



Nutrient Neutrality Calculator for Top House Farm, Big Arowry, Hanmer, Wrexham, SY13 3EJ

Contract Ref: FD171

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Quality Assurance Record

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Document Status and Revision History:

Version	Date	Author	Reviewer	Authoriser	Status / Comment
1	10/04/2024	A. Osborne	C. Townsend	C. Townsend	1 st Issue

Limitation of Liability and Use

The work described in this report was undertaken for the party or parties stated; for the purpose or purposes stated; to the time and budget constraints stated. No liability is accepted for use by other parties or for other purposes, or unreasonably beyond the terms and parameters of its commission and its delivery to normal professional standards.

1. INTRODUCTION

1.1 Purpose of this Report

Townsend Water Engineering Ltd. has been commissioned by Lyndsey Fisher at *Roger Parry & Partners LLP* to undertake the Nutrient Neutrality Calculator for a full planning permission for the conversion of 3 barns into residential dwellings with associated landscaping, car parking, drive and access road at Top House Farm, Big Arowry, Hanmer, Wrexham, SY13 3EJ. This report has been prepared in support of the planning permission for the aforementioned development.

The report is based on the available topographical and land use information for the site detailed in Chapter 2. Chapter 3 is the Nutrient Neutrality Calculator.

1.2 Sources of Information and Consultation

This Report has been informed by:

- Existing Site Plan drawings delivered by *Roger Parry & Partners LLP*; and
- Proposed Site Plan drawings delivered by *Roger Parry & Partners LLP*.

1.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:

- Edwards & Withers (2008) 'Transport and delivery of suspended solids, nitrogen and phosphorous from various sources to freshwaters in the UK', *Journal of Hydrology*- February 2008, pp.144-153.

1.4 Structure of this Report

The Report has been prepared based on the following structure:

- Section 2 refers to spatial considerations by reference to the proposed land use and soil conditions;
- Section 3 presents the Nutrient Neutrality Calculator; and
- Section 4 provides a summary of the assessments.

Additional Appendices are provided that deal with the following:

- Appendix A Proposed Layout;
- Appendix B FEH SAAR data; and
- Appendix C Proposed Nutrient Calculator for the proposed site.

2. SPATIAL PLANNING CONSIDERATION

2.1 Location and Background

The location of the proposed development site is shown in Figure 1 and Figure 2, with location details found in Table 1. The existing development area is 3 barns. The site is located at Top House Farm, Big Arowry, Hanmer, Wrexham, SY13 3EJ (Grid Ref: 345813 ,339123). (Table 1: Site Details).

The development involves the conversion of 3 barns (2 house cows and 1 housed chickens) into 3 residential dwellings with associated landscaping, car parking & drive way. The entire development site is approximately 0.248ha and is currently chicken and cow barns on a farm; a brownfield site. Please see the proposed layout in Appendix A.

The site is within the catchment of the *River Dee* and *Bala Lake* Special Area of Conservation (SAC), and within 227m of Midland Meres & Mosses Phase 2 (Wales) Ramsar Site and within 227m of *Hanmer Mere* SSSI.

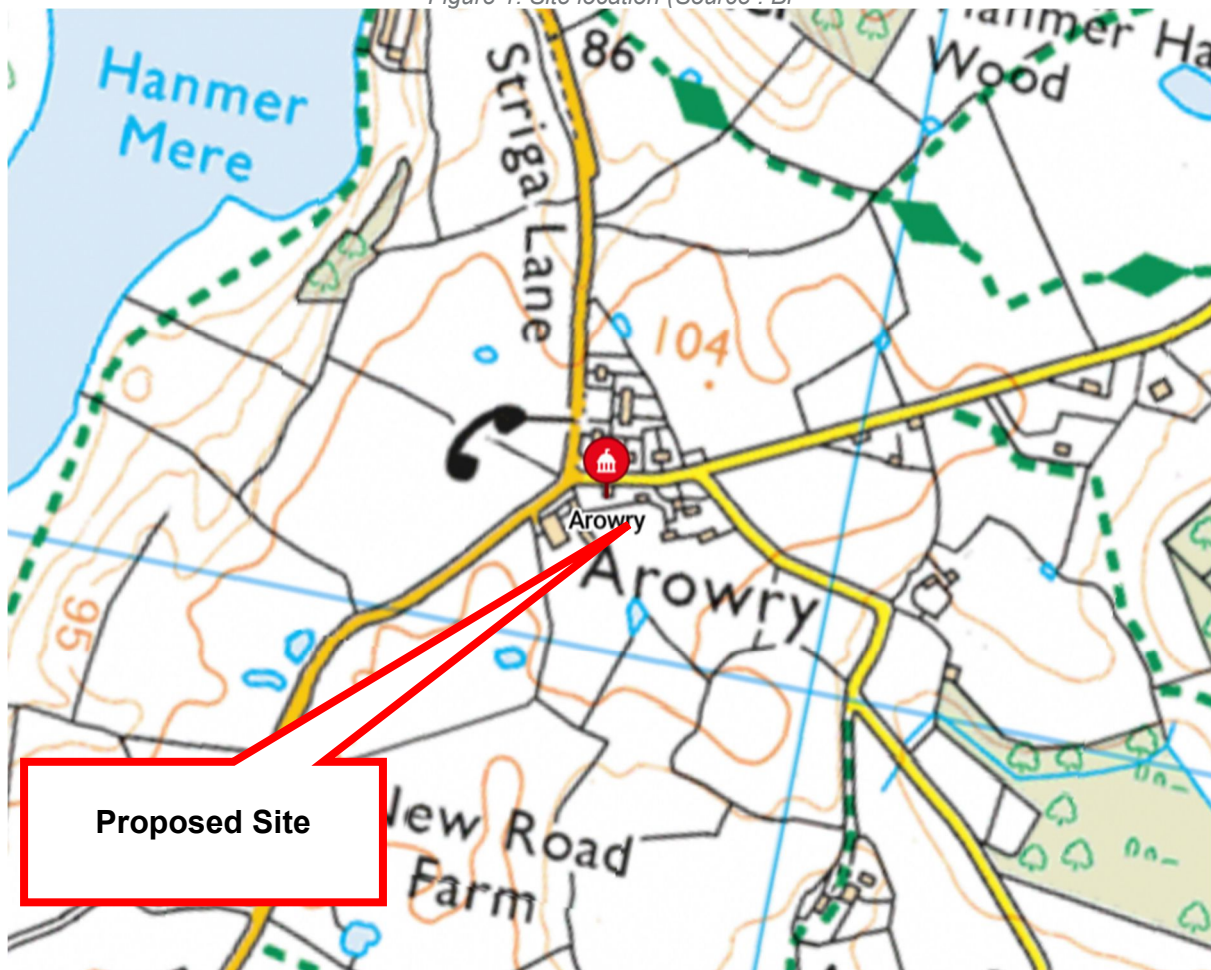
The site is surrounded by fields. To the North of the site is *Brookhouse Lane*, followed by a residential area. To the East is *Moss Lane*. To the West of the site is *New Road*.

Please see Figure 1 and Figure 2 indicating these features.

Table 1: Site Details taken from the site Grid Reference Finder

Reference	Value
OS X (Eastings)	345813
OS Y (Northings)	339123
Nearest Post Code	SY13 3EJ
Grid Reference	SJ458391

Figure 1: Site location (Source : Bi



ng Ordnance Survey Map)



Figure 2: Aerial View of the Site (Source: Grid Reference Finder)

2.2 Geology and Soil

The geology at the site has been obtained from the 'British Geological Survey' (BGS) website. The bedrock beneath the site is described as 'Sidmouth Mudstone Formation - Mudstone'. Superficial deposits are described as 'Till, Devensian - Diamicton'. Please see Figure 3.

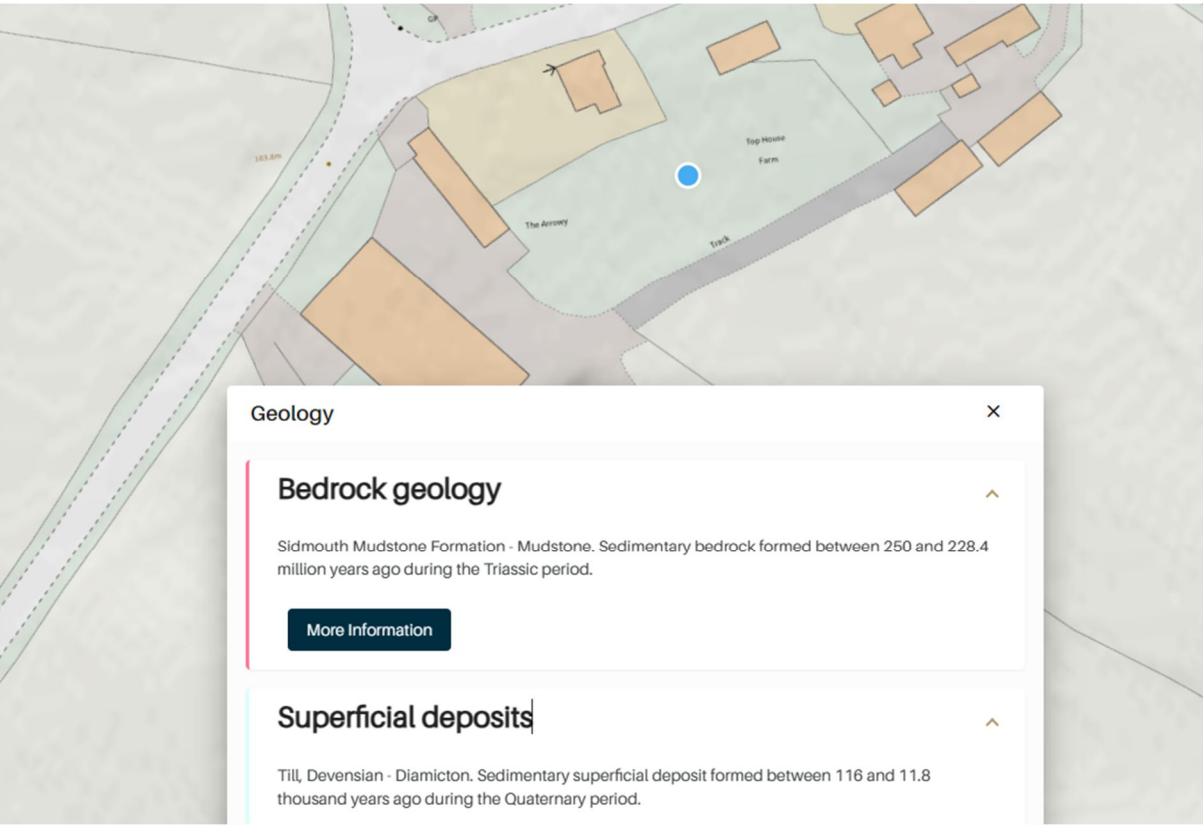


Figure 3: Bedrock Geology & Superficial Deposits (Source: ‘BGS’ Geology Viewer)

Soils at the site are described on the *Cranfield University ‘Soilscales’* website mostly as, ‘*Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils*’ with impeded drainage. Please see Figure 4.

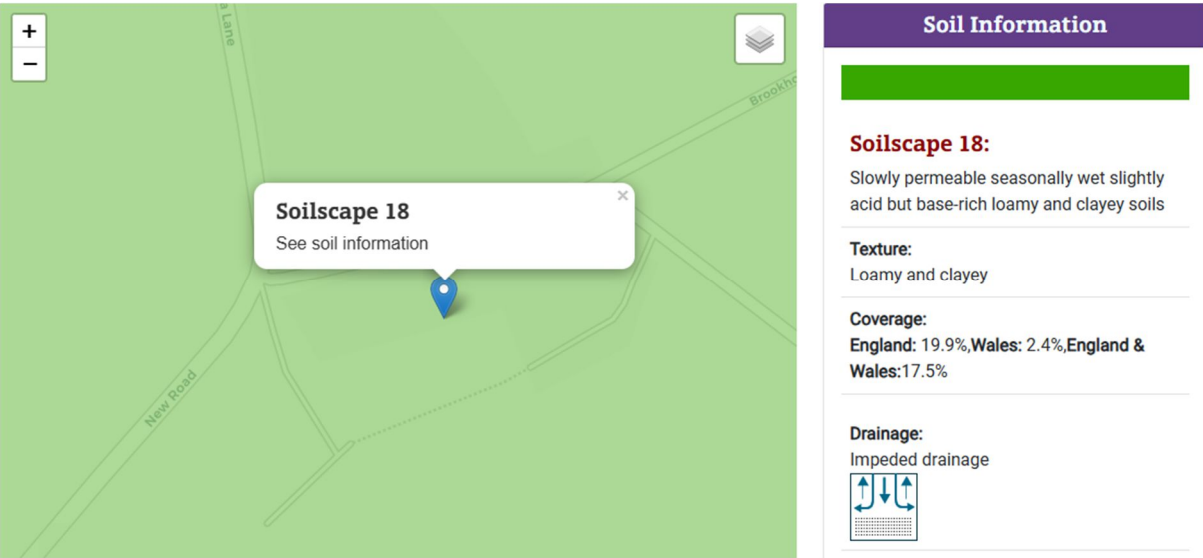


Figure 4: 'Soilscapes' Soil Information

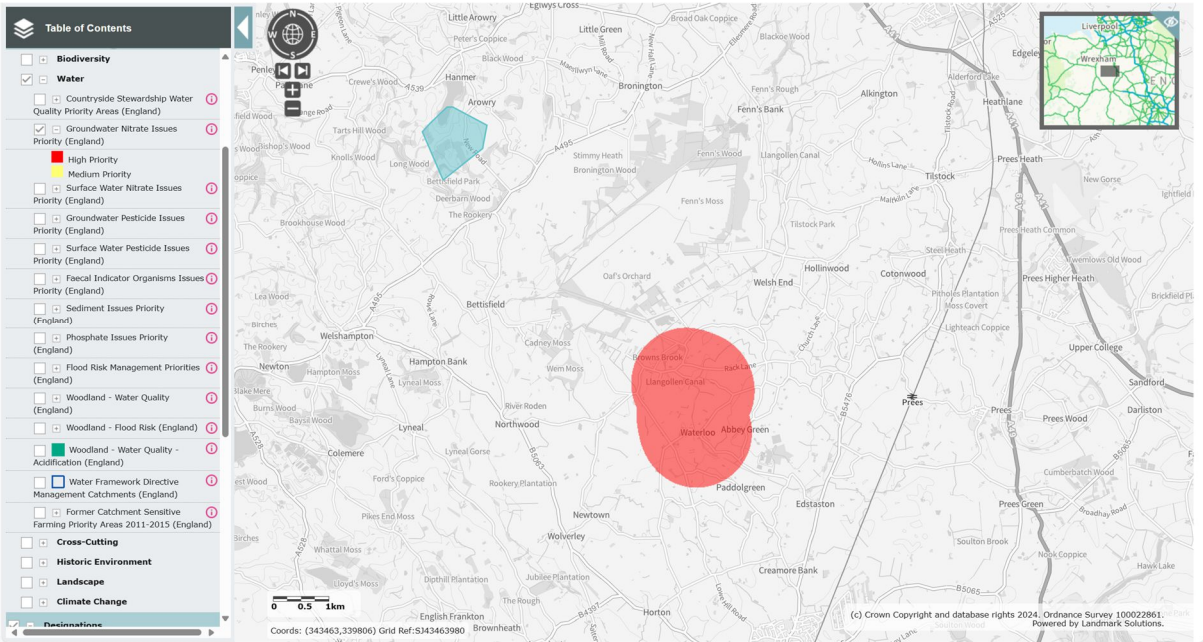


Figure 5: Nitrate Vulnerability Map

The soil information provided by *Soilscapes* and *BGS* indicate that the site is likely to be unsuitable for infiltration due to the clay ground and impeded drainage. The site is not within a nitrate vulnerability area.

2.3 Annual Rainfall

The annual rainfall is 708mm this has been taken from FEH please see below a screenshot from FEH:

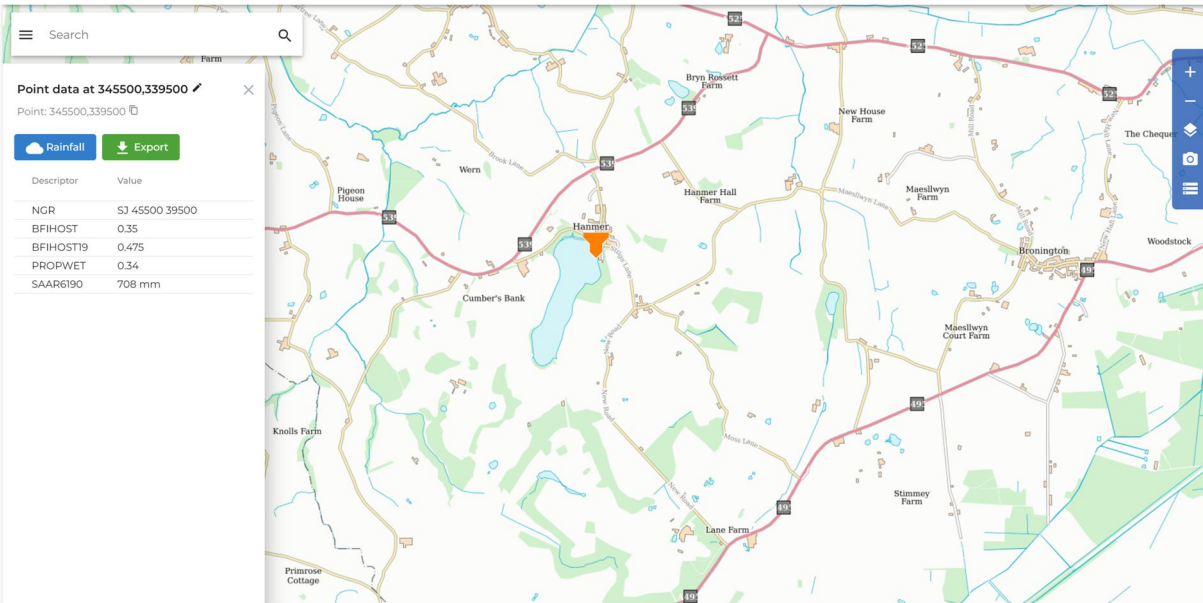


Figure 6: Screenshot of FEH indicating the annual rainfall event

3. NUTRIENT NEUTRALITY CALCULATOR

3.1 Introduction

Nutrient neutrality is an approach for managing new development and water discharge permit proposals to prevent them from causing any net increase in nutrients for the duration of the authorisation. Nutrient neutrality is applicable in Wales to developments with phosphorus discharges into Special Areas of Conservation (SAC) rivers.

West Wales have produced a calculator to mathematically calculate the amount of phosphates a development will produce. This will be used to calculate the nutrient values. Nutrient neutrality must ensure that there is no increase in phosphates and preferably a decrease of phosphate.

3.2 Existing Nutrient Neutrality Calculator

The nutrient calculator for West Wales has been used to calculate the existing nutrient load for the farm that is being disused because of the proposed development. Please see Appendix A, which indicates the nutrient load of the farm. This indicates that the existing phosphate load is 0.2kg TP/year.

However, the calculator does not have a specific choice for livestock yards. The closest would be commercial / industrial, and would underestimate the nutrient loss. Therefore, *Townsend Water Engineering* has used a methodology for the assessment of livestock yards which has been agreed with Natural England. This is based on a report undertaken by nutrient neutral report undertaken by nutrient neutral for a site in Willey Hall Herefordshire.

Slurry Storage and Agricultural Fuels and Oils regulations require that all contamination surface water from Livestock yards, classified as slurry, should be collected and stored. All modern yards are required to achieve this standard. However, yards constructed before March 1991 are not required exempt from this legalisation. Therefore, export of nutrients from dirty water/slurry as a result of runoff from pre-SSAFO yards are beyond these regulations. It is agreed with Natural England that these can be sued in schemes for the generation of nutrient credits. The report methodology is based on this planning permission. It is assumed this is acceptable in legalisation in Wales.

It is also confirmed that this site is not located within a Nitrate Vulnerable Zone.

A detailed description of the livestock yard is provided in order to calculate the current nutrient export from farmyard areas that have different uses, as these will vary. The approach to the calculation of nutrient export follows the same principle as that for the Natural England for urban areas, i.e. calculate the volume of runoff and multiply by an agreed nutrient concentration within that runoff. The coefficients of runoff have been extracted from the academic text and are summarised below:

Table 1 Coefficients	Assumed nutrient coefficients Total Phosphorous mg/l TP
Building roof area	0
Dairy yard	30.8
Sheep	13
General machinery yard	3.0

¹ Edwards & Withers. (2008) 'Transport and delivery of suspended solids, nitrogen and phosphorus from various sources to freshwaters in the UK', *Journal of Hydrology – February 2008*, pp. 144-153. Available at <https://www.sciencedirect.com/journal/journal-of-hydrology/vol/350/issue/3> (Accessed 19th May 2023).

A wide range of concentrations were recorded within the Edwards and Withers Study. However, mean values from the study are considered appropriate.

The total nutrient loss for each defined area is calculated by:

Annual rainfall (m) x land use area (m²) (what type of yard) x nutrient concentration.

Once the total nutrient export has been calculated, a 20% buffer is removed from the total, which reduces the total credits generated, to ensure a precautionary approach is taken.

Buildings and sheds

The farm yard pre-1991 (those under SSAFO Regulations or not) have been highlighted in Figure 7 (red and white stripe area). It is assumed that runoff from buildings is captured and discharged as clean water. Therefore, the footprint area of buildings has been excluded from nutrient calculations. The total area of the farm yard is 565m².

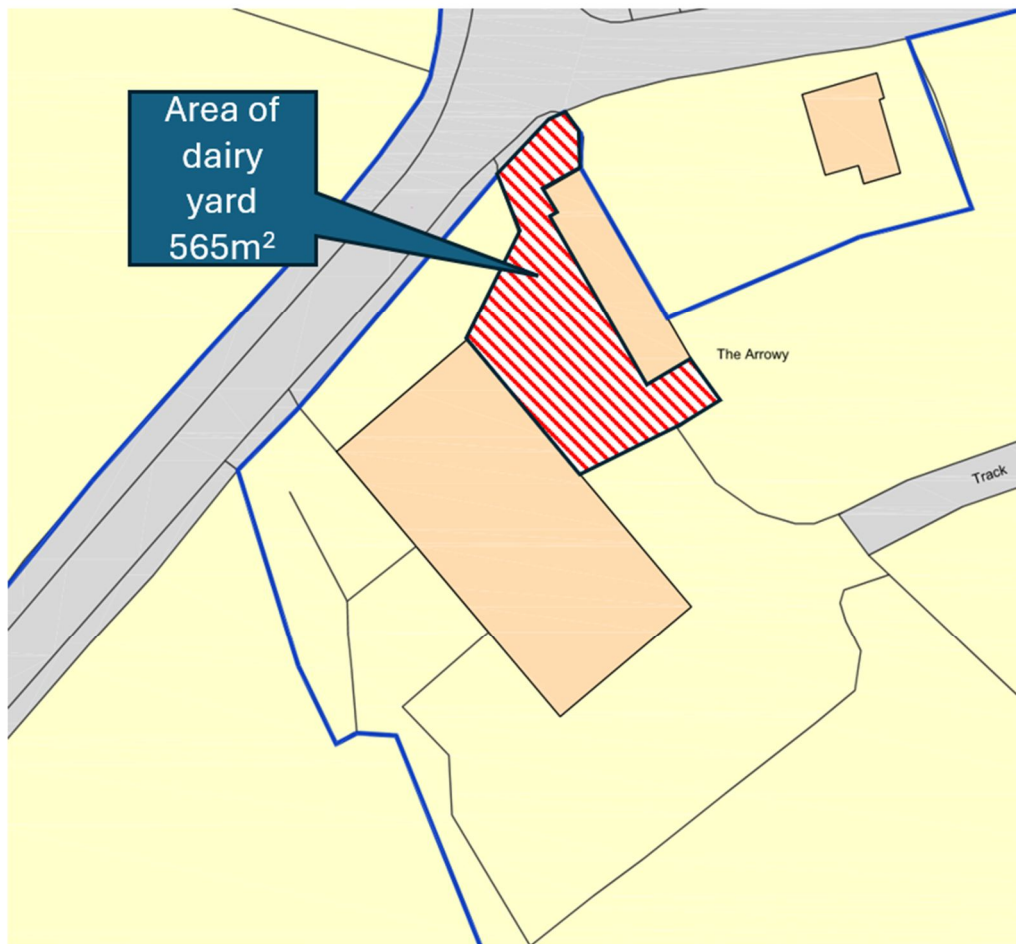


Figure 7: Area of the Farm Yard.

The annual rainfall amount is 708mm/year. So the equation is:

Annual Rainfall x area of dairy yard x TP value

$708 \times 565 \times 30.8 = \text{TP kg/yr}$

Then minus 20% for a buffer. This gives a total of 9.86 kg TP/year.

3.3 Proposed Nutrient Neutrality Calculator

The nutrient of the proposed development has been calculated on the following assumptions:

- The proposed development is for 3 residential dwellings;
- The occupancy is 2.3 people per dwelling; and
- The total required phosphates is 1.64kg TP/year.

Please see appendix B for the proposed development.

Therefore, taking the existing phosphates from the proposed (9.86 kg TP/year-1.64 kg TP/year) means with the inclusion of the proposed development, the phosphates generated on the site has decreased by a minimum of 8.22kg TP/year.

4. SUMMARY & CONCLUSIONS

A summary of the main conclusions for the Sustainable Foul Drainage Assessment is presented below:

- Development proposals are for the conversion of 3 x livestock barns into 3 x residential dwellings at Top House Farm, Big Arowry, Hanmer, Wrexham, SY13 3EJ;
- The proposed development is for a full planning permission. The existing site is 3 barns on a farm;
- The development site is approximately 0.248ha;
- The total phosphates produced by the farmyard is 9.86kg/yr;
- The total phosphates produced by the proposed development is 1.64kg/yr;
- Therefore, with the inclusion of the development, there is a net decrease of 8.22kg/yr.
- This means that the site is acceptable under the nutrient rules.

5. REFERENCES

Author	Date	Title/Description
Department for Communities and Local Government	Mar 2012	Technical Guidance to the National Planning Policy Framework
Ministry of Housing, Communities and Local Government.	Feb 2019	National Planning Policy Framework

Appendix A: Proposed Layout



THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELATED DRAWINGS. ALL DIMENSIONS MUST BE CHECKED AND VERIFIED ON SITE BEFORE COMMENCING ANY WORK OR PRODUCING SHOP DRAWINGS. THE ORIGINATOR SHOULD BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY. THIS DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY ROGER PARRY & PARTNERS.

Rev	Description	Date	By
-	-	year/mm/dd	--

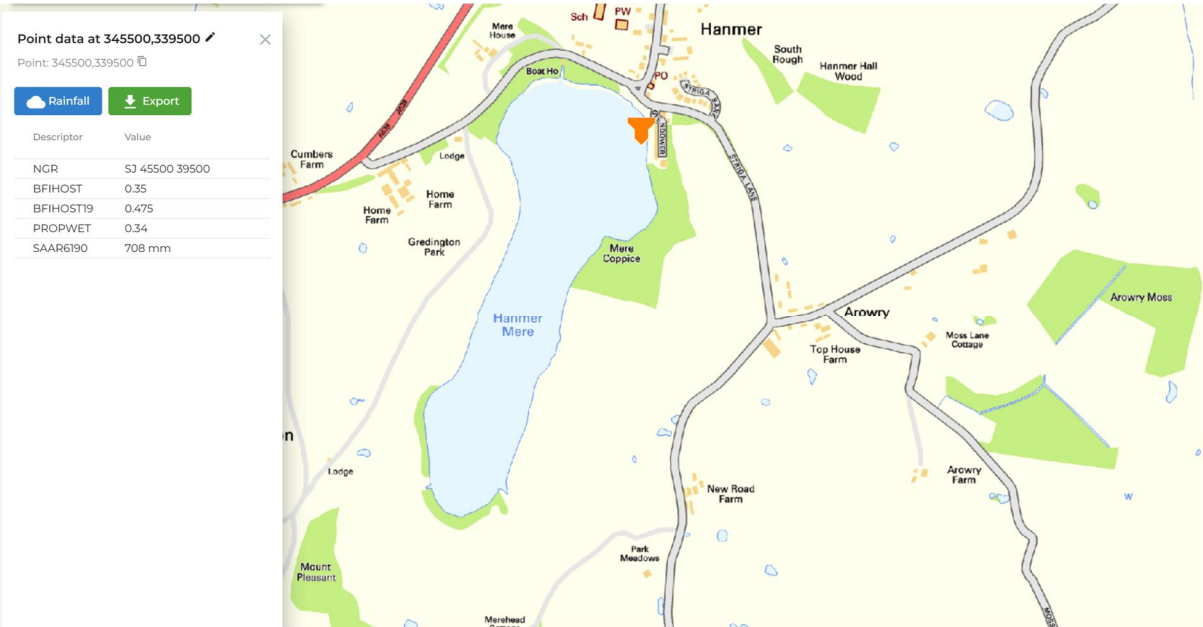


Residential - Agricultural - Commerical

Project;	Proposed Agricultural Building Conversion Cow Shed (Shippon)		
Drawing Title;	Location Plan Combined Schemes		
Location;	Top House Farm, Arowy, Wrexham. SY13 3EQ		
Client;	Mr T. Hanmer		
Scale;	1:500 @ A3		
Drawing No;	75171 / PL /	Rev;	-
Drawn By;		Date;	2022/04/11

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Appendix B: FEH data



Appendix C: Proposed Nutrient Calculator



Cyngor Sir Gâr
Carmarthenshire
County Council



Cyngor Sir
CEREDIGION
County Council

Stage 1 - additional nutrient loading from wastewater

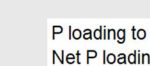
Instructions

User Inputs required

Local planning authority:	Pembrokeshire	
	Please enter the total number of employees required for commercial uses in the cell to the right:	2
Percentage of employees from outside of hydrological catchment:	100	
Water usage (litres/person/day):	120	
Development Proposal (dwellings/units):	3	
Wastewater treatment works:	Package T Please enter the total number of additional dwellings/units that will be on the development site as of the completion date of the project.	
Wastewater treatment works P permit (mg TP/litre):	Please enter value	

Additional population	6	persons
Wastewater by development	720	litres/day
Annual wastewater TP load	1.31	kg TP/yr

Cyngor Sir Gâr Cardiganshire County Council		Cymdor Sir CERIDIGION County Council		Stage 2 - phosphorus loading from existing land use	
Instructions					
User Inputs required					
Local Authority:		Pembrokeshire			
Soil drainage type:		Impeded drainage			
Annual average rainfall (mm):		Please enter value in cell to the right:	700.1 - 750		
Existing Land Use Type(s)	Area (ha)	Annual phosphorus nutrient export (kg TP/year)			
Dairy ▼	0.248	0.36			
Select exisiting (pre-development) land use types from the drop down list.					
Total:	0.248	0.36			



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Carmarthenshire
County Council



Cyngor Sir
CEREDIGION
County Council

Stage 4 - final budget

Instructions	Calculated Outputs
P loading to WwTW: Net P loading from land use change: P budget: P budget + 20% buffer:	1.31 0.05 1.37 1.64
The total annual phosphorus load to mitigate is:	1.64 kg TP/year