Water Strategy

At

Allt Fawr
Meifod
Powys

For

Mr D and Mrs A Bondi

Report prepared by

CGW Owen MRAC., MRICS., FAAV.

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Introduction

This report has been prepared on behalf of Mr and Mrs Bondi of Allt Fawr, Meifod to explain their water strategy in light of development to occur on farm. They are anxious to make efficient use of water on farm and to provide for improvements whenever possible. This report has been produced from observations made during the visit and discussion with Mr and Mrs Bondi. It confirms the advice given during the visit.

Advice and recommendations are based on the information provided by the client and all reasonable effort has been taken to verify that the information is correct. Any actions that affect the tenure of the business or anyone with an interest in the business should be discussed with the appropriate professional adviser before taking material steps in their implementation.

Existing cow accommodation and an adjacent dry fodder store (estimated area at 620m²) are being removed and replaced by a modern roofed menage and horse accommodation area. There will additionally be a horse walker situated to the north of the development, a 13.71m (45') diameter having a circle of developed ground some 1.8m (6') wide.

Presently rainwater off the existing structures is collected and piped directly to watercourse. Rainwater falling onto the new structure will be treated as a resource with use being made of it or it being managed on owned land.

The proposed menage will measure 64m x 35m (210' x 115') and the horse walker (mostly permeable surface). The horse walker will have an estimated impermeable surface of some 36m². Combined development area is therefore 2,276m².

This report identifies the drainage strategy employed for rainwater landing on the development.

Rainfall

The estimate of annual rainfall based on telephone STD code (01938) is given as follow:-

Oct	Nov	Dec	Jan	Feb	Mar
0.090	0.104	0.115	0.108	0.080	0.084

Apr	May	June	July	Aug	Sep	Total
0.058	0.064	0.071	0.062	0.059	0.077	1.00

Wallingford has a SAAR of 917mm with a one in a hundred-year event of 67.16mm. Allowing for urban creep and climate change that latter figure increases to 100.74mm.

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1 Summary

Planning permission is to be sought for a roofed menage at Allt Fawr, Meifod. The footprint of the development is to be 2,276m².

Existing buildings on site will be lost reducing volumes of water piped to watercourse. Rainwater landing on the new development will be treated as a resource, used or infiltrated to land through scrapes.

Historical data suggests approximately 2,276m³ of rain will fall on the new development (this data suggests it can be up to 261.74m³ in December). Wallingford SAAR is lower but has a one in a hundred-year event (after allowing for climate change and urban creep) for 12 hours resulting in 229.28m³ falling on the development. A rainfall event of 5mm, results in 11.38m³ of rainwater falling on the development.

There is limited demand for this water allowing opportunity to enhance biodiversity. To this end it is proposed to collect rainwater in a harvest tank (of 5m³ capacity) linked to drinking troughs, the toilet cistern in the development as well as a tap from which washdown (horses and trailers) will occur.

Excess harvested water will overflow to field NG3959 where 2 connected “scrapes” will be constructed. This will provide habitat of variable water content increasing the area for wildlife to exploit thereby increasing biodiversity.

The six “standards” associated with SuDS are used to frame the water strategy. It is considered that the proposal addresses these standards.

2 Site Details

Allt Fawr is an agricultural unit purchased in 2023 (approximate map reference E313903:N313790). There are a range of traditional buildings together with more modern steel framed buildings on site. The unit extends to an area of around 90 acres or thereabouts.

As the unit is so recently purchased there is limited livestock on farm – 6 horses.

Regard has been had to the Soil Survey of England and Wales which suggests that the soils of the area are of the of the Cegin series which is described as “Slowly permeable seasonally waterlogged fine silty and clayey soils. Some fine silty and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging on slopes. Well drained fine loamy soils over rock in places”.

3 Water Calculations

As part of any strategy, it is important to know volumes of matter being dealt with.

3.1 Development

A planning application is to be made to the Authority for a roofed menage that will measure 64m x 35m (210' x 115'). Additional to this surface is a horse walker (mostly permeable surface). The horse walker will have an estimated impermeable surface of some 36m². The total area of new development is 2,276m².

The proposed development is a private enterprise but it could easily involve getting part time help on the unit. Visitors are best kept informed so they might meet the strategy needs during their stay. Everyone at Allt Fawr should be made aware of the water strategy plan and encouraged to contribute towards improvements whenever possible.

3.2 Volumes Quantified

The estimate of annual rainfall based on telephone STD code (01938) is given as follow:-

Jan	Feb	Mar	Apr	May	June
0.108	0.080	0.084	0.058	0.064	0.071

July	Aug	Sep	Oct	Nov	Dec	Total
0.062	0.059	0.077	0.090	0.104	0.115	1.00

Based on these figures the volume of rainwater falling onto the new development will be approximately **2,276m³ (500,720 gallons)** annually. Wallingford figures would suggest slightly less rainfall on the development at **2,087m³ (459,160 gallons)**. Using the Wallingford 12-hour, one in a hundred-year event (after allowing for climate change and urban creep) about 229.28m³ of rain will fall on the development.

The historical figures above suggest percentage of annual rainfall by month as follows:-

Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
10.8	8.0	8.4	5.8	6.4	7.1	6.2	5.9	7.7	9.0	10.4	11.5	100

During the 6-month winter period (October to end March) approximately 58% of rainfall would fall.

Using the figures above, an estimate of average of daily rainfall is given (mm)

Jan 31 days	Feb 28 days	Mar 31 days	Apr 30 days	May 31 days	June 30 days
3.48	2.86	2.71	1.93	2.06	2.37

July 31 days	Aug 31 days	Sep 30 days	Oct 31 days	Nov 30 days	Dec 31 days
2.00	1.90	2.57	2.90	3.47	3.71

Estimated monthly and daily production based on these averages are provided below from the development of 2,276m².

	Jan 31 days	Feb 28 days	Mar 31 days	Apr 30 days	May 31 days	June 30 days
Monthly estimation	245.81	182.08	191.18	132.00	145.66	161.60
Daily estimation	7.92	6.51	6.17	4.39	4.69	5.39

	July 31 days	Aug 31 days	Sep 30 days	Oct 31 days	Nov 30 days	Dec 31 days
Monthly estimation	141.11	134.28	175.25	204.84	236.70	261.74
Daily estimation	4.55	4.32	5.85	6.60	7.90	8.44

Self-evidently, whilst average monthly rain has been estimated at between 58mm to 115mm (daily at 1.90mm to 3.71mm) there will be periods when daily rainfall is greater – in some cases significantly so. Assuming a rainfall event figure of 5mm, the volume of water generated off the developments would be 11.38m³ (2,503 gallons).

3.3 Sustainable Urban Drainage System (SuDS)

Compliance with SuDS means that water management practices are aligned with natural water systems and processes. In urban areas they manage flood and pollution risks from runoff and generally contribute to environmental enhancement. In rural settings, with more space and land available, more natural and possibly robust systems can be employed.

The key principle of SuDS is to infiltrate with water held back and flow slowed. The ideal is to use methods that are complimentary, to manage runoff as close as possible to where it falls as rain and to be proactive dealing with issues before they occur. The estimated volumes of water (above) reflect the scale of the development.

It is worthy of note that there are buildings currently in-situ where rainwater falling on them is caught and piped through existing drainage directly to watercourse. Powys have determined that where a structure is removed before new development, rainwater on the new development needs inclusion in calculations.

Field Number NG3959 is a low-lying field identified on the attached map. It offers poor quality grazing. Consideration has been given to increasing the biodiversity value of this area as part of long-term planning by the inclusion of two "scrapes". Scrapes are areas where there is variable water level – often dry.

3.4 Annual Management Plan

All systems require regular maintenance and management to ensure their wellbeing. The proposed system will be subject to annual review conducted by the owners who will check that all rainwater goods and pipework are in good order replacing/repairing any that are broken or damaged.

Damage can occur at any time and it will be the responsibility of the owners to remedy any issues identified through the year and not just at annual review. This will ensure maximum efficiency of the system. If noted that there are blockages through the year, they will be cleaned at that time and not have to wait for annual review.

3.5 Water Demand

Rainwater falling on the proposed menage will be dealt with as a resource. Water will be used in a variety of ways to include as a drinking source for horses, as grey water for toilet systems, in washing down horses and trailers.

Horses need water – their daily requirement when at rest is somewhere between 22 litres daily and 68 litres. If we average that at around 45 litres of water per day, and with up to 10 horses on site that would push average daily demand to approximately 0.45m³ (ranging between 0.22 and 0.68m³ daily average). These figures rise when the horse is working.

This water needs to be clean and fresh for consumption.

Another use for water will be flushing toilets. Assuming 10 flushes per day, with 16 litres used per flush, 160 litres will be used. It is more difficult to quantify the amount of water used in washing a trailer or a horse – each act has many variables. Washing a trailer will easily use 100 litres of water, washing a horse something similar.

Washing of plant and equipment will regularly occur – biosecurity is a key demand at Allt Fawr. This will involve potentially large volumes of water but again this is difficult to quantify. Cleaning off protective clothing another use. It is highly unlikely that demand will be equivalent to average daily production based on historical data.

3.6 Developing a Water Efficiency Improvement Action Plan (WEAP)

WEAP's show ownership of identified issues ensuring water efficiency is a core requirement. Once potential improvement actions are identified they are attributed to individuals who become responsible to ensure the actions are conducted. This should not be prescriptive or onerous but ensure responsibility is taken for actions.

In a WEAP, investigation of alternatives can occur such as the elimination of potable water usage (quality issues may impact), offsetting potable water usage (sourcing water with lower standards for tasks such as vehicle and trailer washing, storage of roof rainwater is being considered on farm), reducing potable water usage, re-using water, disposal of used water (discharge to soakaway on field surface is allowed for certain tasks) but SuDS parameters need to be considered to mitigate impact). Making use of non-potable sources of water results in reduced cost and may provide for security of supply to livestock, augment animal welfare on farm in addition to reducing environmental and carbon impact associated with delivering potable water to the premises.

Sustainable development in Wales is established in legislation. The Well-being of Future Generations (Wales) Act 2015 requires all public bodies in Wales "to work towards the goal of "A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change".

Under section 6 of the Environment (Wales) Act 2016 public bodies in Wales have a duty to maintain and enhance biodiversity and promote the resilience of eco-systems – meeting this duty is vital to ensure long-term viability and climate change adaption.

From 7th January 2019, all new developments of more than 1 dwelling house or where the construction area is 100 square meters or more, will require sustainable drainage systems (SuDS) for surface water. It does not cover existing drainage systems.

Sustainable drainage is managing rainwater with the aim of reducing damage from flooding, improving water quality, protecting/improving the environment, protecting health and safety whilst also ensuring the stability and durability of drainage systems.

There are 6 "standards". **Standard S1** relates to surface water runoff destination and addresses the use of surface water by the development and where it should be discharged. The aim is to ensure that runoff is treated as a resource and managed in a way that minimises negative impacts so ensuring that early consideration is given to the use of rainwater harvesting systems to both manage runoff and deliver a source of non-potable water. Where this is not practicable, prioritisation should be given to infiltration. Discharges to sewerage systems must be limited where possible. Priority levels are as follows (Level 1 is the preferred/highest priority, levels 4 and 5 should only be used in exceptional circumstances):-

- Priority Level 1: Surface water runoff is collected for use;
- Priority Level 2: Surface water runoff is infiltrated to ground;
- Priority Level 3: Surface water runoff is discharged to a surface water body;
- Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;
- Priority Level 5: Surface water runoff is discharged to a combined sewer.

The aim of **Standard S2** is to manage surface water runoff from (and on) a site to protect people on site from flooding, to mitigate any increased flood risk to people/property downstream of the site and

to protect the receiving water body. **Standard S3** addresses the drainage design requirements to minimise the potential pollution risk posed by surface water runoff to a receiving water body. **Standard S4** (Amenity**)** addresses the design of SuDS components to enhance the public wellbeing, **Standard S5** (Biodiversity) addresses the design of SuDS to aid the creation of ecologically rich green and blue corridors in developments, **Standard S6** (Design of drainage for Construction) with designing robust surface water drainage systems so they can be easily and safely constructed, maintained and operated.

3.7 Proposal

Any development over 100m² requires SAB approval. A SuDS application will be made for this development.

A substantial volume of rainwater will on the proposed development annually. This is estimated at approximately 2,276m³ based on historical data. That same data shows monthly volumes would vary up to 261.74m³. A one in a hundred-year event for 12 hours results in 229.28m³ falling on the development. A rainfall event of 5mm, results in 11.38m³ falling on the development.

Presently water falling onto roof surface is collected and piped to watercourse. To meet the SuDS requirements of managing water in line with natural water systems and processes the following is proposed:-

- Collect rainwater in a harvest tank of 5m³ capacity. This tank to be positioned to the east of the development. The tank to have a filtration system so no dry matter enters or exits it.

- Connect the harvest tank to toilet cistern so that grey water can be used in flushing.

- Connect the tank to a tap on the west of the development so water might be used for washdown activities (trailer and horses).

- Connect the tank to drinking troughs for the horses to utilise.

With it unlikely that activities above will use the volumes of water to be harvested there needs to be an overflow facility. This overflow is to be connected to drainage leading to field NG3959 where two “scrapes” will be constructed on the fields eastern side. Rainwater from the development will discharge to the first scrape with overflow to a second. The second scrape will have an overflow to the field ditch.

Scrapes hold water back. Field NG3959 has a ditch positioned to its south. In extremis, if rainwater fills both scrape, water will overflow to the ditch. Scrapes have variable water volumes in them meaning there is an environment available for wildlife to exploit. The scrapes would be fenced out allowing the area around to be undisturbed by livestock. This will allow grasses to become rank. A combination of scrapes, undisturbed grass, hedgerows and ditches offers significant habitat to exploit, the synergy generated by the combination will add biodiversity value.

The scrapes will hold water back and it is proposed that each scrape be of an average depth of 0.5m (wholly below existing ground level). The combined surface area of the scrapes will be some 460m²; the first (receiving) scrape half the size of the second one. In this manner the scrapes will be different in their complexity of habitat.

The proposal reduces the volume of water going off impermeable surface to watercourse at Allt Fawr from the current position. The proposal holds water back and manages it primarily on owned land. By harvesting and making use of water it is treated as a resource. A complex habitat is formed increasing biodiversity on farm.

4 Conclusions

Planning permission is to be sought for a roofed menage at Allt Fawr, Meifod. The footprint of the development is to be 2,276m².

Existing cow accommodation and an adjacent dry fodder store (estimated area at 620m²) are being removed and replaced by proposed development. Rainwater off the existing structures is piped to watercourse. This will change with reduced volumes going to the watercourse and rainwater off the new structure treated as a resource.

It is estimated that approximately 2,276m³ of rain will fall on the new development based on historical data. That same data shows monthly volumes would vary up to 261.74m³. Wallingford suggests a one in a hundred-year event (after allowing for climate change and urban creep) for 12 hours results in 229.28m³ falling on the development. A rainfall event of 5mm, results in 11.38m³ falling on the development.

One of the Allt Fawr fields offers low value grazing. Consideration has been given to increasing the biodiversity of this area.

Water demand from the new development will be limited, lower than will be harvested. Treating rainwater off the roof as a resource is paramount and so that harvested will be used but the excess offers potential to enhance biodiversity – a vibrant blue/green corridor as the SuDS manual comments.

The proposed water strategy will be to collect roof rainwater in a harvest tank (after filtration) of about 5m³ capacity. This tank will offer a degree of attenuation whilst also providing 2-3 days use (offering sustainability and reducing pressure on potable sources). The harvest tank will be connected to drinking troughs, the toilet cistern in the development as well as to a tap from which washdown (horses and trailers) will occur.

There will be an overflow from the system taking excess water to field NG3959 where 2 connected “scrapes” will be constructed. The scrapes are a distance from the farmstead and it will have a substantial capital cost. The outfall to the first scrape will need careful planning as water travelling down an unimpeded drain could impact – the discharge point will be into a stoned area to rapidly slow flow.

Rainwater from the development will discharge to the first scrape (approximately half the size of the second) with overflow to the second. The second scrape will have an overflow facility to watercourse (a stone filled trench). In this way two areas will be generated with variable water content resulting in diverse habitat being created. The area around the scrape will be fenced out increasing the biodiversity value of the enclosed grassland.

The six “standards” associated with SuDS are used to frame the water strategy.

Making use of water and allowing for infiltration meets the requirements of Priorities 1 and 2 of Standard 1. It also reduces potable water use, reduces carbon footprint and increases sustainability.

The development reduces the volume of water entering watercourse (no roof water is piped to the ditch) thereby reducing risk to those downstream of the development. By piping away to field NG3959, the lowest lying ground at Allt Fawr, it reduces risk to those on site. This addresses the requirements of Standard 2.

Managing water as proposed takes water away from buildings where pollutants occur. Roof rainwater is regarded as a low pollution risk. By collecting and piping roof rainwater safely to the scrapes, avoiding potential pollutants, satisfies S3 requirements.

Standards 4 and 5 are addressed by increased biodiversity on farm with the provision of new habitats to be exploited by wildlife.

Rainwater goods on agricultural structures are robust and readily repaired and would comply with the requirements of Standard 6.

The owners at Allt Fawr will be responsible for ensuring that the drainage system employed remains in good order.

Reflecting on the above, it is considered that the drainage strategy at Allt Fawr is in line with SuDS requirements and should be accepted by the Authority.

CGW Owen MRAC., MRICS., FAAV.

3rd August 2023