LIQUID

Sample Matrix : SLUDGE

Laboratory References	
Report Number	91467
Sample Number	64584

Date Received	15-FEB-2018
Date Reported	20-MAR-2018

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Total Calcium (Ca)	145	mg/kg
Total Iron (Fe)	5670	mg/kg
Total Molybdenum (Mo)	<0.05	mg/kg
Total Lead (Pb)	<0.5	mg/kg
Total Cadmium (Cd)	0.02	mg/kg
Total Mercury (Hg)	<0.05	mg/kg
Total Nickel (Ni)	0.50	mg/kg
Total Chromium (Cr)	0.53	mg/kg
Total Sodium (Na)	<10	mg/kg
pH 1:6 [Fresh]	5.80	

Released by ..... *Darren Whitbread* ..... Date ..... *20/03/18* .....

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

ADAM STONE
4R GROUP
12C NEWENT BUS PARK
GLOUCESTER STREET
NEWENT
GLOUCESTERSHIRE GL18 1DZ

V293

Please quote above code for all enquiries

BONTGOCH WTW
ELERCH
CEREDIGION
SY24 5DP

LIQUID SLUDGE

SLUDGE

Sample Reference :

BONTGOCH LIQUID

Sample Matrix : SLUDGE

Laboratory References	
Report Number	91467
Sample Number	64584

Date Received	15-FEB-2018
Date Reported	20-MAR-2018

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Organic Matter LOI	0.47	% w/w
Lime Equivalent as CaCO3	<2	% w/w
Total Aluminium	74.0	mg/kg
Fluoride [100:1 H2S04 Soluble]	<10	mg/kg
Total Arsenic (As)	<0.5	mg/kg
Total Selenium (Se)	0.03	mg/kg
Neutralising Value as CaO [TNV]	<1	% w/w

Released by *Darren Whitbread* Date *20/03/18*

DŴR CYMRU - WELSH WATER

Bontgoch liquid

Analysis of Water Treatment Works Sludge

Date: 20/03/18

Application rate (t/ha)	**250**	Lab report no. 91467
Application rate (t/acre)	**100**	Lab sample no. 64584
pH	**5.8**	
Dry solids (%)	**1.34**	
Organic matter content (%)	**0.5**	

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.04	%	0.40	100.0	0.05	12.5
Ammonium-N	50	mg/kg	0.05	12.5		
Phosphorus (P)	99.3	mg/kg	0.10			
Phosphate (P_2O_5)			0.23	56.6	0.05	11.3
Potassium (K)	10	mg/kg	0.01			
Potash (K_2O)			0.01	3.0	0.00	0.6
Magnesium (Mg)	11.6	mg/kg	0.01			
Magnesium (MgO)			0.02	4.6	0.00	0.9
Sulphur (S)	60.3	mg/kg	0.06			
Sulphur (SO_3)			0.15	37.7	0.02	3.8

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(g/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	4.4	mg/kg	4.4	1.10	15.00
Copper	0.34	mg/kg	0.3	0.09	7.50
Nickel	0.5	mg/kg	0.5	0.13	3.00
Lead	0.5	mg/kg	0.5	0.13	15.00
Cadmium	0.02	mg/kg	0.0	0.01	0.15
Chromium	0.53	mg/kg	0.5	0.13	15.00
Mercury	0.05	mg/kg	0.1	0.01	0.10
Arsenic	0.50	mg/kg	0.5	0.13	0.70
Other Elements					
Aluminium	74	mg/kg	74	19	
Iron	5670	mg/kg	5670	1418	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

Dŵr Cymru
Welsh Water

Sample Analysis Report

Sampling Point No -	79131	**Location -**	BRYNGWYN WTW SLUDGE TANKERING
Date Sampled -	01-Feb-19	**Time Taken -**	11:21
Originator -	SEWAGE	**Purpose -**	EQO/DIRECTIVE COMPLIANCE
Laboratory -	GLASLYN	**Lab Ref No -**	S 6260932
Sampler -	EXTA	**No Results -**	20
Type -			

Sample Results

Code	Determinand Name	Units		Result	Limit
238	Magnesium	MG/KG		963	
288	ALUMINIUM (DRY WT)	MG/KG		4320	
357	ARSENIC (DRY WT)	MG/KG		30.9	
4620	pH	PH UNITS		5.7	
7774	WTW MERCURY TOTAL	MG/KG	LT	0.47	
8241	LOSS ON IGNITION	%		35.1	
9233	Ammoniacal nitrogen	MG/KG	LT	139	
9234	Sulphur	MG/KG		5250	
9271	Cadmium	MG/KG		1.21	
9272	CHROMIUM TOTAL	MG/KG		15.2	
9273	Copper	MG/KG	LT	7.8	
9275	Nickel	MG/KG		81.1	
9276	LEAD TOTAL	MG/KG		32.9	
9277	ZINC TOTAL	MG/KG		713	
9278	IRON TOTAL	MG/KG		590000	
9281	% Dry solids	%		4.39	
9282	% Minerals	%		64.9	
9283	% K (dry weight)	%		0.019	
9284	% P (dry weight)	%		0.13	
9285	% N (dry weight)	%		0.88	

DŴR CYMRU - WELSH WATER

Bryngwyn

Analysis of Water Treatment Works Sludge

Date: 01/02/19

Application rate (t/ha)	**250**
Application rate (t/acre)	**100**
pH	**5.7**
Dry solids (%)	**4.4**
Organic matter content (%)	**35.1**

Lab ref no. S 6260932

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.88	%	0.38	95.9	0.006	1.5
Ammonium-N	139	mg/kg	0.01	1.5		
Phosphorus (P)	1300	mg/kg	0.06			
Phosphate (P_2O_5)			0.13	32.4	0.026	6.5
Potassium (K)	190	mg/kg	0.01			
Potash (K_2O)			0.01	2.5	0.002	0.5
Magnesium (Mg)	963	mg/kg	0.04			
Magnesium (MgO)			0.07	17.4	0.014	3.5
Sulphur (S)	5250	mg/kg	0.23			
Sulphur (SO_3)			0.57	143.1	0.057	14.3

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	713.00	mg/kg	0.03	7.77	15.00
Copper	7.80	mg/kg	0.00	0.09	7.50
Nickel	81.10	mg/kg	0.00	0.88	3.00
Lead	32.90	mg/kg	0.00	0.36	15.00
Cadmium	1.21	mg/kg	0.00	0.01	0.15
Chromium	15.20	mg/kg	0.00	0.17	15.00
Arsenic	30.90	mg/kg	0.00	0.34	0.70
Mercury	0.47	mg/kg	0.00	0.01	0.10
Other Elements					
Aluminium	4320	mg/kg	0.19	47	
Iron	590000	mg/kg	25.72	6431	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

Dŵr Cymru
Welsh Water

Sample Analysis Report

Sampling Point No -	79186	**Location -**	CEFN DRYSCOED WTW SLUDGE TANKE
Date Sampled -	01-Feb-19	**Time Taken -**	11:29
Originator -	SEWAGE	**Purpose -**	EQO/DIRECTIVE COMPLIANCE
Laboratory -	GLASLYN	**Lab Ref No -**	S 6260959
Sampler -	EXTA	**No Results -**	20
Type -			

Sample Results

Code	Determinand Name	Units		Result	Limit
238	Magnesium	MG/KG		828	
288	ALUMINIUM (DRY WT)	MG/KG		196000	
357	ARSENIC (DRY WT)	MG/KG	LT	8.2	
4620	pH	PH UNITS		6.6	
7774	WTW MERCURY TOTAL	MG/KG	LT	0.55	
8241	LOSS ON IGNITION	%		53.5	
9233	Ammoniacal nitrogen	MG/KG		292	
9234	Sulphur	MG/KG		13200	
9271	Cadmium	MG/KG		0.49	
9272	CHROMIUM TOTAL	MG/KG		5.3	
9273	Copper	MG/KG		38.7	
9275	Nickel	MG/KG		33.8	
9276	LEAD TOTAL	MG/KG	LT	6.2	
9277	ZINC TOTAL	MG/KG		209	
9278	IRON TOTAL	MG/KG		3700	
9281	% Dry solids	%		3.69	
9282	% Minerals	%		46.5	
9283	% K (dry weight)	%		0.012	
9284	% P (dry weight)	%		0.11	
9285	% N (dry weight)	%		1.05	

DŴR CYMRU - WELSH WATER

Cefn Dryscoed

Analysis of Water Treatment Works Sludge

Date: 01/02/19

Application rate (t/ha)	**250**
Application rate (t/acre)	**100**
pH	**6.6**
Dry solids (%)	**3.7**
Organic matter content (%)	**53.5**

Lab ref no. S 6260959

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	1.05	%	0.39	96.9	0.011	2.7
Ammonium-N	292	mg/kg	0.01	2.7		
Phosphorus (P)	1100	mg/kg	0.04			
Phosphate (P_2O_5)			0.09	23.2	0.019	4.6
Potassium (K)	120	mg/kg	0.00			
Potash (K_2O)			0.01	1.3	0.001	0.3
Magnesium (Mg)	828	mg/kg	0.03			
Magnesium (MgO)			0.05	12.7	0.010	2.5
Sulphur (S)	13200	mg/kg	0.49			
Sulphur (SO_3)			1.22	304.4	0.122	30.4

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	209.00	mg/kg	0.01	1.93	15.00
Copper	38.70	mg/kg	0.00	0.36	7.50
Nickel	33.80	mg/kg	0.00	0.31	3.00
Lead	6.20	mg/kg	0.00	0.06	15.00
Cadmium	0.49	mg/kg	0.00	0.00	0.15
Chromium	5.30	mg/kg	0.00	0.05	15.00
Arsenic	8.20	mg/kg	0.00	0.08	0.70
Mercury	0.55	mg/kg	0.00	0.01	0.10
Other Elements					
Aluminium	196000	mg/kg	7.23	1808	
Iron	3700	mg/kg	0.14	34	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

Dŵr Cymru
Welsh Water

Sample Analysis Report

Sampling Point No -	79114	**Location -**	CRAY WTW SLUDGE TANKERING POINT
Date Sampled -	01-Feb-19	**Time Taken -**	11:37
Originator -	SEWAGE	**Purpose -**	EQO/DIRECTIVE COMPLIANCE
Laboratory -	GLASLYN	**Lab Ref No -**	S 6261010
Sampler -	EXTA	**No Results -**	20
Type -			

Sample Results

Code	Determinand Name	Units		Result	Limit
238	Magnesium	MG/KG		249	
288	ALUMINIUM (DRY WT)	MG/KG		2550	
357	ARSENIC (DRY WT)	MG/KG		40.1	
4620	pH	PH UNITS		5.7	
7774	WTW MERCURY TOTAL	MG/KG	LT	0.33	
8241	LOSS ON IGNITION	%		38.5	
9233	Ammoniacal nitrogen	MG/KG	LT	39.7	
9234	Sulphur	MG/KG		6920	
9271	Cadmium	MG/KG		0.62	
9272	CHROMIUM TOTAL	MG/KG		13.3	
9273	Copper	MG/KG	LT	7.8	
9275	Nickel	MG/KG		12.4	
9276	LEAD TOTAL	MG/KG		19.2	
9277	ZINC TOTAL	MG/KG		147	
9278	IRON TOTAL	MG/KG		473000	
9281	% Dry solids	%		15.4	
9282	% Minerals	%		61.5	
9283	% K (dry weight)	%	LT	0.0087	
9284	% P (dry weight)	%		0.078	
9285	% N (dry weight)	%		0.79	

DŴR CYMRU - WELSH WATER

Crai cake

Analysis of Water Treatment Works Sludge

Date: 01/02/19

Application rate (t/ha)	**113**
Application rate (t/acre)	**45**
pH	**5.7**
Dry solids (%)	**15.4**
Organic matter content (%)	**38.5**

Lab ref no. S 6261010

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.79	%	1.22	137.5	0.006	0.7
Ammonium-N	39.7	mg/kg	0.01	0.7		
Phosphorus (P)	780	mg/kg	0.12			
Phosphate (P_2O_5)			0.28	31.1	0.055	6.2
Potassium (K)	87	mg/kg	0.01			
Potash (K_2O)			0.02	1.8	0.003	0.4
Magnesium (Mg)	249	mg/kg	0.04			
Magnesium (MgO)			0.06	7.2	0.013	1.4
Sulphur (S)	6920	mg/kg	1.07			
Sulphur (SO_3)			2.66	301.1	0.266	30.1

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	147.00	mg/kg	0.02	2.56	15.00
Copper	7.80	mg/kg	0.00	0.14	7.50
Nickel	12.40	mg/kg	0.00	0.22	3.00
Lead	19.20	mg/kg	0.00	0.33	15.00
Cadmium	0.62	mg/kg	0.00	0.01	0.15
Chromium	13.30	mg/kg	0.00	0.23	15.00
Arsenic	40.10	mg/kg	0.01	0.70	0.70
Mercury	0.33	mg/kg	0.00	0.01	0.10
Other Elements					
Aluminium	2550	mg/kg	0.39	44	
Iron	473000	mg/kg	72.84	8231	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

Dŵr Cymru
Welsh Water

Sample Analysis Report

Sampling Point No -	79114	**Location -**	CRAY WTW SLUDGE TANKERING POINT
Date Sampled -	14-May-18	**Time Taken -**	14:00
Originator -	SEWAGE	**Purpose -**	EQO/DIRECTIVE COMPLIANCE
Laboratory -	GLASLYN	**Lab Ref No -**	S 4179277
Sampler -	ETI3	**No Results -**	22
Type -	7HR COMPOSITE		

Sample Results

Code	Determinand Name	Units		Result	Limit
212	POTASSIUM (DRY WT)	MG/KG	LT	87	
238	Magnesium	MG/KG		282	
288	ALUMINIUM (DRY WT)	MG/KG		2400	
357	ARSENIC (DRY WT)	MG/KG		38.6	
4620	pH	PH UNITS		6.3	
7774	WTW MERCURY TOTAL	MG/KG	LT	0.98	
8241	LOSS ON IGNITION	%		36.5	
8939	TOT NIT AS N (SLDG)	MG/KG			
8941	TOT PHOS AS P (SLDG)	MG/KG			
9233	Ammoniacal nitrogen	MG/KG	LT	297	
9234	Sulphur	MG/KG		2320	
9271	Cadmium	MG/KG	LT	0.21	
9272	CHROMIUM TOTAL	MG/KG	LT	4.3	
9273	Copper	MG/KG	LT	7.8	
9275	Nickel	MG/KG	LT	5.1	
9276	LEAD TOTAL	MG/KG	LT	24.4	
9277	ZINC TOTAL	MG/KG		82.2	
9278	IRON TOTAL	MG/KG		405000	
9281	% Dry solids	%		2.06	
9282	% Minerals	%		63.5	
9284	% P (dry weight)	%	LT	0.00584	
9285	% N (dry weight)	%		0.69	

DŴR CYMRU - WELSH WATER

Crai liquid

Analysis of Water Treatment Works Sludge

Date: 14/05/18

Application rate (t/ha)	**250**	Lab ref no. S 4179277
Application rate (t/acre)	**100**	
pH	**6.3**	
Dry solids (%)	**2.1**	
Organic matter content (%)	**36.5**	

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.69	%	0.14	35.5	0.006	1.5
Ammonium-N	297	mg/kg	0.01	1.5		
Phosphorus (P)	58.4	mg/kg	0.00			
Phosphate (P_2O_5)			0.00	0.7	0.001	0.1
Potassium (K)	87	mg/kg	0.00			
Potash (K_2O)			0.00	0.5	0.000	0.1
Magnesium (Mg)	282	mg/kg	0.01			
Magnesium (MgO)			0.01	2.4	0.002	0.5
Sulphur (S)	2320	mg/kg	0.05			
Sulphur (SO_3)			0.12	29.9	0.012	3.0

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	82.20	mg/kg	0.00	0.42	15.00
Copper	7.80	mg/kg	0.00	0.04	7.50
Nickel	5.10	mg/kg	0.00	0.03	3.00
Lead	24.40	mg/kg	0.00	0.13	15.00
Cadmium	0.21	mg/kg	0.00	0.00	0.15
Chromium	4.30	mg/kg	0.00	0.02	15.00
Arsenic	38.60	mg/kg	0.00	0.20	0.70
Mercury	0.98	mg/kg	0.00	0.01	0.10
Other Elements					
Aluminium	2400	mg/kg	0.05	12	
Iron	405000	mg/kg	8.34	2086	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

Dŵr Cymru
Welsh Water

Sample Analysis Report

Sampling Point No -	303551	**Location -**	HIRWAUN WTW SLUDGE TANKERING PO
Date Sampled -	14-May-18	**Time Taken -**	11:15
Originator -	SEWAGE	**Purpose -**	EQO/DIRECTIVE COMPLIANCE
Laboratory -	GLASLYN	**Lab Ref No -**	S 4179276
Sampler -	ETI3	**No Results -**	22
Type -	7HR COMPOSITE		

Sample Results

Code	Determinand Name	Units		Result	Limit
212	POTASSIUM (DRY WT)	MG/KG	LT	87	
238	Magnesium	MG/KG		476	
288	ALUMINIUM (DRY WT)	MG/KG		2560	
357	ARSENIC (DRY WT)	MG/KG		38.8	
4620	pH	PH UNITS		6.3	
7774	WTW MERCURY TOTAL	MG/KG	LT	0.91	
8241	LOSS ON IGNITION	%		37	
8939	TOT NIT AS N (SLDG)	MG/KG			
8941	TOT PHOS AS P (SLDG)	MG/KG			
9233	Ammoniacal nitrogen	MG/KG	LT	274	
9234	Sulphur	MG/KG		2310	
9271	Cadmium	MG/KG	LT	0.11	
9272	CHROMIUM TOTAL	MG/KG	LT	4.3	
9273	Copper	MG/KG	LT	7.8	
9275	Nickel	MG/KG	LT	5.1	
9276	LEAD TOTAL	MG/KG	LT	22.6	
9277	ZINC TOTAL	MG/KG		83.3	
9278	IRON TOTAL	MG/KG		425000	
9281	% Dry solids	%		2.22	
9282	% Minerals	%		63	
9284	% P (dry weight)	%	LT	0.00584	
9285	% N (dry weight)	%		0.77	

DŴR CYMRU - WELSH WATER

Hirwaun

Analysis of Water Treatment Works Sludge

Date: 14/05/18

Application rate (t/ha)	**250**
Application rate (t/acre)	**100**
pH	**6.3**
Dry solids (%)	**2.2**
Organic matter content (%)	**37.0**

Lab ref no. S 4179276

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.77	%	0.17	42.7	0.006	1.5
Ammonium-N	274	mg/kg	0.01	1.5		
Phosphorus (P)	58.4	mg/kg	0.00			
Phosphate (P_2O_5)			0.00	0.7	0.001	0.1
Potassium (K)	87	mg/kg	0.00			
Potash (K_2O)			0.00	0.6	0.000	0.1
Magnesium (Mg)	476	mg/kg	0.01			
Magnesium (MgO)			0.02	4.4	0.004	0.9
Sulphur (S)	2310	mg/kg	0.05			
Sulphur (SO_3)			0.13	32.1	0.013	3.2

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	83.30	mg/kg	0.00	0.46	15.00
Copper	7.80	mg/kg	0.00	0.04	7.50
Nickel	5.10	mg/kg	0.00	0.03	3.00
Lead	22.60	mg/kg	0.00	0.13	15.00
Cadmium	0.11	mg/kg	0.00	0.00	0.15
Chromium	4.30	mg/kg	0.00	0.02	15.00
Arsenic	38.80	mg/kg	0.00	0.22	0.70
Mercury	0.91	mg/kg	0.00	0.01	0.10
Other Elements					
Aluminium	2560	mg/kg	0.06	14	
Iron	425000	mg/kg	9.44	2359	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

Dŵr Cymru
Welsh Water

Sample Analysis Report

Sampling Point No -	48418	**Location -**	PORTIS WTW SLUDGE TANKERING POIN
Date Sampled -	14-May-18	**Time Taken -**	14:40
Originator -	SEWAGE	**Purpose -**	EQO/DIRECTIVE COMPLIANCE
Laboratory -	GLASLYN	**Lab Ref No -**	S 4179279
Sampler -	ETI3	**No Results -**	22
Type -	7HR COMPOSITE		

Sample Results

Code	Determinand Name	Units		Result	Limit
212	POTASSIUM (DRY WT)	MG/KG	LT	87	
238	Magnesium	MG/KG		801	
288	ALUMINIUM (DRY WT)	MG/KG		2820	
357	ARSENIC (DRY WT)	MG/KG		42.7	
4620	pH	PH UNITS		6.6	
7774	WTW MERCURY TOTAL	MG/KG	LT	1.38	
8241	LOSS ON IGNITION	%		37.6	
8939	TOT NIT AS N (SLDG)	MG/KG			
8941	TOT PHOS AS P (SLDG)	MG/KG			
9233	Ammoniacal nitrogen	MG/KG	LT	416	
9234	Sulphur	MG/KG		2390	
9271	Cadmium	MG/KG	LT	0.12	
9272	CHROMIUM TOTAL	MG/KG	LT	4.3	
9273	Copper	MG/KG	LT	7.8	
9275	Nickel	MG/KG		7.3	
9276	LEAD TOTAL	MG/KG	LT	34.5	
9277	ZINC TOTAL	MG/KG		92.7	
9278	IRON TOTAL	MG/KG		449000	
9281	% Dry solids	%		1.46	
9282	% Minerals	%		62.4	
9284	% P (dry weight)	%	LT	0.00584	
9285	% N (dry weight)	%		0.75	

DŴR CYMRU - WELSH WATER

Portis

Analysis of Water Treatment Works Sludge

Date: 14/05/18

Application rate (t/ha)	**250**
Application rate (t/acre)	**100**
pH	**6.6**
Dry solids (%)	**1.5**
Organic matter content (%)	**37.6**

Lab ref no. S 4179279

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.75	%	0.11	27.4	0.006	1.5
Ammonium-N	416	mg/kg	0.01	1.5		
Phosphorus (P)	58.4	mg/kg	0.00			
Phosphate (P_2O_5)			0.00	0.5	0.000	0.1
Potassium (K)	87	mg/kg	0.00			
Potash (K_2O)			0.00	0.4	0.000	0.1
Magnesium (Mg)	801	mg/kg	0.01			
Magnesium (MgO)			0.02	4.9	0.004	1.0
Sulphur (S)	2390	mg/kg	0.03			
Sulphur (SO_3)			0.09	21.8	0.009	2.2

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	92.70	mg/kg	0.00	0.34	15.00
Copper	7.80	mg/kg	0.00	0.03	7.50
Nickel	7.30	mg/kg	0.00	0.03	3.00
Lead	34.50	mg/kg	0.00	0.13	15.00
Cadmium	0.12	mg/kg	0.00	0.00	0.15
Chromium	4.30	mg/kg	0.00	0.02	15.00
Arsenic	42.70	mg/kg	0.00	0.16	0.70
Mercury	1.38	mg/kg	0.00	0.01	0.10
Other Elements					
Aluminium	2820	mg/kg	0.04	10	
Iron	449000	mg/kg	6.56	1639	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

Dŵr Cymru
Welsh Water

Sample Analysis Report

Sampling Point No -	100506	**Location -**	PRESELI WTW SLUDGE Tankering Point (N
Date Sampled -	01-Feb-19	**Time Taken -**	12:04
Originator -	SEWAGE	**Purpose -**	EQO/DIRECTIVE COMPLIANCE
Laboratory -	GLASLYN	**Lab Ref No -**	S 6261051
Sampler -	EXTA	**No Results -**	20
Type -			

Sample Results

Code	Determinand Name	Units		Result	Limit
238	Magnesium	MG/KG		606	
288	ALUMINIUM (DRY WT)	MG/KG		183500	
357	ARSENIC (DRY WT)	MG/KG		18.4	
4620	pH	PH UNITS		6.6	
7774	WTW MERCURY TOTAL	MG/KG	LT	1.17	
8241	LOSS ON IGNITION	%		54	
9233	Ammoniacal nitrogen	MG/KG	LT	356	
9234	Sulphur	MG/KG		11300	
9271	Cadmium	MG/KG		1.1	
9272	CHROMIUM TOTAL	MG/KG		6.2	
9273	Copper	MG/KG		38.8	
9275	Nickel	MG/KG		13.7	
9276	LEAD TOTAL	MG/KG	LT	6.2	
9277	ZINC TOTAL	MG/KG		130	
9278	IRON TOTAL	MG/KG		20600	
9281	% Dry solids	%		1.71	
9282	% Minerals	%		46	
9283	% K (dry weight)	%		0.018	
9284	% P (dry weight)	%		0.56	
9285	% N (dry weight)	%		0.77	

DŴR CYMRU - WELSH WATER

Preseli liquid

Analysis of Water Treatment Works Sludge

Date: 01/02/19

Application rate (t/ha)	**250**
Application rate (t/acre)	**100**
pH	**6.6**
Dry solids (%)	**1.7**
Organic matter content (%)	**54.0**

Lab ref no. S 6261051

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.77	%	0.13	32.9	0.006	1.5
Ammonium-N	356	mg/kg	0.01	1.5		
Phosphorus (P)	5600	mg/kg	0.10			
Phosphate (P_2O_5)			0.22	54.8	0.044	11.0
Potassium (K)	180	mg/kg	0.00			
Potash (K_2O)			0.00	0.9	0.001	0.2
Magnesium (Mg)	606	mg/kg	0.01			
Magnesium (MgO)			0.02	4.3	0.003	0.9
Sulphur (S)	11300	mg/kg	0.19			
Sulphur (SO_3)			0.48	120.8	0.048	12.1

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	130.00	mg/kg	0.00	0.56	15.00
Copper	38.80	mg/kg	0.00	0.17	7.50
Nickel	13.70	mg/kg	0.00	0.06	3.00
Lead	6.20	mg/kg	0.00	0.03	15.00
Cadmium	1.10	mg/kg	0.00	0.00	0.15
Chromium	6.20	mg/kg	0.00	0.03	15.00
Arsenic	18.40	mg/kg	0.00	0.08	0.70
Mercury	1.17	mg/kg	0.00	0.01	0.10
Other Elements					
Aluminium	183500	mg/kg	3.14	784	
Iron	20600	mg/kg	0.35	88	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

RICHARD EVANS
4 RECYCLING LTD
CONTROL HOUSE
A1 BUSINESS PARK
KNOTTINGLEY ROAD
KNOTTINGLEY WF11 0BU

V724

Please quote above code for all enquiries

STRATA FLORIDA WTW
STRATA FLORIDA
TREGARON

SLUDGE

SLUDGE

Laboratory References	
Report Number	45285
Sample Number	79539

Sample Reference :

LIQUID SLUDGE

Sample Matrix : SLUDGE

Date Received	26-FEB-2019
Date Reported	01-MAR-2019

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Oven Dry Solids	2.90	%
Conductivity 1:6	37.1	uS/cm
Total Nitrogen	<0.04	% w/w
Ammonium Nitrogen	<50	mg/kg
Total Phosphorus (P)	95.4	mg/kg
Total Potassium (K)	16.2	mg/kg
Total Magnesium (Mg)	<10	mg/kg
Total Copper (Cu)	0.71	mg/kg
Total Zinc (Zn)	3.82	mg/kg
Total Sulphur (S)	166	mg/kg

Released by *Darren Whitbread* Date *01/03/19*

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

RICHARD EVANS
4 RECYCLING LTD
CONTROL HOUSE
A1 BUSINESS PARK
KNOTTINGLEY ROAD
KNOTTINGLEY WF11 0BU

V724

Please quote above code for all enquiries

STRATA FLORIDA WTW
STRATA FLORIDA
TREGARON

SLUDGE

SLUDGE

Laboratory References	
Report Number	45285
Sample Number	79539

Sample Reference :

LIQUID SLUDGE

Sample Matrix : SLUDGE

Date Received	26-FEB-2019
Date Reported	01-MAR-2019

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Total Calcium (Ca)	43.4	mg/kg
Total Iron (Fe)	784	mg/kg
Total Lead (Pb)	1.59	mg/kg
Total Cadmium (Cd)	0.01	mg/kg
Total Mercury (Hg)	<0.05	mg/kg
Total Nickel (Ni)	0.32	mg/kg
Total Chromium (Cr)	0.30	mg/kg
Total Sodium (Na)	31.1	mg/kg
pH 1:6 [Fresh]	5.36	
Organic Matter LOI	1.85	% w/w

Released by ..... *Darren Whitbread* ..... Date ..... *01/03/19* .....

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

RICHARD EVANS
4 RECYCLING LTD
CONTROL HOUSE
A1 BUSINESS PARK
KNOTTINGLEY ROAD
KNOTTINGLEY WF11 0BU

V724

Please quote above code for all enquiries

STRATA FLORIDA WTW
STRATA FLORIDA
TREGARON

SLUDGE

SLUDGE

Laboratory References	
Report Number	45285
Sample Number	79539

Sample Reference :

LIQUID SLUDGE

Sample Matrix : SLUDGE

Date Received	26-FEB-2019
Date Reported	01-MAR-2019

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Lime Equivalent as CaCO3	<2	% w/w
Total Aluminium	3398	mg/kg
Total Arsenic (As)	1.35	mg/kg
Neutralising Value as CaO [TNV]	<1	% w/w

Released by ..... *Darren Whitbread* ..... Date ..... *01/03/19* .....

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

DŴR CYMRU - WELSH WATER

Strata Florida liquid

Analysis of Water Treatment Works Sludge

Date: 01/03/19

Application rate (t/ha)	**250**	Lab report no. 45285
Application rate (t/acre)	**100**	Lab sample no. 79539
pH	**5.4**	
Dry solids (%)	**2.90**	
Organic matter content (%)	**1.9**	

NUTRIENT CONTENT

			Total		Available	
TOTALS	**result**	**units**	**(kg/tonne)**	**(kg/ha)**	**(kg/tonne)**	**(kg/ha)**
Nitrogen (N)	0.04	%	0.40	100.0	0.05	12.5
Ammonium-N	50	mg/kg	0.05	12.5		
Phosphorus (P)	95.4	mg/kg	0.10			
Phosphate (P_2O_5)			0.22	54.4	0.04	10.9
Potassium (K)	16.2	mg/kg	0.02			
Potash (K_2O)			0.02	4.9	0.00	1.0
Magnesium (Mg)	10	mg/kg	0.01			
Magnesium (MgO)			0.02	4.0	0.00	0.8
Sulphur (S)	166	mg/kg	0.17			
Sulphur (SO_3)			0.42	103.8	0.04	10.4

POTENTIALLY TOXIC ELEMENTS

			Rate		Limit
TOTALS	**result**	**units**	**(g/tonne)**	**(kg/ha)**	**(kg/ha/yr)**
Zinc	3.82	mg/kg	3.8	0.96	15.00
Copper	0.71	mg/kg	0.7	0.18	7.50
Nickel	0.3	mg/kg	0.3	0.08	3.00
Lead	1.6	mg/kg	1.6	0.40	15.00
Cadmium	0.01	mg/kg	0.0	0.00	0.15
Chromium	0.30	mg/kg	0.3	0.08	15.00
Mercury	0.05	mg/kg	0.1	0.01	0.10
Arsenic	1.35	mg/kg	1.4	0.34	0.70
Other Elements					
Aluminium	3398	mg/kg	3398	850	
Iron	784	mg/kg	784	196	

To convert from kg/tonne to units/ton multiply by 2
To convert from kg/ha to units/acre multiply by 0.8

ANALYTICAL REPORT

Report Number	**69670-15**	**P684**	**TOM POWELL**	**Client**	**10131**
Date Received	**20-MAY-2015**		**4RECYCLING LTD**		**BAILEA**
Date Reported	**27-MAY-2015**		**UNIT 1A CARADON WORKS**		**HEOL SENNI**
Project	**SOILS**		**HAIGH PARK ROAD**		**BRECON**
Reference	**10131**		**STOURTON**		**LD3 8ST**
Order Number	**20140207**		**LEEDS LS10 1RT**		

Laboratory Reference		[redacted]	**SOIL276133**	[redacted]	[redacted]	[redacted]	**SOIL276137**	[redacted]	**SOIL276139**	**SOIL276140**	**SOIL276141**
Sample Reference		[redacted]	**12/12**	[redacted]	[redacted]	[redacted]	**16/16**	[redacted]	**18/18**	**19/19**	**20/20**
Determinand	**Unit**	[redacted]	**SOIL**	[redacted]	[redacted]	[redacted]	**SOIL**	[redacted]	**SOIL**	**SOIL**	**SOIL**
pH water [1:2.5]		[redacted]	6.1	[redacted]	[redacted]	[redacted]	5.6	[redacted]	5.8	5.8	5.9
Available Phosphorus (Index)	mg/l	[redacted]	34.4 (3)	[redacted]	[redacted]	[redacted]	32.8 (3)	[redacted]	41.0 (3)	25.6 (3)	30.4 (3)
Available Potassium (Index)	mg/l	[redacted]	137 (2-)	[redacted]	[redacted]	[redacted]	88.2 (1)	[redacted]	77.8 (1)	62.8 (1)	78.9 (1)
Available Magnesium (Index)	mg/l	[redacted]	78.4 (2)	[redacted]	[redacted]	[redacted]	113 (3)	[redacted]	103 (3)	102 (3)	94.2 (2)
Total Copper	mg/kg	[redacted]	12.7	[redacted]	[redacted]	[redacted]	13.2	[redacted]	16.5	13.3	14.2
Total Zinc	mg/kg	[redacted]	73.0	[redacted]	[redacted]	[redacted]	87.1	[redacted]	86.1	83.0	83.7
Total Lead	mg/kg	[redacted]	28.7	[redacted]	[redacted]	[redacted]	30.8	[redacted]	29.1	28.5	31.0
Total Arsenic	mg/kg	[redacted]	17.0	[redacted]	[redacted]	[redacted]	15.0	[redacted]	13.3	14.4	14.9
Total Cadmium	mg/kg	[redacted]	0.43	[redacted]	[redacted]	[redacted]	0.41	[redacted]	0.37	0.40	0.41
Total Nickel	mg/kg	[redacted]	21.1	[redacted]	[redacted]	[redacted]	25.4	[redacted]	23.9	20.6	22.8
Total Chromium	mg/kg	[redacted]	39.5	[redacted]	[redacted]	[redacted]	46.4	[redacted]	43.2	35.7	41.6
Total Mercury	mg/kg	[redacted]	0.04	[redacted]	[redacted]	[redacted]	0.05	[redacted]	0.05	0.06	0.05
Total Selenium	mg/kg	[redacted]	0.43	[redacted]	[redacted]	[redacted]	0.40	[redacted]	0.37	0.41	0.40
Total Molybdenum	mg/kg	[redacted]	<1	[redacted]	[redacted]	[redacted]	<1	[redacted]	<1	<1	<1
Fluoride 2:1 ratio	mg/kg	[redacted]	23.9	[redacted]	[redacted]	[redacted]	15.0	[redacted]	14.9	14.2	15.6

Notes

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.

The results as reported relate only to the item(s) submitted for testing.

The results are presented on a dry matter basis unless otherwise stipulated.

ANALYTICAL REPORT

Report Number	**69671-15**	**P684**	**TOM POWELL**	**Client**	**10131**
Date Received	**20-MAY-2015**		**4RECYCLING LTD**		**BAILEA**
Date Reported	**27-MAY-2015**		**UNIT 1A CARADON WORKS**		**HEOL SENNI**
Project	**SOILS**		**HAIGH PARK ROAD**		**BRECON**
Reference	**10131**		**STOURTON**		**LD3 8ST**
Order Number	**20140207**		**LEEDS LS10 1RT**		

Laboratory Reference		**SOIL276142**
Sample Reference		**21/21**
Determinand	**Unit**	**SOIL**
pH water [1:2.5]		6.3
Available Phosphorus (Index)	mg/l	34.8 (3)
Available Potassium (Index)	mg/l	52.4 (0)
Available Magnesium (Index)	mg/l	61.6 (2)
Total Copper	mg/kg	12.9
Total Zinc	mg/kg	86.1
Total Lead	mg/kg	30.4
Total Arsenic	mg/kg	13.2
Total Cadmium	mg/kg	0.42
Total Nickel	mg/kg	22.9
Total Chromium	mg/kg	39.9
Total Mercury	mg/kg	0.04
Total Selenium	mg/kg	0.39
Total Molybdenum	mg/kg	<1
Fluoride 2:1 ratio	mg/kg	20.9

Notes

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.

ANALYTICAL REPORT

Report Number	**34836-16**	**T740**	**IAN CLATWORTHY**	**Client**	**BEILIGEWN CRAI**
Date Received	**06-OCT-2016**		**4 RECYCLING LTD**		**BRECON**
Date Reported	**13-OCT-2016**		**CENTRAL HOUSE**		**LD3 8YL**
Project	**SOIL**		**A1 BUSINESS PARK**		
Reference	**BEILIGEWN CRAI**		**KNOTTINGLEY ROAD**		
Order Number			**KNOTTINGLEY WF11 0BU**		

Laboratory Reference		[redacted]	[redacted]	[redacted]	**SOIL322108**	[redacted]	[redacted]	**SOIL322111**	**SOIL322112**		
Sample Reference		[redacted]	[redacted]	[redacted]	**FIELDS 21-24**	[redacted]	[redacted]	**FIELDS 33-38**	**FIELDS 39-42**		
Determinand	**Unit**	[redacted]	[redacted]	[redacted]	**SOIL**	[redacted]	[redacted]	**SOIL**	**SOIL**		
pH water [1:2.5]		[redacted]	[redacted]	[redacted]	5.7	[redacted]	[redacted]	5.7	5.7		
Available Phosphorus (Index)	mg/l	[redacted]	[redacted]	[redacted]	27.4 (3)	[redacted]	[redacted]	22.4 (2)	23.2 (2)		
Available Potassium (Index)	mg/l	[redacted]	[redacted]	[redacted]	129 (2-)	[redacted]	[redacted]	113 (1)	116 (1)		
Available Magnesium (Index)	mg/l	[redacted]	[redacted]	[redacted]	106 (3)	[redacted]	[redacted]	67.7 (2)	79.9 (2)		
Total Copper	mg/kg	[redacted]	[redacted]	[redacted]	15.0	[redacted]	[redacted]	12.2	12.9		
Total Zinc	mg/kg	[redacted]	[redacted]	[redacted]	93.8	[redacted]	[redacted]	80.1	83.7		
Total Lead	mg/kg	[redacted]	[redacted]	[redacted]	25.8	[redacted]	[redacted]	20.6	21.2		
Total Arsenic	mg/kg	[redacted]	[redacted]	[redacted]	17.3	[redacted]	[redacted]	16.4	15.7		
Total Cadmium	mg/kg	[redacted]	[redacted]	[redacted]	0.47	[redacted]	[redacted]	0.41	0.44		
Total Nickel	mg/kg	[redacted]	[redacted]	[redacted]	26.7	[redacted]	[redacted]	25.4	28.2		
Total Chromium	mg/kg	[redacted]	[redacted]	[redacted]	42.2	[redacted]	[redacted]	47.5	50.3		
Total Mercury	mg/kg	[redacted]	[redacted]	[redacted]	<0.2	[redacted]	[redacted]	<0.2	0.23		
Total Selenium	mg/kg	[redacted]	[redacted]	[redacted]	0.47	[redacted]	[redacted]	0.47	0.41		
Total Molybdenum	mg/kg	[redacted]	[redacted]	[redacted]	<1	[redacted]	[redacted]	<1	<1		
Fluoride 2:1 ratio	mg/kg	[redacted]	[redacted]	[redacted]	13.6	[redacted]	[redacted]	13.8	13.4		

Notes

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.

ANALYTICAL REPORT

Report Number	**71108-17**	**J633**	**DAVID POWELL**	**Client**	**GLYNLLECH UCHAF FARM**
Date Received	**23-AUG-2017**		**4RECYCLING LTD**		**NANTYFFIN ROAD**
Date Reported	**30-AUG-2017**		**CONTROL HOUSE**		**PENYCAU**
Project	**SOIL**		**A1 BUSINESS PARK**		**SA9 1J**
Reference	**GLYNLLECH UCHAF FARM**		**KNOTTINGLEY ROAD**		
Order Number			**KNOTTINGLEY WF11 0BU**		

Laboratory Reference		**SOIL353304**	**SOIL353305**	**SOIL353306**	**SOIL353307**	**SOIL353308**	**SOIL353309**	**SOIL353310**	**SOIL353311**		
Sample Reference		**4040**	**3724**	**9927**	**8638**	**6133/7829**	**4848/5441**	**7519**	**4363**		
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**		
pH water [1:2.5]		5.5	5.4	5.8	6.1	5.4	5.8	6.0	5.5		
Available Phosphorus (Index)	mg/l	6.6 (0)	11.8 (1)	13.6 (1)	17.8 (2)	10.4 (1)	14.4 (1)	10.8 (1)	11.2 (1)		
Available Potassium (Index)	mg/l	66.4 (1)	41.7 (0)	40.3 (0)	28.2 (0)	48.8 (0)	47.6 (0)	46.4 (0)	30.2 (0)		
Available Magnesium (Index)	mg/l	76.8 (2)	58.4 (2)	62.3 (2)	63.2 (2)	59.2 (2)	67.8 (2)	56.9 (2)	43.3 (1)		
Total Copper	mg/kg	15.1	16.6	13.6	20.4	16.6	19.6	17.3	17.5		
Total Zinc	mg/kg	74.2	75.9	48.0	37.3	83.0	85.1	72.3	70.5		
Total Lead	mg/kg	70.9	61.6	54.4	68.9	53.6	62.9	55.6	60.6		
Total Arsenic	mg/kg	63.3	69.8	43.4	34.3	49.9	53.7	66.8	64.1		
Total Cadmium	mg/kg	1.47	0.59	0.96	1.15	0.86	0.71	0.86	0.90		
Total Nickel	mg/kg	13.3	12.6	<10	14.4	11.7	12.6	12.8	11.7		
Total Chromium	mg/kg	32.8	31.6	32.1	42.1	42.5	35.6	15.9	15.8		
Total Mercury	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Total Selenium	mg/kg	0.92	0.69	0.54	0.79	0.59	0.58	0.60	0.64		
Total Molybdenum	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1		
Fluoride 2:1 ratio	mg/kg	7.3	6.4	13.3	15.7	11.3	13.8	10.6	10.2		

Notes

Analysis Notes

The sample submitted was of adequate size to complete all analysis requested.

The results as reported relate only to the item(s) submitted for testing.

The results are presented on a dry matter basis unless otherwise stipulated.

Risk Assessment

Risk assessment for land spreading activity at Bailea, Beili Gwern, and Glynllech Uchaf farms.

Risk assessment reviewed by Mr A. Stone in Feb 2019.

Data				Judgement				Action	
Receptor What is at risk? What do I wish to protect?	*Source* The agent or process with potential to cause harm	*Harm* The harmful consequences if things go wrong	*Pathway* How the receptor might come into contact with the source	*Probability of exposure* How likely is this contact?	*Consequence* Severity of the consequences if this occurs	*Magnitude of risk* The overall magnitude of the risk	*Justification for magnitude* Basis of my judgement	*Risk management* How I can best manage the risk to reduce the magnitude	*Residual risk* Magnitude of the risk after management
Surface water – ditches, watercourses and ponds	Nutrients, aluminium, and organic matter	Surface water pollution	Surface run-off	Medium	High	Medium	Proximity of ditches and under drainage Low pollution potential of water treatment works sludge	Comply with Water Code, NVZ, Cross Compliance, Sludge Regs and EPR. No spreading areas to be observed as per attached plans. Follow PQA	Low
Groundwater	Nutrients, Aluminium, PTEs	Groundwater pollution	Inappropriate application	Medium	Medium	Low	WTW sludge has low concentrations of PTEs. Some WTW sludges contain aluminium but solubility low at observed soil pHs. Alum sludge will not be spread on fields with soil pH <6	As above	Low
Soils	Physical damage to soil structure	Damage to soil structure and poor subsequent grass yields	Delivery and spreading activity	Low	Medium to high	Low	Delivery and spreading to be undertaken when ground conditions are suitable	Comply with Soil Code and Cross Compliance Criteria. Apply only in suitable conditions. Follow PQA	Low

Risk Assessment (continued)

Soils	Nutrients, Aluminium, and PTEs	Build-up of nutrients. and/or PTEs	Spreading activity	High	Medium to high	Low	Waste analysis. Soil analysis. Appropriate rates of application. Alum sludge will not be spread on fields with soil pH <6	Apply according to PQA, RB209 and Soil Code	Low
Local human population and wildlife	Spreading activities – physical	Harm to humans or animals	Trespass, accidental contact	Low	Medium	Low	Agricultural areas with limited public access. Minimum 3-week non-utilisation period	Application during appropriate conditions and awareness of access issue	Low
Local human population	Odour during spreading activity	Odour issues/complaints	Airborne compounds	Low	Low	Low	The WTW sludge has minimal odour	Odour management plan available in EMS in accordance with SR2010No4 permit	Low
Local human population	Releases of airborne dusts/ particulate matter	Harm to human health - respiratory irritation and illness.	Air transport then inhalation	Low	Medium	Low	Waste streams have low potential to produce airborne dust and particulate matter	Waste will be applied in accordance with CoGAP and EMS	Low
Local human population	As above	Nuisance dust on cars, clothing etc.	Deposition from air	Low	Low	Low	As above	As above	Low
Local human population	Emissions; litter	Nuisance loss of amenity and harm to pet health	Transport through air	Low	Low	Low	Waste does not contain litter as it derives from a controlled manufacturing processes	Waste will be applied according to Codes of Good Agricultural Practice and SR2010No4 EMS.	Low
Local human population	Noise	Noise complaints	Noise from delivery, and spreading	Low	Low to Medium	Low	Agricultural machinery in agricultural areas	Avoid sensitive spreading periods e.g. bank holidays and weekends. Delivery during daylight hours	Low
Local human population	Pests (e.g. scavenging animals, flies)	Harm to human health, nuisance, loss of amenity	Air transport and over land	Low / Medium	Low / Medium	Low / Medium	The WTW sludge is highly unlikely to attract scavenging animals. Sludge has low potential to attract flies	All waste will be stored, transported and spread in accordance with conditions set in SR2010No4 permit and CoGAP. Wastes are unlikely to attract pests as WTW sludge is not food based	Low
Local human population and local environment.	Mud on local roads	Nuisance, loss of amenity, risk of accident	Vehicles entering and leaving site	Medium	Medium	Medium	Road safety. Tractors/ spreaders trailing mud and debris from fields	Operation will not cause any additional effects on surrounding roads than normal agricultural practice occurring in the surrounding area	Low
Hedgerows and trees	Physical damage from	Ecological & landscape	Physical damage from spreading equipment	Low	Low	Low	Professional contractors employed instructed to take care around trees	Leave a 2m minimum buffer zone adjacent to trees and hedgerows	Low

Risk Assessment (continued)

	spreading equipment								
River Usk (Tributaries) SSSI	Nutrients PTEs Dusts	Ecological	Surface run-off Airborne compounds	Medium	High	Medium	Proximity of SSSI Particularly sensitive nature of SSSI (fish and plant species) Waste streams have low potential to produce airborne dust and particulate matter	Apply according to PQA 20m non-spreading buffer zone applied to where SSSI borders fields and to watercourses that run directly into SSSI	Low
River Usk (Upper Usk) SSSIs	Nutrients PTEs Dusts	Ecological	Surface run-off Airborne compounds	Medium	High	Medium	Proximity of SSSI Particularly sensitive nature of SSSI (fish and plant species) Waste streams have low potential to produce airborne dust and particulate matter	Apply according to PQA 20m non-spreading buffer zone applied to where SSSI borders fields and to watercourses that run directly into SSSI	Low
River Usk SAC	Nutrients PTEs Dusts	Ecological	Surface run-off Airborne compounds	Medium	High	Medium	Proximity of SAC Particularly sensitive nature of SAC (fish and plant species) Waste streams have low potential to produce airborne dust and particulate matter	Apply according to PQA 20m non-spreading buffer zone applied to where SSSI borders fields and to watercourses that run directly into SAC	Low
Nant Llech SSSI	Nutrients PTEs Dusts	Ecological	Surface run-off Airborne compounds	Medium	High	Medium	Proximity of SSSI Particularly sensitive nature of SSSI (watercourse and woodland/ plant species) Waste streams have low potential to produce airborne dust and particulate matter	Apply according to PQA SSSI is over 100m away from any spread area in the opposite direction to prevailing wind, so no buffer zone is needed	Low

This is to certify that

Richard Evans

Has successfully completed

Recycling Waste to Land Training

Including: Environmental Permitting, How to Comply with your Land Spreading Permit, 4R's Environmental Management System, Requirements of Technically Competent Managers and Nominated Competent Persons, and Adherence to Quality Protocols

At: 4R Newent Office

Date: 22/02/18

Trainer's Name: Dr Becky Wheeler

Training Organisation: In-House

Renewal Date: Ongoing

4R Group Ltd is an ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 Certified organisation.