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Amgylchedd Cymru  
Environment  
Agency Wales



## Land Spreading Activities at Gelliargwelt Uchaf Farm

Report into the application of wastes and slurries on land at  
Gelliargwelt Uchaf Farm, Gelligaer, Hengoed CF82 8FY

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# Introduction

The purpose of this report is to ascertain if the land spreading activities being carried out at Gelliargwellt Uchaf farm are for agricultural benefit and if the quantities are in excess of the limits set in the Code of Good Agricultural Practice.

Links to all documents and legislation referred to in this document are provided in the bibliography section on page 15.

## Farm details

Gelliargwellt Uchaf farm is a 280 Hectare dairy farm located near to the village of Gelligaer in the County of Caerphilly.

The farm is operated by Price & Co Farming Limited and has a herd of approximately 450 - 500 dairy cows and associated livestock.

Nutrients for grass growth and silage production are provided by slurry and manures from the farm and by the application of compost and leachate from an adjacent in-vessel composting facility.

The composting facility is regulated by the Environment Agency via an Environmental Permit issued under the Environmental Permitting Regulations 2010.

# Nutrient Management

## Farm Sources of Organic Material

Organic nitrogen and other nutrients may be applied to agricultural land from a variety of sources, including farm yard manure and industrial wastes. These materials are valuable sources of most major plant nutrients and organic matter. Appropriate application to land allows their nutrient value to be used for the benefit of crops and soil fertility, which can result in large savings in the use of inorganic fertilisers. Organic manures, particularly solid manures, add useful amounts of organic matters to soils. Their use can improve water holding capacity, drought resistance and structural stability, as well as the biological activity of soils.

In order to ensure that organic manure and slurry applied to land is not excessive and that the activity results in agricultural benefit, all applications should be applied in accordance with the Code of Good Agricultural Practice (COGAP). Where non agricultural waste is applied to land for agricultural benefit the applications must comply with any conditions detailed in any relevant permit or exemption under the Environmental Permitting (England & Wales) Regulations 2010.

The total area of land in and around Gelliargwellt Uchaf farm which is utilised for grazing and a three cut grass silage system is 328 Hectares.

The guidelines written in the document - *Protecting our Water, Soil and Air - A Code of Good of Agricultural Practice for Farmers Growers and Land Managers (2009)* state that within a calendar year no more that 250 kg per hectare of total nitrogen from organic sources should be applied to agricultural land. This level is not a legal requirement, and may be increased, if there is appropriate justification given from a FACTS (Fertiliser Advisers Certification and Training Scheme) qualified advisor. Additional non organic nitrogen (in the form of fertilizers) may also be applied to the land, to satisfy the crop requirement.

Using the COGAP limit and the amount of land available for spreading, Gelliargwellt Uchaf farm has a total application limit of 82,000 kg of total nitrogen from organic sources per year.

At current stocking levels the farm produces approximately 63,160kg of total organic nitrogen a year (see Table 1 below). All the figures are taken from Welsh Assembly Government Nitrate Vulnerable Zones in Wales - Farmers Workbook 2009 edition. These are the most up to date standard figures available in Wales. No specific slurry analysis has been carried out on this farm for this report.

**Table 1. Total amount of organic nitrogen produced on farm in 12 months**

Livestock	Location	Units	Total N produced per unit (kg/pa)	Total N produced per annum(kg)
Dairy Cow (yield 6-9000 litres)	Gelliargwellt Uchaf farm	490	101	49490
Young dairy (3-less than 13 month)	Gelliargwellt Uchaf farm	120	35	4200
Calf (0 – 3 months)	Gelliargwellt Uchaf farm	40	8	320
Young stock 13 months to 1 <sup>st</sup> calf	Tir Y Rhen Farm	150	61	9150
<b>Total</b>				<b>63160</b>

## Slurry Storage Capacity

Slurry storage is regulated by the Water Resources (Control of Pollution) Silage, Slurry and Agricultural Fuel Oil (Wales) Regulations 2010. These regulations set standards for the storage silage, slurries and agricultural fuel oil. Under these regulations farmers are required to have at least four months storage for slurry.

Slurry is defined as liquid or semi liquid matter composed of excreta produced by livestock while in a yard or building (including that held in woodchip corrals) or a mixture wholly or mainly consisting of livestock excreta, livestock bedding rainwater and washings from a building or yard used by livestock and of a consistency that allows it to be pumped or discharged by gravity.

At Gelliargwellt Uchaf farm they currently milk 490 cows of which 250 are housed in cubicles where all the slurry is collected during the months the cows are housed.

Table 2 calculates the total amount of slurry produced at Gelliargwellt Uchaf farm.

**Table 2. Total slurry produced at Gelligaergellit Uchaf farm**

Type of livestock	Number of livestock	Daily volume of slurry produced per unit per month (m <sup>3</sup> )	Total collected per day during storage period Oct - Jan	Total collected (m <sup>3</sup> per month)
Dairy cows 6-9000 litres yield in cubicles	250	1.59	100%	398 m <sup>3</sup> to slurry lagoon

Figure 1 below shows the locations of where all the stores and dirty yard areas are located on the farm, using the Environment Agency Easimap mapping tool.

**Figure 1. Locations of silage stores, slurry lagoons and dirty yard areas at Gelliargwellt Uchaf farm.**



*Silage clamps and yard area (hatched blue) = 5031m<sup>2</sup> (a), Lower yard area (hatched red) = 600m<sup>2</sup>(b), Lagoon (hatched green) = 1398.6m<sup>2</sup> (c), Smaller in-line storage lagoons taking run off from the lower yard area (hatched purple) = 45m<sup>3</sup> + 9m<sup>3</sup>*

## Parlour Washing Lagoons

All parlour washings and wash water currently drain to two in-line lagoons. The first settlement lagoon has a capacity of 45m<sup>3</sup>, and the second lagoon has a capacity 9m<sup>3</sup>. (purple hatched areas in Figure 1). They are emptied using a low rate irrigator or pumped back into the slurry lagoon if required to aid pumping of the slurry.

Total capacity of parlour washing lagoons = 45 m<sup>2</sup> + 9 = 54 m<sup>3</sup>

The total amount of wash water produced from the dairy parlour is detailed in Table 3 below.

**Table 3. Total Amount of Wash Water From Dairy Parlour**

Livestock	Units	Wash water Produced Per Unit Per Month	Total parlour washings produced per Month (m <sup>3</sup> )
Dairy cows 6-9000 litres (milked 2 x per day)	150	20 litres day ( high volume hose)	3
Dairy cows 6-9000 litres (milked 3x per day)	300	30 litres per day	9
<b>Total</b>			<b>12m<sup>3</sup></b>

The total amount of parlour washings that need to be stored during the winter months is calculated in Table 4 below.

**Table 4. Total Amount of Parlour Washings That Need To Be Stored**

Parlour washings produced per month	Winter Storage Period for SSAFO		Total volume parlour washings to be stored during storage period
12 m <sup>3</sup>	4 months	=	48 m <sup>3</sup>

The existing wash water lagoons have sufficient capacity to store the wash water during the winter months when ground conditions may not be suitable for spreading.

## Main Slurry Store

As the lagoon is an irregular shape the surface area has been measured using the EAW Easimap measuring tool = 1398.6m<sup>2</sup> (green hatched area in Figure 1). The lagoon is approximately 6m deep at the back and 2.4m deep at the front so an average depth of 3.5 m is used to take into account the required freeboard (available space above the liquid) of 300mm.

Total capacity of main slurry store = 1398.6 m<sup>2</sup> x 3.5 = **4893 m<sup>3</sup>**

In addition to the slurry that is produced on the farm, the slurry store also has to have capacity for the dirty water that is collected from the yard areas. These are shown in Figure 1 (blue and red hatched areas).

The amount of dirty water produced is calculated using rainfall figures (Table 5). For this report the rainfall data is taken from Dairy Co's cost effective dairy strategies on dairy farms. The figures are approximate and should be taken as a guideline only.

**Table 5. Monthly Rainfall During Storage Periods.**

Month	Oct	Nov	Dec	Jan	Total
Rainfall mm (for STD 01433)	207 mm	211 mm	236 mm	235 mm	889 mm
Average Monthly Rainfall	222mm				

Table 6 calculates the average volume of rainfall entering the slurry store per month.

**Table 6. Average Volume of Rainfall Entering the Slurry Store Per Month.**

Area of Slurry Store (c), Plus silage yard area (a) + (b)		Average Monthly Rainfall		Average Volume of Rainfall Entering the Slurry Store per Month
6430	X	222mm	/1000 =	1427 m <sup>3</sup>

Table 7 calculates the monthly volume of slurry that needs to be stored, taking into account the slurry (Table 2) and the dirty water (Table 6) produced from the yard areas.



**Table 7. Monthly Volume of Slurry That Needs To Be Stored**

Total slurry	Total dirty water		Monthly Slurry Plus Dilution
398 m <sup>2</sup>	1427 m <sup>2</sup>	=	1825m <sup>3</sup>

Table 8 then calculates how much slurry is needed to be stored during the winter months.

**Table 8. Total Volume of Slurry That Needs To Be Stored**

Slurry plus dilution (Table 7)	Slurry Storage Period for SSAFO		Total Volume of Slurry Plus Dilution To Be Stored during storage period
1825m <sup>3</sup>	4 months	=	7300m <sup>3</sup>

In summary, Gelliargwellt Uchaf farm currently has 4893 m<sup>3</sup> of storage. This equates to approximately 2.6 months storage for slurry using the cow numbers and yard areas given above. There is an additional capacity of 54m<sup>3</sup> for the parlour washings. This is the worst case scenario as the rainfall figures are taken for the winter months with the highest rainfall figures. The Dairy Co. rainfall figures may not be a true reflection of the site, as they are based on the average rainfall in the 01443 STD phone code area.

## Sources of Organic Material from On-Site Waste Activities

At present, the following land spreading activities are carried out at Gelliargwellt Uchaf farm under the Environmental Permitting Regulations 2010, and are regulated by the Environment Agency; Spreading of compost leachate, composted animal bedding and mature compost. This is in addition to the on-farm sources of organic material which are spread. In all cases, spreading must be carried out in accordance with the Code of Good Agricultural Practice.

### Land spreading of Composting Leachate

Bryn Compost Limited are authorised to spread leachate from the composting activity on land at Gelliargwellt Uchaf farm under a Standard Rules Number 4 Mobile Plant for land spreading permit (Ref EAWML 105116). Prior to land spreading this material, the operator is required to submit a deployment form to the Environment Agency, which contains an assessment of the material and analysis to determine what benefit it will confer to the land. The assessment is made by a person with the appropriate technical expertise and contains chemical testing results for the material and the receiving fields to evidence the reasons for their opinion. The chemical analysis must be carried out at an accredited laboratory. The Environment Agency makes an assessment based on this information to make sure that the benefits of the activity outweigh any potential impact. Only once an agreement is given in writing to this deployment can the land spreading start at the site.

The chemical analysis completed for the most recent deployment application (December 2010) gives the following total levels of these nutrients at the stated 50,000 l/ha application rate:

**Table 9. Levels of nutrients calculated for compost leachate (based on the 50,000 l/ha application rate)**

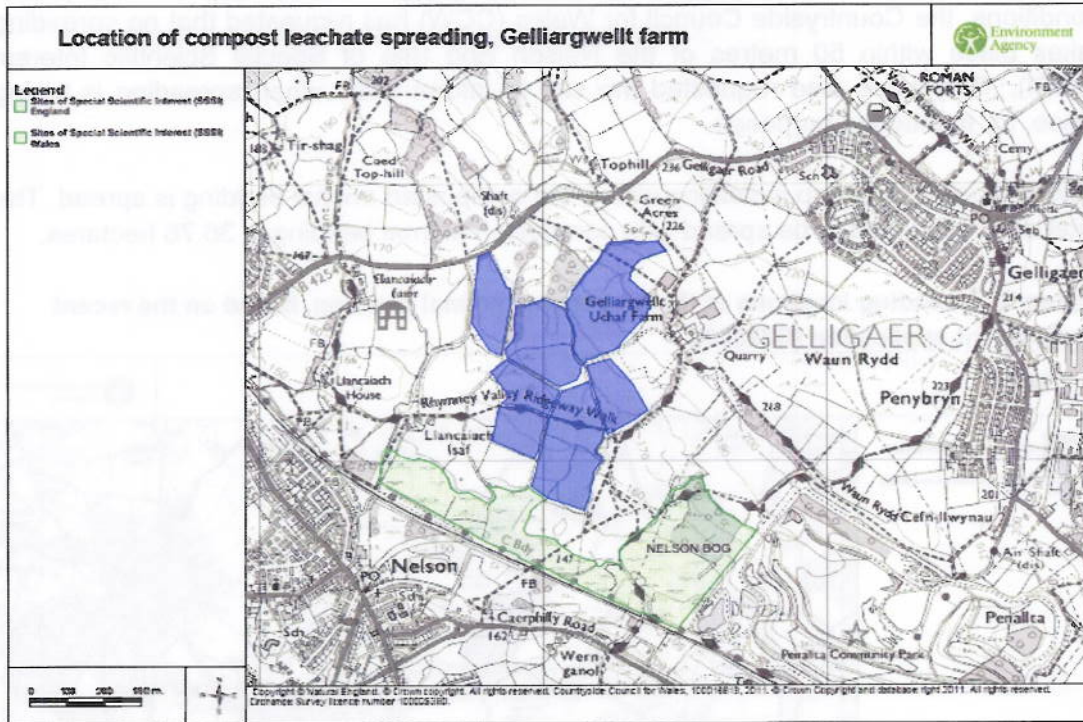
Nutrient	Total Nutrients (kg/ha)	Available Nutrients (kg/ha)
Nitrogen	94.5	59
Phosphate	9	3.5
Potash	171	171

For comparison purposes, the Fertiliser manual (RB 209) Version 8 indicates nutrient requirement for silage crops ranging from 200 - 360 in kg/ha, depending on the farming system employed.

The chemical analysis indicates that the compost leachate contains beneficial amounts of Nitrogen and Potash. Any additional fertiliser requirements will be met with artificial fertilisers. Providing that the application is made in accordance with the stated application rate of 50,000 litres per Hectare and that the principles outlined in the Code of Good Agricultural Practice are followed then this activity will be beneficial to the crop and poses a minimal environmental risk.

Figure 2 below is a map showing the fields where the compost leachate will be spread. The total amount of land to be spread with compost leachate in the most recent deployment was 18.65 hectares.

Figure 2 – Fields where compost leachate is allowed to be spread at Gelliargwellt Uchaf farm, taken from EAWML105116 deployment form, January 2011



## Land spreading of waste animal bedding

Gelliargwellt Uchaf farm are authorised to spread composted wood waste which has been used as animal bedding under a Paragraph 7 exemption (Ref PRI066). The exemption applies strict limits on the type and quantity of material that can be spread onto agricultural land, which must be complied with before the activity can be carried out.

The chemical analysis completed by an accredited laboratory for the most recent deployment application (October 2010) gives the following total levels of these nutrients at the stated 30 tonnes per hectare application rate:

Table 10. Levels of nutrients calculated for waste animal bedding (based on the 30 tonnes per hectare application rate)

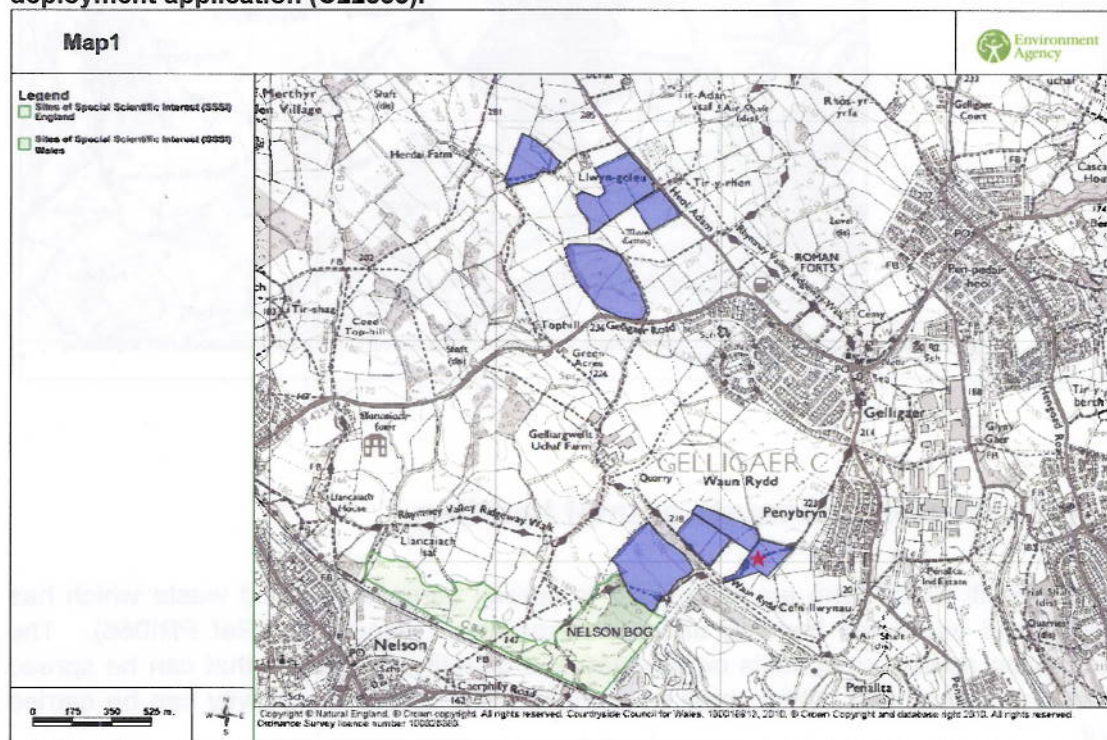
Nutrient	Total Nutrients (kg/ha)	Available Nutrients (kg/ha)
Nitrogen	186	11
Phosphate	41	41
Potash	51	51

Providing that the application is made in accordance with the stated application rate of 30 tonnes per hectare and that the principles outlined in the Code of Good Agricultural Practice are followed then this activity will be beneficial to the crop and poses a minimal environmental risk. The addition of this organic matter will enhance soil structure, water holding capacity and nutrient retention.

In addition to the restrictions placed on the spreading of this activity from the permit conditions, the Countryside Council for Wales (CCW) has requested that no spreading takes place within 50 metres of the Nelson Bog Site of Special Scientific Interest (SSSI). They have also requested the site to inform them when spreading is taking place, for monitoring purposes.

Figure 3 below is a map indicating where the composted animal bedding is spread. The total amount of land to be spread with composted animal bedding is 36.76 hectares.

**Figure 3. Spreading locations of the composted animal bedding, based on the recent deployment application (C22333).**



## Land spreading of mature compost

Bryn Compost Limited was previously authorised to carry out this activity under a Paragraph 7 exemption (Ref BRY016). This material has recently achieved the 'PAS100' standard accreditation by the Composting Association, which allows the material to be used as a product without the need for any waste authorisations. More information on this certification can be found on WRAP's website - [http://www.wrap.org.uk/recycling\\_industry/information\\_by\\_material/organics/production.html](http://www.wrap.org.uk/recycling_industry/information_by_material/organics/production.html).

General information on how the Environment Agency regulates the composting sector can be found on the Environment Agency website - [http://www.environment-agency.gov.uk/static/documents/Business/MWRP\\_RPS\\_002\\_Compost\\_v3\\_final\\_08-04-09.pdf](http://www.environment-agency.gov.uk/static/documents/Business/MWRP_RPS_002_Compost_v3_final_08-04-09.pdf)

The last sample of this material that the Environment Agency required as part of the Paragraph 7 exemption was in September 2009. The chemical test results at this time showed that the compost contains beneficial amounts of Nitrogen and Potash together with other elements, when using an application rate of 25 tonnes per hectare. Due to the recent PAS100 certification the application rate is most likely to be less than previous years, as the material can now be sold as a product and taken off the farm without waste controls.

For the benefit of this report we will use the previous set of results submitted to the Environment Agency, in order to gain an indication of the compost spreading on Gelliargwellt Uchaf farm.

The chemical analysis completed for the most recent Paragraph 7 application (September 2009) gives the following total levels of these nutrients at the stated 25 tonnes per hectare application rate:

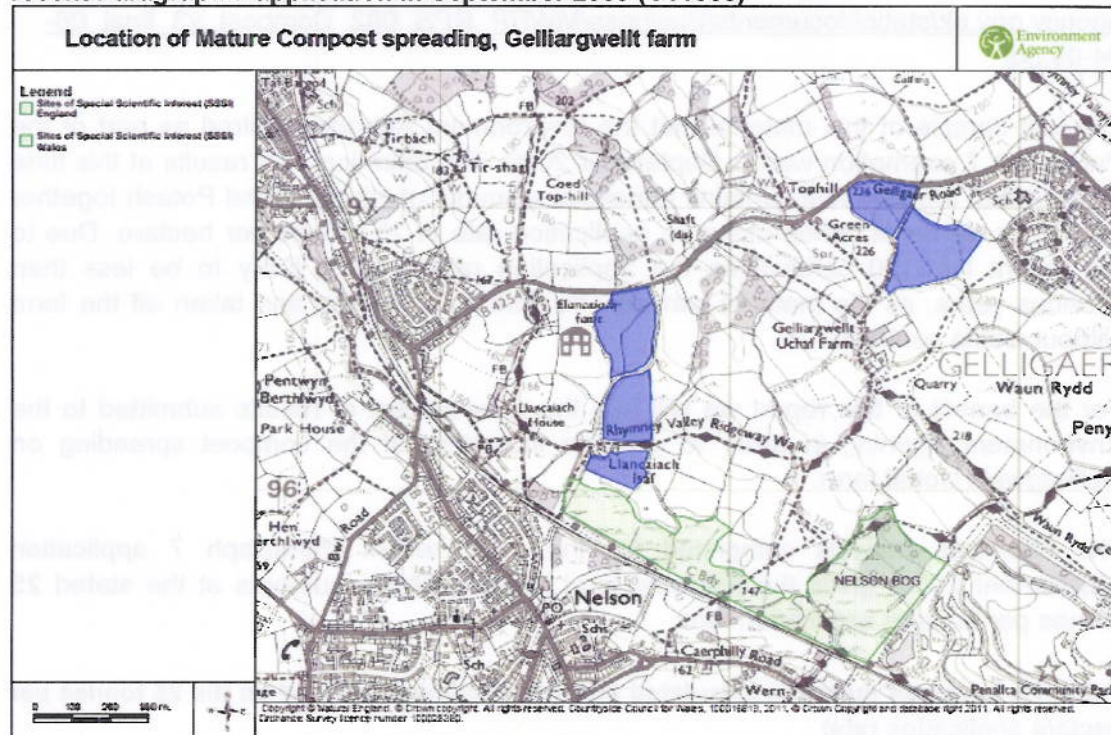
**Table 11. Levels of nutrients calculated for mature compost (based on the 25 tonnes per hectare application rate)**

Nutrient	Total Nutrients (kg/ha)	Available Nutrients (kg/ha)
Nitrogen	250	54
Phosphate	59	59
Potash	73	73

Any additional fertiliser required for crop uptake will be provided with artificial fertilisers.

Figure 4 below is a map indicating where the mature compost is spread. The most recent data shows that the total area of land that was spread with compost was 17.38 hectares.

Figure 4. Spreading locations of the mature compost, based on the information in the recent Paragraph 7 application in September 2009 (C11508)



## Total Amounts of Organic Material Applied to Land at Gelliargwellt Uchaf Farm, from Farm and Waste Sources

The total amounts of nitrogen from both the farm and the waste sources that are spread onto land at Gelliargwellt Uchaf farm are summarised below. This is calculated using the nutrient levels for each material, and the stated area of land where they are to be spread.

**Table 12: Total amounts of nitrogen (kg) and the available nitrogen (kg) provided to the land at Gelliargwellt Uchaf farm from farm and waste activities**

Activity	Total Organic Nitrogen (kg)	Available Organic Nitrogen (kg)
Farm sources	63160	18948
Compost leachate	1762	1100
Composted animal bedding	5580	330
Mature compost	4345	939
<b>TOTAL</b>	<b>74847</b>	<b>21317</b>

This shows that there is a total of 74,847kg of total organic nitrogen provided to the land from the waste management activities, of which 21,317kg nitrogen is available for the current crop. This is due to the high organic matter content in the compost and the composted animal bedding locking up the nitrogen. This will be slowly released to become available for future crops.

The COGAP (2009) guidelines state that within a calendar year no more than 250 kg of total nitrogen from organic sources should be applied to agricultural land. For Gelliargwellt Uchaf farm this equates to a total farm application limit of 82,000kg.

The calculations in this report show that the farm is currently below the guideline limit.

# Conclusion

This report takes into account all the spreading activities that are carried out at Gelliargwellt Uchaf farm.

At current stocking levels the farm produces approximately 63,160kg of total organic nitrogen a year. In addition to this approximately 11,687kg of total organic nitrogen is provided from the waste management activities. This gives a total of 74,847kg of total nitrogen from organic sources applied to land at Gelliargwellt Uchaf farm.

These results show that no more than 250 kg per hectare of total nitrogen from organic sources is applied to agricultural land at Gelliargwellt Uchaf farm within any calendar year. This is within the limits set in the Code of Good Agricultural Practice.

Source	kg
Animal manure	15847
Compost	11687
Other organic sources	47313
<b>TOTAL</b>	<b>74847</b>

The above table shows a total of 74,847kg of total organic nitrogen applied to the land at Gelliargwellt Uchaf farm. This is within the limits set in the Code of Good Agricultural Practice. The total nitrogen applied to the land is 74,847kg, which is within the limits set in the Code of Good Agricultural Practice. The total nitrogen applied to the land is 74,847kg, which is within the limits set in the Code of Good Agricultural Practice.

The above table shows a total of 74,847kg of total organic nitrogen applied to the land at Gelliargwellt Uchaf farm. This is within the limits set in the Code of Good Agricultural Practice. The total nitrogen applied to the land is 74,847kg, which is within the limits set in the Code of Good Agricultural Practice. The total nitrogen applied to the land is 74,847kg, which is within the limits set in the Code of Good Agricultural Practice.



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Nodwch y bydd taliadau yn amrywio ar draws darparwyr ffôn.



**Yr amgylchedd yn gyntaf:** Argreffir yr adroddiad hwn ar bapur wedi ei wneud yn gyfan gwbl o wastraff a ddefnyddiwyd eisoes. Defnyddir isgynhyrchion gwneud y mwydion a'r papur ar gyfer compostio a gwrtaith, gwneud sment a chynhyrchu trydan.