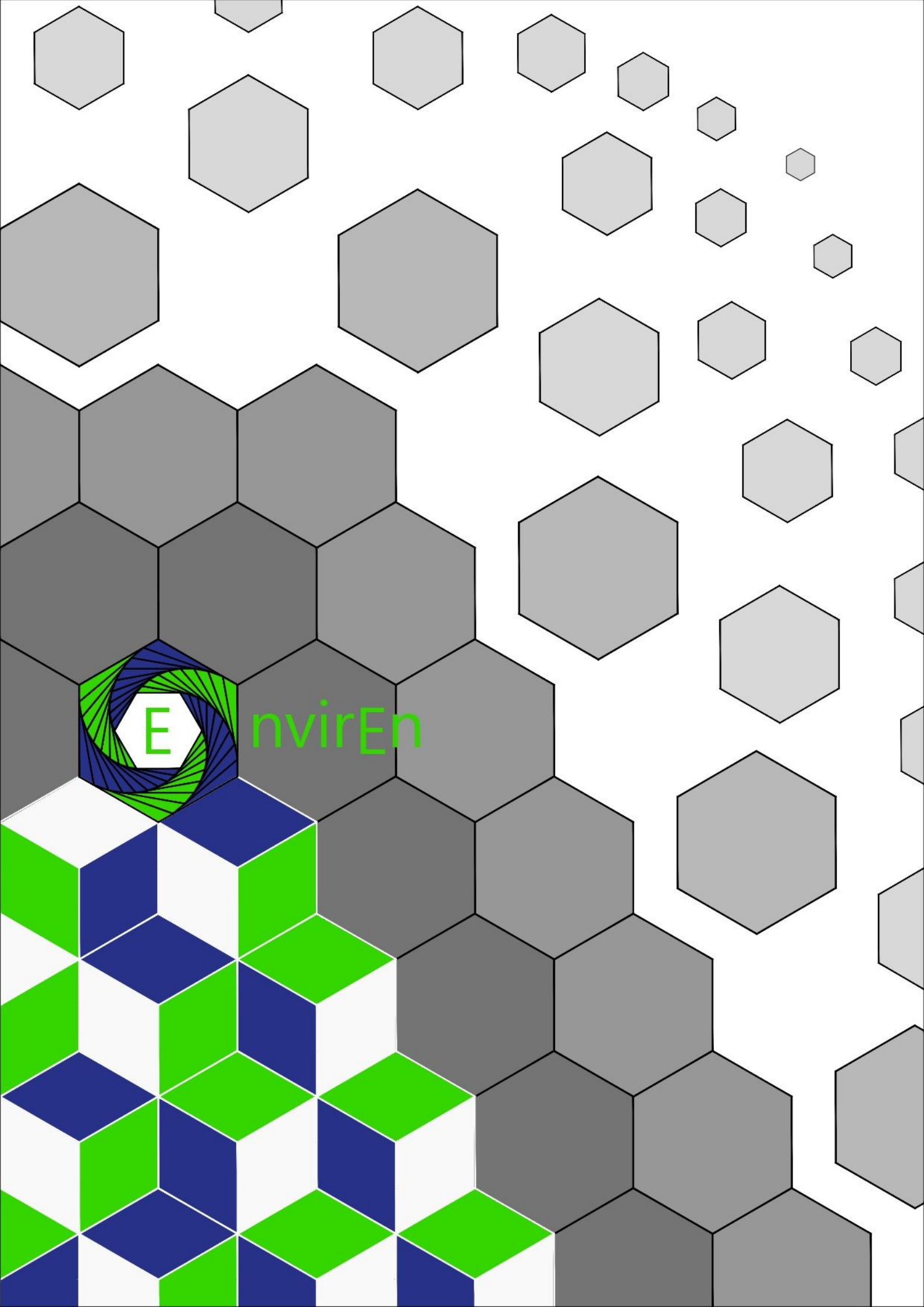






Drainage Strategy and Water Quality Assessment (DSWQA)

Llanfair Farm, Marshfield

L. Costa BEng

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Executive Summary

This report has been prepared by Enviren Ltd solely for use as part of planning application associated with the construction of one dwelling on Llanfair Farm, Marshfield (Grid reference: ST 26205 82486). This report shall analyse the existing site use, flood risk potential and vulnerability classification and then discuss a suitable on-site drainage strategy with due consideration to flood risk, vulnerability classification and water quality.

This report has been compiled with due regard to the requirements of the associated Technical Guidance (March 2012), the Planning Policy Guidance for Flood Risk (PPG) [Updated August 2022]¹ as well as CIRIA C753 The SuDS Manual, Government guidance², the Natural Resources Wales Flood Risk Management Plan: South East Wales Place and the Newport City Council Local Flood Risk Management Strategy. In the preparation of this report attention has also been paid to the River Usk Management Plan.

The site is shown to be situated entirely within Flood Zone 1 and at low risk of river flooding and is not effected by any other identified form of flood risk. In accordance with flood risk planning guidance, the SFRA and the Non-statutory technical standards³ there should be no increase in peak discharges from the site and discharge rates and discharge volumes should be constrained as close as reasonably practicable to greenfield runoff rates and volumes, but never exceed the existing discharge rate and volume. Where achieving greenfield runoff rates is not reasonably practicable a 30% betterment over brownfield runoff rates could reasonably be specified, providing confirmation is received from the council, with the volume of water not exceeding previous brownfield conditions. Where a betterment cannot be incorporated then the development must provide wider benefits to the downstream water network in line with the other three core pillars of SuDS (see **Figure 3.1**), being water quality, biodiversity and amenity.

¹ Department for Levelling Up, Housing and Communities and Ministry of Housing Communities and Local Government – Flood Risk and Coastal Change.

² EA – Flood Map for Planning and Long Term Flood Risk Mapping.

³ Department for Environment, Food and Rural Affairs – Sustainable Drainage Systems – Non-statutory technical standards for sustainable drainage systems (March 2015)



The proposed development will result in an increase in impermeable surface area as the existing green space shall be replaced with the dwelling. Surface water shall be disposed of through permeable paving and a soakaway system, thereby not increasing flood risk elsewhere. The proposed development shall discharge treated foul water to ground through a drainage mound, located an acceptable distance away from the proposed dwelling.

In compliance with the requirements of the National Planning Policy Framework, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Additionally the development will not increase flood risk to the wider catchment area owing to suitable management of surface water runoff.



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1. Introduction

- 1.1. This report has been prepared by Enviren Ltd solely for use as part of planning application associated with the construction of a rural enterprise worker's dwelling at Llanfair Farm, Marshfield (Grid reference: ST 26205 82486). This Drainage Strategy (DS) is compliant with the requirements of the associated Technical Guidance (March 2012) along with other regional and national guidance.

Sources of Information

- 1.2. This report has been based on the following sources of information (this list is not exhaustive and comprises the major sources of background documentation):
- a) Site Layout Plan
 - b) Topographical Survey Information
 - c) Environment Agency Surface Water Flood Maps
 - d) Environment Agency Fluvial and Thalassic Flood Maps
 - e) Environment Agency Reservoir Flood Maps
 - f) Local Authority Groundwater Flood Maps
 - g) Sustainable Drainage Statutory Guidance
 - h) Natural Resources Wales Flood Risk Management Plan: South East Wales Place
 - i) British Geological Survey (BGS) Drift & Geology Maps
 - j) Newport City Council Local Flood Risk Management Strategy
 - k) The River Usk Management Plan
- 1.3. The existing site currently consists of agricultural land associated with Llanfair Farm. Topographical information confirms that overland flows from the site are directed to the east. Runoff from the existing land flows overland into the local watercourse network. This is discussed in more detail in [Section 2](#). Access is present from the west off Church Lane.

Table 1.1 – Site Specific Information			
Category		Site Specific Information	
Site Name		Llanfair Farm, Marshfield	
Site Location		Marshfield, Cardiff	
Overall Site Area		0.013 Hectares	
Design Return Period		100 years for on-site flooding	
Climate Change Allowance		45% - Rainfall intensity	
Flood Zone (Rivers and Sea)		Flood Zone 1 (FZ1)	
Risk of Surface Water Flooding		Very low risk	
Risk of Reservoir Flooding		Very low risk	
Risk of Groundwater Flooding		None identified	
Risk of Sewer Flooding		None identified	
Critical Drainage Status		Not believed to be within a Critical Drainage Area	
High Risk	Medium Risk	Low Risk	Very low risk

2. Background Information

Site Location

- 2.1. The site is located off Church Lane, Marshfield. The application site is located 9.4 kilometres north east of Cardiff centre and approximately 7.15 kilometres south west of Newport. The exact location can be found in [Figure 2.1](#):

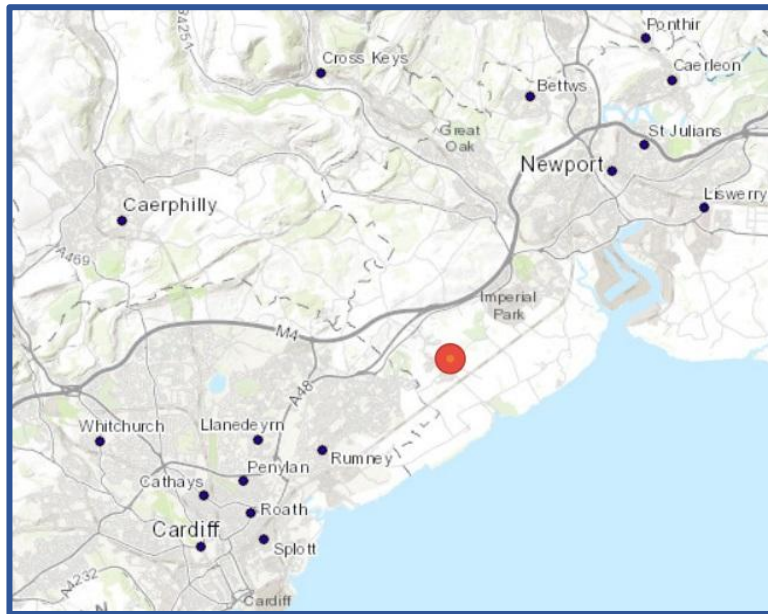


Figure 2.1 – Site Location

Outline Site Hydrology

- 2.2. Interrogation of local topographical information identifies that overland flows from the site are directed to the east and into a series of minor watercourses that discharge into the Severn Estuary.
- 2.3. Inspection of UK Topographical Information⁴ data shows a low hydraulic gradient to the west with levels falling from approximately 11.000mAOD within the application site to 0.000mAOD at the Severn Estuary, approximately 2.5km south of the site.



Figure 2.2 – UK Satellite Topographic Data – Site Hydrology

[Contains information from TessaDEM, which is made available [here](#) under the Open Database License (ODbL).]

⁴ TessaDEM – Satellite Contoured Mapping.

Site Description

- 2.4. The area to be developed comprises agricultural land used as part of the farm. The overall area of development is approximately 0.013 hectares in size when considering the areas in the site plan (see [Appendix A](#)). The development site is bordered to the north, east and south by agricultural fields, and to the west by an agricultural barn. As displayed on the mapping in [Figure 2.3](#) the site consists of fields and a dirt road.



Figure 2.3 – Aerial Reconnaissance Photography

Geotechnical/Geological

- 2.5. GS Mapping⁵ indicates that the development is underlain by interbedded Argillaceous rocks and sandstone, of the St Maughans Formation described typically as interbedded purple, brown and green sandstones and red mudstones with intraformational conglomerates containing calcrete clasts. Details of the bedrock are found in [Figure 2.4](#). Local BGS Borehole Records⁶ confirm the maps findings.

⁵ BGS Surface Geology – Geology of Britain Viewer

⁶ BGS – GeoIndex Onshore

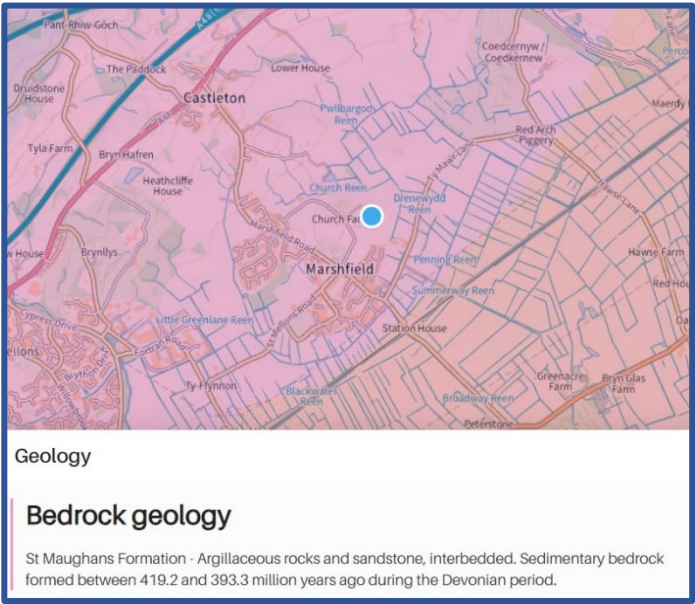


Figure 2.4 – BGS Geological Mapping

Table 2.1 – Geological Stratum	
Underlying Geology	Description
Topsoil	Slightly acid loamy and clayey soils with impeded drainage
St Maughans Formation	Interbedded purple, brown and green sandstones and red mudstones with intraformational conglomerates containing calcrete clasts

3. Outline Surface Water Drainage Strategy

- 3.1. As described in the Strategic Flood Risk Assessment, the accompanying technical standards and planning policy guidance; new development should embrace the sustainability goals of SuDS, accommodating SuDS in development proposals where possible.

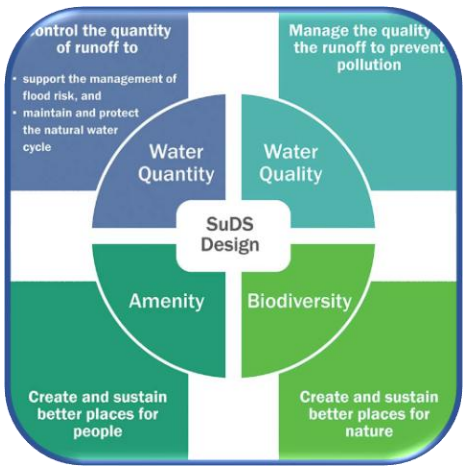


Figure 3.1 – Multiple benefits of SuDS

- 3.2. Proposed surface water drainage systems should also seek to provide a betterment in runoff rates and volumes when compared to existing conditions. As per the non-statutory technical standards, post development runoff rates should be limited to the existing runoff rate for all events between the 1 in 1 year and the 1 in 100 year events, including an



allowance for climate change. However for previously developed sites (brownfield sites), runoff rates should be limited to the equivalent greenfield runoff rates for all events between the 1 in 1 year and the 1 in 100 year events, including a suitable allowance for climate change. Where this is not practical a betterment over the existing situation is expected for all return period events (usually 30%). However, should betterment not be achievable this can be offset by improvements in relation to the other 'pillars of SuDS'.

- 3.3. To achieve the policy goals of the SFRA a discharge method should be sought that is compliant with the surface water discharge hierarchy which specifies discharge preferability. The hierarchy states that discharge should be:
- Into the ground (infiltration);
 - To a surface water body;
 - To a surface water sewer, highway drain, or another drainage system; or
 - To a combined sewer

Discharge to Ground

- 3.4. A review of the British Geological Survey GeoIndex Onshore⁷ explorer provides a localised description of the strata underlying the site. The underlying strata is described as interbedded purple, brown and green sandstones and red mudstones with intraformational conglomerates containing calccrete clasts.
- 3.5. Beyond a desktop study, infiltration testing was undertaken by the applicant across the site parcel to prove that infiltration would be possible. On this basis of background mapping and onsite infiltration testing, soakaways and permeable paving should be viable options. BRE365 compliant soakaway tests have not been undertaken; however, percolation tests have been undertaken for the proposed drainage mound with favourable infiltration rates (see **Table 4.1** for percolation test results).
- 3.6. It is recommended that BRE365 compliant testing is undertaken at a later stage; however, should this testing be unsuccessful, discharge to a watercourse should be pursued. It was noted that groundwater at the application site was shallow (1.8m below ground level); however, superficial SuDS components such as permeable paving and soakaways discharging clean roof runoff should still be acceptable providing a 1m depth is present between these infiltration components and the groundwater level.

Proposed Surface Water Drainage Strategy

- 3.7. As per UK government flood risk and coastal change guidance⁸, Sustainable Drainage Statutory Guidance, Natural Resources Wales Flood Risk Management Plan: South East Wales and the Newport City Council Local Flood Risk Management Strategy, SuDS should be considered as part of new development, particularly major development. SuDS can provide various benefits, as outlined in **Figure 3.1**. As well as providing storage, SuDS can also provide pollution control at source (Source Control) and in some instance Interception, leading to significant water quality benefits. Potential SuDS options are outlined in **Table 3.1**:

⁷ British Geological Survey – GeoIndex Onshore

⁸ Development for Levelling Up, Housing and Communities and Ministry of Housing Communities and Local Government – Flood risk and coastal change 25 August 2022.



Table 3.1 – Sustainable Drainage Systems										
Constraint	Topography		Geological			Development		Maintainability	Commercial Desirability	Suitability
Characteristic	Slope	Outfall Design	Contaminated	Permeability	Groundwater	Area (Hectares)	Density			
Site Specific Result	1:20	Shallow	No	Yes	1.8m	0.013	L			
Recharging										
Infiltration Trench	✓	✓	✓	✗	✗	✗	✗	✓	✓	✗
Permeable Pavement	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
Soakaway	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Infiltration Basin	✓	✗	✓	✗	✗	✗	✗	✓	✓	✗
Swale	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗
Recycling										
Rainwater Harvesting	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗
Green Roof	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗
Discharging										
Filtration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pond/Wetland	✓	✗	✓	✓	✓	✗	✗	✓	✓	✗
Detention Basin	✓	✗	✓	✓	✓	✗	✗	✓	✓	✗
Subsurface Storage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

- 3.8. A drainage strategy could be pursued which utilises soakaways and permeable paving (see [Appendix G](#)). This should be provided as a minimum and the development should look to achieve source control and interception through the incorporation of localised green SuDS features such as: tree pits, rain gardens and bioretention beds. The components must be designed such that cleansing can be provided for the frequent, high pollutant runoff events or “first flush” events, this is typically defined as the 1 in 1 year return period event.

Treatment Design

- 3.9. Sustainable Drainage Systems (SuDS) can be designed to maximise water treatment through creating a SuDS treatment train which incorporates the key pollutant removal mechanisms. A list of key removal mechanisms is tabulated in [Table 3.2](#):

Table 3.2 – Pollutant Removal Mechanisms	
Removal Mechanism	Description
Sedimentation	Sedimentation is one of the primary removal mechanisms in SuDS. Most pollution in runoff is attached to sediment particles, and so removal of sediment results in a significant reduction in pollutant loads. Sedimentation is achieved by reducing flow velocities to a level at which the sediment particles fall out of suspension (finer particles requiring lower velocities) or by encouraging flocculation (which increases particle size). Very fine particles may remain in suspension and essentially be characterised as dissolved. Sediment requires periodic removal to



	permit the effective functioning of SuDS components. Care also has to be taken in design to minimise the risk of resuspension when extreme rainfall events occur.
Filtration and Biofiltration	Pollutants that are conveyed in association with sediment may be filtered from runoff. This may occur through trapping within the soil or aggregate matrix, on plants or on geotextile layers within the construction. The location of any filtration will depend on the internal structure of the particular SuDS component. There will generally be a need to balance removal efficiency with the potential risk of blockage of the filtration component (and associated maintenance needs of the component, e.g. filter removal and replacement) although planting can often be used to help minimise blockage risks and lead to systems that are relatively self-maintaining.
Separation	Many hydrocarbons and some other pollutants (e.g. pollens) float on the surface of water as an immiscible "skin". Such pollutants can be skimmed off using separation processes, or can be trapped by vegetation, allowing subsequent degradation, for example by volatilisation and photolysis.
Adsorption	Adsorption occurs when pollutants attach or bind to the surface of sediment, soil, sand, aggregate or artificial material. The actual process is complex but tends to be a combination of surface reactions. Change in acidity of runoff can either increase (higher pH) or decrease (lower pH) the adsorption of pollutants. Similarly, the winter use of de-icing salts can encourage the release of metals from the surface. Eventually, the materials onto which pollutants adsorb will become saturated and so this method of treatment will cease to be effective unless mechanisms for regeneration are available.
Biodegradation	In addition to the physical and chemical processes that may occur on and within a SuDS component, biological treatment may also occur. Microbial communities are likely to be established within the soil or aggregate matrix, using the oxygen within the free-draining materials and the nutrients supplied with the inflows, to degrade organic pollutants such as oils and grease. The level of activity of such bioremediation will be affected by the environmental conditions such as temperature and the supply of oxygen and nutrients. It also depends on the physical conditions, such as the suitability of the materials for colonisation. Ammonia and ammonium ions can be oxidised by bacteria in the ground to form nitrate, which is a highly soluble form of nitrogen. Nitrate is readily used as a nutrient by plants. In oxygen-limiting conditions, anaerobic bacteria can facilitate denitrification, in which the participation of several species of bacteria can eventually result in the complete reduction of nitrate to molecular nitrogen. This is an important process where excessive nitrate production threatens groundwater quality or eutrophication in surface waters.
Volatilisation	Volatilisation involves the transfer of a compound from the solid or solution phase to the atmosphere. The conversion to a gas or vapour is influenced by temperature, reducing pressure, chemical reaction or a combination of these processes. The rate of volatilisation of a compound is dependent on its vapour pressure, as well as the characteristics of the surrounding soil. In SuDS systems, volatilisation is primarily concerned with organic compounds associated with petroleum products and pesticides.
Precipitation	This process is the most common mechanism for removing soluble metals. Precipitation involves chemical reactions between pollutants and compounds in the soil or aggregate matrix that transform dissolved constituents into particles of insoluble precipitates. Metals are precipitated as hydroxides, sulphides and carbonates, depending on which precipitants are present and the pH level. Precipitation can remove most metals (e.g. arsenic, cadmium, Chromium, copper,



	iron, lead, mercury, nickel, zinc) and many anionic species (e.g. phosphates, sulphates, fluorides), although to different levels according to the applied conditions.
Uptake by plants	In ponds and wetlands, uptake by plants (specifically via the biofilm growth around the plant structure) is an important removal mechanism for nutrients (phosphorous and nitrogen). Metals can also be removed in this manner, although intermittent maintenance may be required to remove the plants, otherwise there is the possibility that metals will be returned to the water when the plants die. Die-back can also be accompanied by a release of nutrients. Plants also create suitable conditions for deposition of metals, such as sulphides, in the root zone and also provide a microbiological environment that supports the biodegradation of organic pollutants.
Photolysis	The breakdown of surface-held organic pollutants by exposure to UV light.
Hydrolysis	The chemical breakdown of a compound due to reaction with water.
Oxidation	The combination of a compound with oxygen.
Reduction	The loss of oxygen from a compound.
Substitution	The replacement of one functional group in a compound with another.

3.10. A comparison between potential SuDS features and the removal mechanisms in **Table 3.2** is presented in **Table 3.3**, with a recommendation of a complimentary treatment train for the development:

Table 3.3 – Treatment Capacity of Sustainable Drainage Systems														
SuDS Component	Treatment Mechanism													
	Sedimentation	(Bio) Filtration	Separation	Adsorption	Biodegradation	Volatilisation	Precipitation	Plant Uptake	Photolysis	Hydrolysis	Oxidation	Reduction	Substitution	Treatment Eligibility
Infiltration Trench	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗	✓	✓	✓	✗
Permeable Pavement	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✓	✓	✓
Soakaway	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Infiltration Basin	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗	✓	✓	✓	✗
Swale	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗
Green Roof	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
Filtration	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗
Pond/Wetland	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
Detention Basin	✗	✓	✗	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗
Subsurface Storage	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✗
Proprietary Tank	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗

*Dependent on component specific design. Dependent on manufacturers details.

Source Control Measures and Rainwater Harvesting

3.11. Source control measures are defined in CIRIA C753⁹ as the control of runoff at or near its source, so that it does not enter the drainage system or is delayed and attenuated before it enters the drainage system. Typical source control components include:

- Green roofs
- Permeable surfaces

⁹ CIRIA C753 – The SuDS Manual – Chapter 26



- Rainwater harvesting
- Water butts
- Rain gardens
- Filter strips
- Filter trenches

3.12. As described in this chapter the development shall incorporate permeable paving which shall act as source control for surface water runoff. However, the developer should consider the use of other source control components as part of the detailed design such as rain gardens for increased amenity, biodiversity and water quality benefits.

Hydraulic Design

3.13. A soakaway has been modelled based on interpreted infiltration rates obtained from the percolation testing (see [Appendix B](#)). The infiltration rate used is outlined in [Figure 3.2](#).

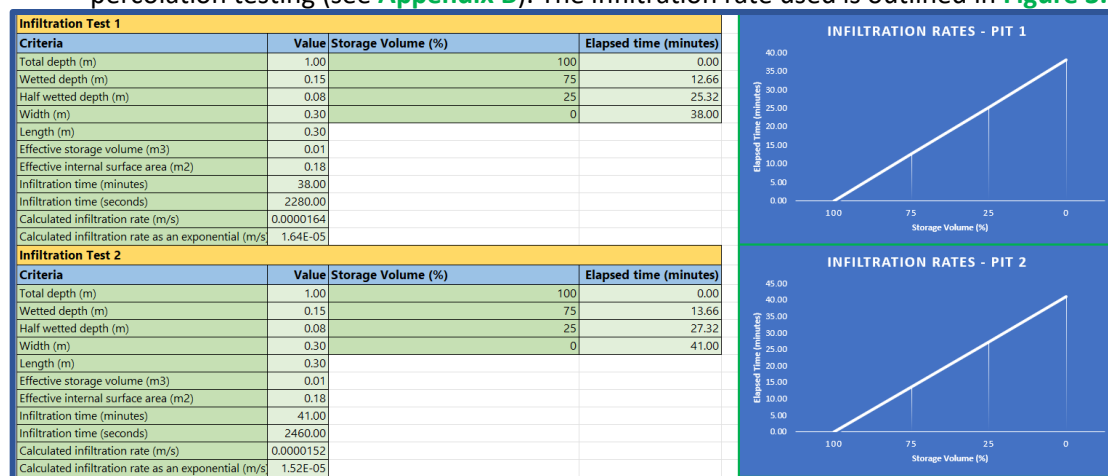


Figure 3.2 – Calculated Infiltration Rates

4. Foul Drainage Proposals

Strategy

4.1. The development is to consist of 1 dwelling. The foul water drainage from the proposed dwelling will discharge firstly to a BS EN 12566 compliant Package Treatment Plant located a minimum of 7m away from the dwelling, beyond this the effluent from the dwelling shall discharged to the adjacent drainage mound.

Building Control Considerations

Package Treatment Plant

4.2. Approved Document H places spatial requirements on the use of PTPs. The discharge from PTPs are to be 10m away from any habitable parts of dwellings. The tank should be located at least 7m from any building. Any tank should be located within 30m of vehicle access if they are to be emptied by a tanker with a clear access for the suction hose without passing through any dwelling. PTPs should have adequate capacity for the population equivalent that they serve. The subsequent treatment measures also have their own spatial restrictions.

Drainage Mound

4.3. Drainage mounds are a network of perforated pipes arranged in a continuous loop in a similar manner to a drainage field. The difference being that the drainage mound is above



ground level and the level between the underside of the pipes and the underlying ground is made up with washed gravel and filter sand, this comprises a 200mm thick layer of 10-20mm sized granular material and at least 700mm of 2mm sized coarse filter sand. Drainage mounds should be designed so that there is aerobic contact between the liquid and the filter material to ensure that biodegradation can take place. The pipes should be laid at a nominal grade of circa 1:200 and have at least 2m of undisturbed ground between each perforated pipe (see **Figure 4.1**).

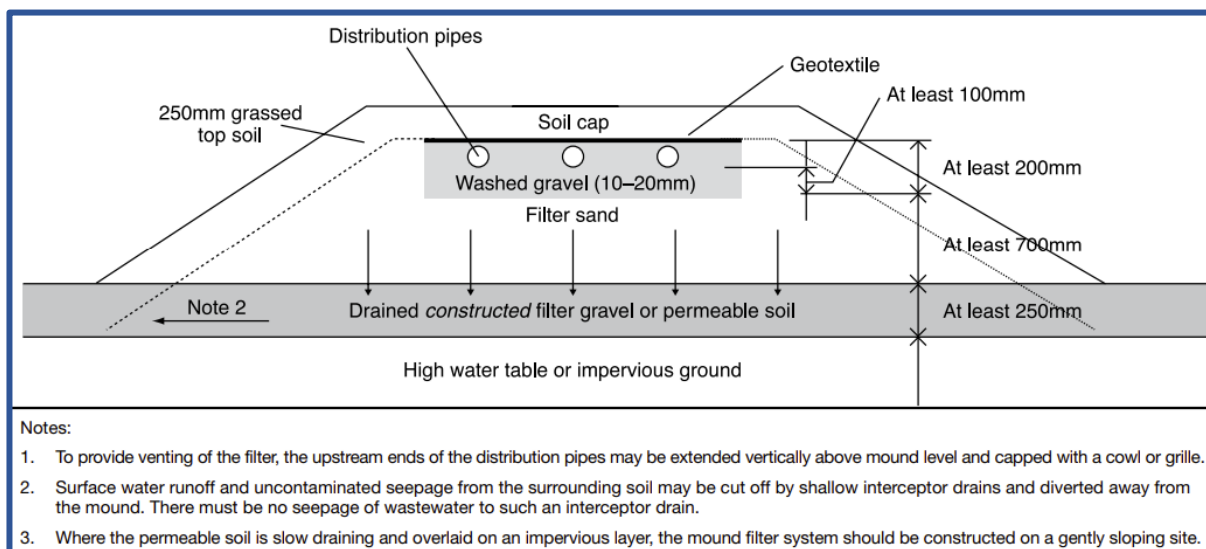


Figure 4.1 – Drainage Mound Arrangement.

- 4.4. Percolation tests have been undertaken onsite which demonstrate that the ground underlying the site has good permeability. The results of these tests can be found in **Table 4.1**.

Table 4.1 – Summary of site infiltration rate and Vp values	
Trial Pit 1 (TP1)	
Test	Vp Value
1	34.8
2	40.8
Average	37.8
Trial Pit 2 (TP2)	
Test	Vp Value
1	37.6
2	44.8
Average	41.2
Averages	
Average Vp	39.5

- 4.5. Drainage mounds must be constructed at least 10m away from any watercourse or permeable drain, this includes soakaways. Drainage mounds must be constructed 50m from any groundwater abstraction point and not located in a Source Protection Zone. They should be constructed 15m away from any building and they should be constructed sufficiently far from any soakaway or other drainage field/mound to ensure that the soakage of the ground isn't exceeded. Providing all of these conditions are met drainage mounds may be considered as part of on-site mitigation methods. The drainage mound should be sized in



accordance with Paragraph 1.44 of Approved Document H and the worst case scenario Vp value as described below:

$$A_t = p \times V_p \times 0.2$$

$$A_t = 6 \times 39.5 \times 0.2$$

$$A_t = 47.4m^2$$

Where:

A_t = The Area of the drainage mound required.

p = The number of people to be served by the drainage mound (conservatively assumed as 6 as per British Water Flows and Loads 4)

V_p = The Percolation Value (s/mm)

- 4.6. The drainage mound therefore should be at least 47.4m² in plan area. The minimum dimensions advised by BR478 shall therefore be sufficient to dissipate the expected flows from the property.

5. Compliance With Welsh Government Circular 008/2018

- 5.1. The proposed drainage mound is compliant with the criteria identified within Paragraph 2.6 of Welsh Government Circular 008/2018 as outlined in this section.

Strategy

- 5.2. The development is to consist of 1 dwelling. The foul water drainage from the proposed dwelling will discharge firstly to a BS EN 12566 compliant Package Treatment Plant located a minimum of 7m away from the dwelling, beyond this the effluent from the dwelling shall be discharged to the adjacent drainage mound.
- 5.3. An assessment of the drainage proposals has been carried out, with consideration to the following factors:
- Contravention of recognised practices:** Proposals comply with relevant British Standards.
 - Adverse effect on water sources/resources:** The proposed site is not within a Source Protection Zone (SPZ), therefore no groundwater sources will be adversely affected.
 - Health hazard or nuisance:** The proposed arrangement ensures that the effluent disposal system will have treated effluent to a safe level before being discharged.
 - Damage to controlled waters:** The water table has been identified at approximately 1.8m below ground, for this reason a drainage mound has been proposed instead of a drainage field, as a drainage field could allow percolation of effluent to groundwater.
 - Damage to the environment and amenity:** Although the site is located within the Gwent Levels – St. Brides Site of Special Scientific Interest (SSSI) (see Figure 5.1), the proposed arrangements are unlikely to lead to raw or partially treated sewage entering into receiving waters or onto land.
 - Overloading the existing capacity of the area:** There is no indication that the addition of new discharges from the proposed development to those which already exist in the area, or the quality or quantity of new discharges by themselves are likely to overload the local subsoil soakage capacity or receiving water to the extent it may lead to the problems of ponding, sewage flooding, pollution or nuisance.



- g) **Absence of suitable outlets:** Percolation tests show suitable results, therefore there are suitable outlets through use of a drainage mound.
- h) **Unsuitable soakage characteristics:** Percolation testing carried out shows that the soil conditions would be effective at disposing of sewage from the proposed Package Treatment Plant.
- i) **High water table:** The water table has been identified as being high, for this reason a drainage mound has been considered within the proposals.
- j) **Rising ground water levels:** There has been no evidence identified that show ground water levels consistently rising, therefore it is unlikely that the proposed drainage system will be affected or that land/property in the area will be damaged.
- k) **Flooding:** The proposed site is classed as low risk from flooding, therefore private sewerage would not likely lead to any environmental or amenity problems.
- l) **Maintenance plan:** The proposed drainage plan will be maintained in accordance with relevant standards, including British Standard 6297 and Approved Document H of the Building Regulations. Additionally, records showing maintenance and de-sludging will be kept for 5 years, in accordance with Environmental Permitting Regulations permits and exemptions. These records shall include:
 - 1. Service logs
 - 2. Contractor invoices
 - 3. Service agreements with a servicing contractor



Figure 5.1 – DEFRA Magic Map

6. Maintenance of Attenuation/SuDS Measures

Permeable Paving

- 6.1. The Permeable Paving system should comprise upstream silt traps on all inlets which should be monitored every six months for signs of sediment build up with deposits disposed of appropriately. To ensure that soil from the surrounding ground does not laterally enter the system the entire structure should be wrapped and sealed with a permeable geotextile. The minimum maintenance expectations are provided in **Table 6.1** which are as per Table 20.15 of the SuDS Manual.

**Table 6.1** – Maintenance Regime of Permeable Paving

Maintenance Task	Indicative Frequency	Typical Tasks
Brushing and vacuuming (standard cosmetic sweep over whole surface)	Annually	After leaf fall clearance of the surface should take place, particularly attention should be paid to areas adjacent green space.
Stabilise and mow contributing and adjacent areas	As necessary	Mow and maintain adjacent green areas to prevent permeable pores clogging.
Removal of weeds	As necessary	Remove surface weeds and vegetation from pores of paving.
Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As necessary	Use standard mowing equipment and earth working tools to remedy landscape areas.
Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As necessary	Replace blocks where break down has occurred. Replace chippings between individual blocks as necessary.
Rehabilitation of surface and upper substructure by remedial sweeping	Every 10-15 years	Deep clean of surface layer with grit blasting as required.
Monitor permeable paving to gauge performance.	3 months and 6 months after installation then annually.	Inspect for poor performance or weed growth, check sediment accumulation rates and monitor inspection chambers.

Soakaways

- 6.2. The maintenance of the soakaways shall be as per Section 13.12 of the SuDS Manual which covers infiltration systems. Soakaways, infiltration trenches and blankets should include monitoring points where the water level in the system can be observed or measured. The full maintenance requirements/schedule can be found in **Table 6.2**, which are as per Table 13.1 of the SuDS manual.

Table 6.2 – Maintenance Regime of Soakaway

Maintenance Task	Indicative Frequency	Typical Tasks
Inspect for sediment and debris in pre-	Annually	Inspect areas for sediment.



treatment components and floor of inspection tube or chamber and inside of concrete manhole rings		
Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)	Check the gutters and filters for blockages and clean as required .
Trimming any roots that may be causing blockages	Annually (or as required)	Inspect for any roots that appear to be causing blockage and use appropriate tool to trim.
Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections	Using appropriate tools and PPE, remove sediment from the areas.
Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required	If necessary, remove soakaway. Reconstruct soakaway following construction guidelines.
Replacement of clogged geotextile (will require reconstruction of soakaway)	As required	Remove clogged geotextile and reconstruct soakaway following construction guidelines.
Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually	Using inspection well, monitor rate of sediment accumulation.
Check soakaway to ensure emptying is occurring	Annually	Using inspection well, monitor water levels to ensure that the soakaway is functioning

- 6.3. It must be noted that under the provisions of the Sewerage Sector Guidance (SSG) and the contained Design and Construction Guidance (DCG) SuDS features are capable of being adopted by the Water Authority (in this instance Welsh Water) providing the SuDS component is designed to the criteria specified in the DCG as well as any specific criteria published by the Water Authority (in the case of Welsh Water). The SSG does not cover permeable paving, therefore the system will not be capable of being adopted by the Water Authority. Confirmation will be needed from the Water Authority as to whether they would be willing to adopt the bypass separator and cellular storage.



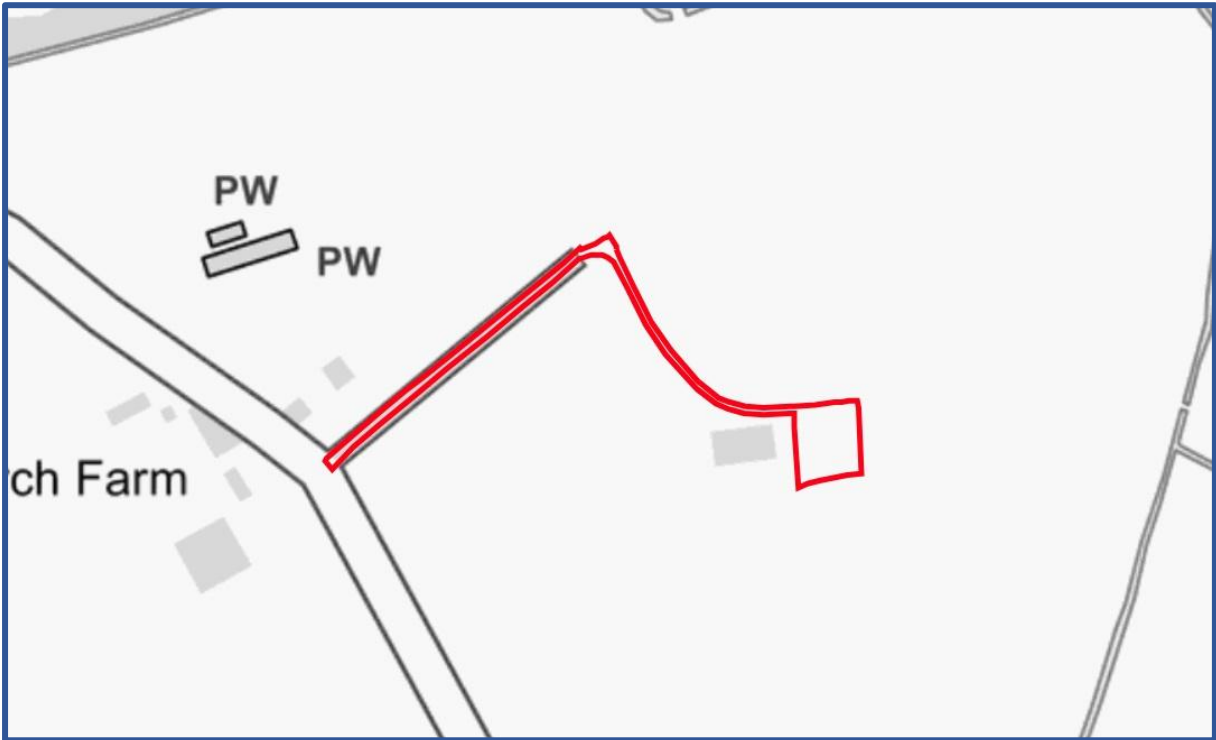
7. Conclusion

- 7.1. This report is compliant with the associated Technical Guidance as well as the Newport City Council Local Flood Risk Management Strategy. This report demonstrates that the proposals will appropriately mitigate surface water arisings associated with the construction of 1 dwelling at Llanfair Farm, Marshfield (see [Appendix A](#)). Surface water arisings shall be discharged to ground thereby reducing the impact of the development on downstream receptors.
- 7.2. The development will also not be at significant flood risk for the entirety of its design life through the incorporation of an appropriately designed drainage system. Providing the surface and foul water disposal strategies in this document are implemented flood risk and water quality concerns should not prevent approval being granted.



Appendix A Site Plan

(Press Alt + Left Arrow to return if using Hyperlinks)





Appendix B Soakaway Calculations

(Press Alt + Left Arrow to return if using Hyperlinks)

Rainfall Methodology	FEH-22	Time of Entry (mins)	5.00	Connection Type	Level Soffits	Enforce best practice design rules	✓
Return Period (years)	100	Maximum Time of Concentration (mins)	30.00	Minimum Backdrop Height (m)	0.200		
Additional Flow (%)	0	Maximum Rainfall (mm/hr)	550.0	Preferred Cover Depth (m)	1.200		
CV	0.750	Minimum Velocity (m/s)	1.00	Include Intermediate Ground	✓		

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	499	1350	749	1500	900	1800

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Shape	Circular	Barrels	1	Auto Increment (mm)	75	Preferred Cover (m)	1.200	Follow Ground	x
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100	150
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Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1.1	0.002	5.00	9.000	1200	355.445	137.142	0.500
S1.2	0.002	5.00	9.150	1200	363.438	137.130	0.750
S2.1	0.002	5.00	9.300	1200	355.457	123.642	0.500
S2.2	0.002	5.00	9.100	1200	363.378	123.642	0.500
S1.3			9.000	1200	364.945	132.392	0.665
SOAK			9.300	1200	367.945	132.392	0.985

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.1-1.2	S1.1	S1.2	7.993	0.600	8.500	8.400	0.100	80.0	150	5.12	142.4
1.2-1.3	S1.2	S1.3	4.972	0.600	8.400	8.335	0.065	76.5	150	5.19	141.8
2.1-2.2	S2.1	S2.2	7.921	0.600	8.800	8.600	0.200	39.6	150	5.08	142.7
2.2-1.3	S2.2	S1.3	8.889	0.600	8.600	8.335	0.265	33.5	150	5.17	142.0
1.3-SOAK	S1.3	SOAK	3.000	0.600	8.335	8.315	0.020	150.0	150	5.25	141.4

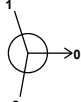
Flow+ v11.0 Copyright © 1988-2025 Causeway Technologies Ltd

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.1-1.2	7.993	80.0	150	Circular	9.000	8.500	0.350	9.150	8.400	0.600
1.2-1.3	4.972	76.5	150	Circular	9.150	8.400	0.600	9.000	8.335	0.515
2.1-2.2	7.921	39.6	150	Circular	9.300	8.800	0.350	9.100	8.600	0.350
2.2-1.3	8.889	33.5	150	Circular	9.100	8.600	0.350	9.000	8.335	0.515
1.3-SOAK	3.000	150.0	150	Circular	9.000	8.335	0.515	9.300	8.315	0.835

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.1-1.2	S1.1	1200	Manhole	Adoptable	S1.2	1200	Manhole	Adoptable
1.2-1.3	S1.2	1200	Manhole	Adoptable	S1.3	1200	Manhole	Adoptable
2.1-2.2	S2.1	1200	Manhole	Adoptable	S2.2	1200	Manhole	Adoptable
2.2-1.3	S2.2	1200	Manhole	Adoptable	S1.3	1200	Manhole	Adoptable
1.3-SOAK	S1.3	1200	Manhole	Adoptable	SOAK	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1.1	355.445	137.142	9.000	0.500	1200				
						0	1.1-1.2	8.500	150
S1.2	363.438	137.130	9.150	0.750	1200		1	1.1-1.2	8.400
						0	1.2-1.3	8.400	150
S2.1	355.457	123.642	9.300	0.500	1200				
						0	2.1-2.2	8.800	150
S2.2	363.378	123.642	9.100	0.500	1200		1	2.1-2.2	8.600
						0	2.2-1.3	8.600	150
S1.3	364.945	132.392	9.000	0.665	1200		1	1.2-1.3	8.335
						2	2.2-1.3	8.335	150
						0	1.3-SOAK	8.335	150
SOAK	367.945	132.392	9.300	0.985	1200		1	1.3-SOAK	8.315

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240	2 year (l/s)	2.7
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	0.0	30 year (l/s)	4.9
M5-60 (mm)	20.000	Analysis Speed	Normal	Check Discharge Rate(s)	✓	100 year (l/s)	6.2
Ratio-R	0.370	Skip Steady State	x	1 year (l/s)	2.1	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	10	0	30	0	10	0
2	0	10	0	100	45	10	0

Site Makeup	Brownfield	PIMP (%)	100	Betterment (%)	0	Q 30 year (l/s)	4.9
Brownfield Method	MRM	CV	0.840	Q 1 year (l/s)	2.1	Q 100 year (l/s)	6.2
Contributing Area (ha)	0.013	Time of Concentration (mins)	5.00	Q 2 year (l/s)	2.7		

Base Inf Coefficient (m/hr)	0.05472	Safety Factor	2.0	Invert Level (m)	8.315	Pit Width (m)	3.000	Depth (m)	0.400	Number Required	1
Side Inf Coefficient (m/hr)	0.05472	Porosity	1.00	Time to half empty (mins)	361	Pit Length (m)	5.000	Inf Depth (m)			

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year +10% A 15 minute summer	106.724	30.199	2 year +10% A 180 minute summer	29.340	7.550	30 year +10% A 600 minute summer	20.592	5.632
1 year +10% A 15 minute winter	74.894	30.199	2 year +10% A 180 minute winter	19.072	7.550	30 year +10% A 600 minute winter	14.070	5.632
1 year +10% A 30 minute summer	70.426	19.928	2 year +10% A 240 minute summer	23.310	6.160	30 year +10% A 720 minute summer	18.287	4.901
1 year +10% A 30 minute winter	49.422	19.928	2 year +10% A 240 minute winter	15.487	6.160	30 year +10% A 720 minute winter	12.290	4.901
1 year +10% A 60 minute summer	48.435	12.800	2 year +10% A 360 minute summer	17.884	4.602	30 year +10% A 960 minute summer	14.937	3.933
1 year +10% A 60 minute winter	32.179	12.800	2 year +10% A 360 minute winter	11.625	4.602	30 year +10% A 960 minute winter	9.894	3.933
1 year +10% A 120 minute summer	30.524	8.066	2 year +10% A 480 minute summer	14.148	3.739	30 year +10% A 1440 minute summer	10.749	2.881
1 year +10% A 120 minute winter	20.279	8.066	2 year +10% A 480 minute winter	9.400	3.739	30 year +10% A 1440 minute winter	7.224	2.881
1 year +10% A 180 minute summer	23.824	6.131	2 year +10% A 600 minute summer	11.633	3.182	100 year +45% CC +10% A 15 minute summer	492.075	139.240
1 year +10% A 180 minute winter	15.486	6.131	2 year +10% A 600 minute winter	7.948	3.182	100 year +45% CC +10% A 15 minute winter	345.316	139.240
1 year +10% A 240 minute summer	19.078	5.042	2 year +10% A 720 minute summer	10.405	2.789	100 year +45% CC +10% A 30 minute summer	327.408	92.645
1 year +10% A 240 minute winter	12.675	5.042	2 year +10% A 720 minute winter	6.993	2.789	100 year +45% CC +10% A 30 minute winter	229.760	92.645
1 year +10% A 360 minute summer	14.732	3.791	2 year +10% A 960 minute summer	8.600	2.265	100 year +45% CC +10% A 60 minute summer	222.268	58.739
1 year +10% A 360 minute winter	9.576	3.791	2 year +10% A 960 minute winter	5.697	2.265	100 year +45% CC +10% A 60 minute winter	147.669	58.739
1 year +10% A 480 minute summer	11.707	3.094	2 year +10% A 1440 minute summer	6.301	1.689	100 year +45% CC +10% A 120 minute summer	135.946	35.926
1 year +10% A 480 minute winter	7.778	3.094	2 year +10% A 1440 minute winter	4.235	1.689	100 year +45% CC +10% A 120 minute winter	90.319	35.926
1 year +10% A 600 minute summer	9.661	2.643	30 year +10% A 15 minute summer	261.725	74.059	100 year +45% CC +10% A 180 minute summer	103.155	26.545
1 year +10% A 600 minute winter	6.601	2.643	30 year +10% A 15 minute winter	183.666	74.059	100 year +45% CC +10% A 180 minute winter	67.054	26.545
1 year +10% A 720 minute summer	8.669	2.323	30 year +10% A 30 minute summer	172.575	48.833	100 year +45% CC +10% A 240 minute summer	80.465	21.265
1 year +10% A 720 minute winter	5.826	2.323	30 year +10% A 30 minute winter	121.105	48.833	100 year +45% CC +10% A 240 minute winter	53.459	21.265
1 year +10% A 960 minute summer	7.202	1.896	30 year +10% A 60 minute summer	116.589	30.811	100 year +45% CC +10% A 360 minute summer	60.519	15.574
1 year +10% A 960 minute winter	4.771	1.896	30 year +10% A 60 minute winter	77.459	30.811	100 year +45% CC +10% A 360 minute winter	39.339	15.574
1 year +10% A 1440 minute summer	5.319	1.425	30 year +10% A 120 minute summer	71.367	18.860	100 year +45% CC +10% A 480 minute summer	47.178	12.468
1 year +10% A 1440 minute winter	3.574	1.425	30 year +10% A 120 minute winter	47.414	18.860	100 year +45% CC +10% A 480 minute winter	31.344	12.468
2 year +10% A 15 minute summer	137.982	39.044	30 year +10% A 180 minute summer	54.374	13.992	100 year +45% CC +10% A 600 minute summer	38.327	10.483
2 year +10% A 15 minute winter	96.830	39.044	30 year +10% A 180 minute winter	35.344	13.992	100 year +45% CC +10% A 600 minute winter	26.187	10.483
2 year +10% A 30 minute summer	90.525	25.616	30 year +10% A 240 minute summer	42.626	11.265	100 year +45% CC +10% A 720 minute summer	33.932	9.094
2 year +10% A 30 minute winter	63.527	25.616	30 year +10% A 240 minute winter	28.320	11.265	100 year +45% CC +10% A 720 minute winter	22.805	9.094
2 year +10% A 60 minute summer	61.301	16.200	30 year +10% A 360 minute summer	32.252	8.299	100 year +45% CC +10% A 960 minute summer	27.573	7.261
2 year +10% A 60 minute winter	40.727	16.200	30 year +10% A 360 minute winter	20.965	8.299	100 year +45% CC +10% A 960 minute winter	18.265	7.261
2 year +10% A 120 minute summer	37.990	10.040	30 year +10% A 480 minute summer	25.255	6.674	100 year +45% CC +10% A 1440 minute summer	19.690	5.277
2 year +10% A 120 minute winter	25.240</							



Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1.1	11	8.513	0.013	0.3	0.0146	0.0000	OK
15 minute winter	S1.2	11	8.418	0.018	0.6	0.0200	0.0000	OK
15 minute summer	S2.1	11	8.811	0.011	0.3	0.0124	0.0000	OK
15 minute winter	S2.2	11	8.615	0.015	0.6	0.0165	0.0000	OK
15 minute summer	S1.3	10	8.371	0.036	1.2	0.0406	0.0000	OK
180 minute winter	SOAK	120	8.368	0.053	0.4	0.8582	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S1.1	1.1-1.2	S1.2	0.3	0.319	0.015	0.0076
15 minute winter	S1.2	1.2-1.3	S1.3	0.6	0.356	0.029	0.0098
15 minute summer	S2.1	2.1-2.2	S2.2	0.3	0.419	0.011	0.0057
15 minute winter	S2.2	2.2-1.3	S1.3	0.6	0.515	0.019	0.0163
15 minute summer	S1.3	1.3-SOAK	SOAK	1.3	0.844	0.090	0.0051
180 minute winter	SOAK	Infiltration		0.1			



Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.1	11	8.515	0.015	0.4	0.0167	0.0000	OK
15 minute winter	S1.2	11	8.420	0.020	0.8	0.0230	0.0000	OK
15 minute summer	S2.1	11	8.813	0.013	0.4	0.0142	0.0000	OK
15 minute summer	S2.2	11	8.617	0.017	0.8	0.0189	0.0000	OK
240 minute winter	S1.3	156	8.379	0.044	0.4	0.0498	0.0000	OK
240 minute winter	SOAK	156	8.379	0.064	0.4	1.0332	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	S1.1	1.1-1.2	S1.2	0.4	0.348	0.020	0.0092
15 minute winter	S1.2	1.2-1.3	S1.3	0.8	0.357	0.039	0.0117
15 minute summer	S2.1	2.1-2.2	S2.2	0.4	0.455	0.014	0.0070
15 minute summer	S2.2	2.2-1.3	S1.3	0.8	0.515	0.026	0.0201
240 minute winter	S1.3	1.3-SOAK	SOAK	0.4	0.633	0.030	0.0172
240 minute winter	SOAK	Infiltration		0.1			



Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1.1	11	8.519	0.019	0.7	0.0218	0.0000	OK
480 minute winter	S1.2	312	8.435	0.035	0.2	0.0399	0.0000	OK
15 minute winter	S2.1	11	8.816	0.016	0.7	0.0185	0.0000	OK
15 minute winter	S2.2	11	8.622	0.022	1.4	0.0247	0.0000	OK
480 minute winter	S1.3	312	8.436	0.101	0.4	0.1137	0.0000	OK
480 minute winter	SOAK	312	8.436	0.121	0.4	1.9466	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S1.1	1.1-1.2	S1.2	0.7	0.412	0.035	0.0137
480 minute winter	S1.2	1.2-1.3	S1.3	0.2	0.246	0.010	0.0390
15 minute winter	S2.1	2.1-2.2	S2.2	0.7	0.539	0.025	0.0103
15 minute winter	S2.2	2.2-1.3	S1.3	1.4	0.515	0.045	0.0278
480 minute winter	S1.3	1.3-SOAK	SOAK	0.4	0.486	0.028	0.0416
480 minute winter	SOAK	Infiltration		0.1			



Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	S1.1	176	8.570	0.070	0.3	0.0793	0.0000	OK
180 minute winter	S1.2	176	8.570	0.170	0.6	0.1924	0.0000	SURCHARGED
15 minute winter	S2.1	10	8.823	0.023	1.4	0.0255	0.0000	OK
15 minute winter	S2.2	10	8.630	0.030	2.8	0.0342	0.0000	OK
180 minute winter	S1.3	176	8.570	0.235	1.2	0.2659	0.0000	SURCHARGED
180 minute winter	SOAK	176	8.570	0.255	1.1	4.1160	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
180 minute winter	S1.1	1.1-1.2	S1.2	0.3	0.316	0.015	0.1026
180 minute winter	S1.2	1.2-1.3	S1.3	0.6	0.315	0.028	0.0875
15 minute winter	S2.1	2.1-2.2	S2.2	1.4	0.663	0.049	0.0166
15 minute winter	S2.2	2.2-1.3	S1.3	2.7	0.595	0.089	0.0646
180 minute winter	S1.3	1.3-SOAK	SOAK	1.1	0.633	0.075	0.0528
180 minute winter	SOAK	Infiltration		0.1			



Appendix C Drainage Layout

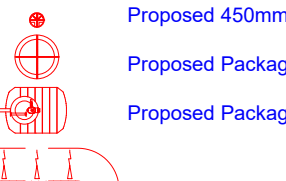
(Press Alt + Left Arrow to return if using Hyperlinks)

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General Notes

1. This drawing is for planning purposes only and cannot be relied upon as construction information. Detailed levels information will be required for construction drawings.
2. Actual levels on-site will vary and will need further investigation. Slab and Spot levels shown on this layout are indicative and act as a minimum level in relation to adjacent spot levels.
3. All installed pipework and drainage infrastructure must be installed in line with the relevant Approved Document and British Standard to the satisfactions of the Building Control Officer and any other relevant inspector.

Key

- 
- Proposed Foul Water Sewer
 - Proposed 450mm Plastic Inspection Chamber
 - Proposed Package Pumping Chamber
 - Proposed Package Treatment Plant
 - Proposed Drainage Mound
 - Indicative Building Outline
 - Proposed Surface Water Soakaway
 - Drainage Mound 15m Offset
 - Package Treatment Plant 7m Offset/Soakaway 5m Offset
 - Proposed 50mm Rising Main

Drawing Reference Table

[illegible]

1.2	Revised for Submission	21.03.2025	LC
1.1	First Issue.	13.02.2024	ZS
REV.	REVISION DETAILS	DATE	INITIAL

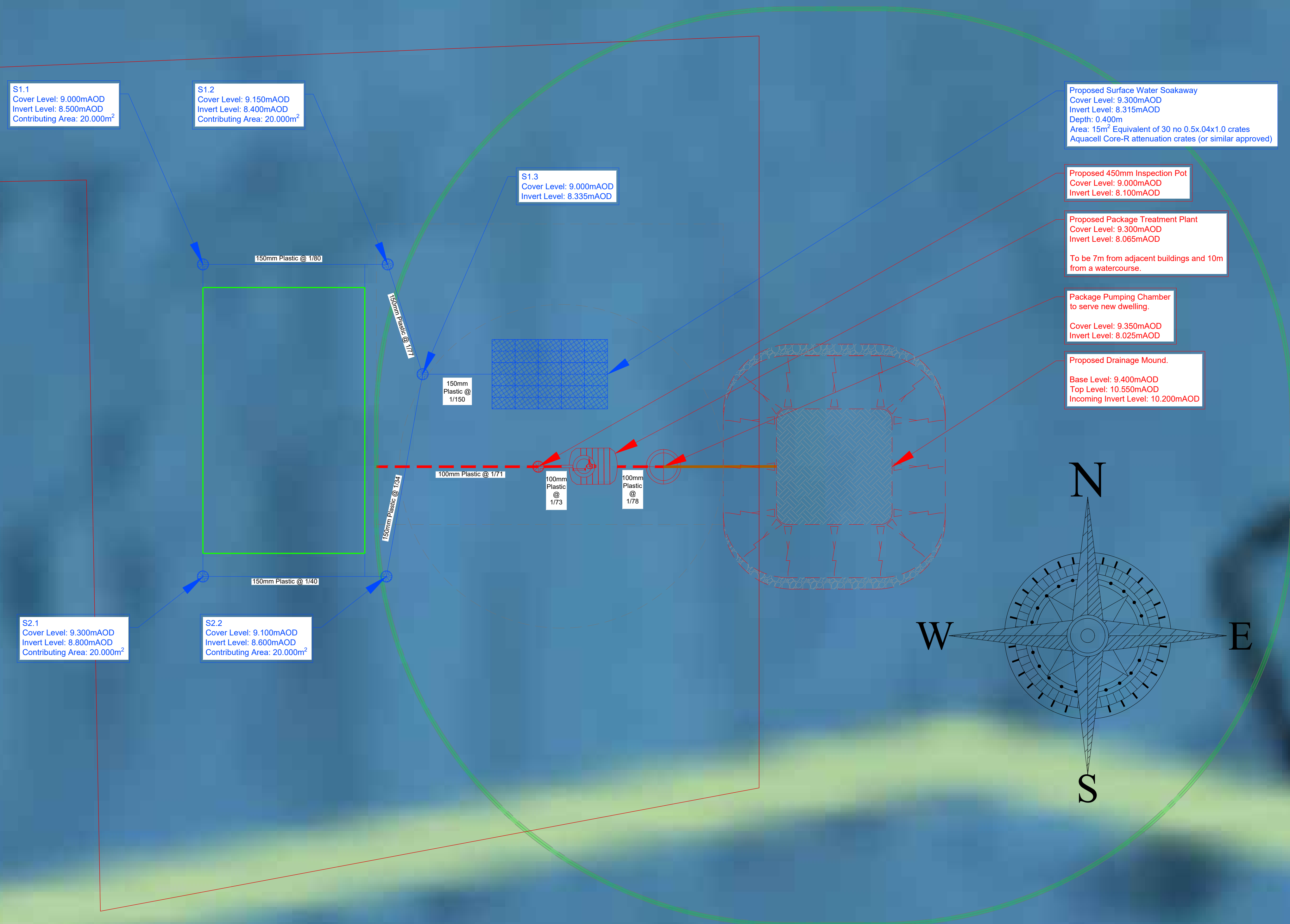


Llanfair Farm,
Marshfield

Drainage Strategy Plan

PLANNING

1:100 Drawing Scale	13.02.2024 First issued
2500185-ENV-S1-OT-TR-C-0001 Drawing No.	1.2 Revision Letter





Appendix D Drainage Mound construction detailing

(Press Alt + Left Arrow to return if using Hyperlinks)

1. Detailed levels information will be required for construction information.
2. All installed pipework and drainage infrastructure must be installed inline with the relevant Approved Document and British Standard to the satisfaction of the Building Control Officer and any other relevant inspector.
3. This drawing should be read in conjunction with Approved Document H of the Building Regulations, BS 6297 as well as BRE BR478.
4. All works should be undertaken by suitably qualified staff in accordance with the CDM Regulations 2015.

[illegible]

PLANNING	ZS Drawn by
As shown Drawing Scale	13.02.2024 First issued
2500185-ENV-S1-OT-TR-C-0001 Drawing No.	1.2 Revision Letter



Appendix E Foul Drainage Assessment Form (FDA1)

(Press Alt + Left Arrow to return if using Hyperlinks)

Foul Drainage Assessment Form (FDA)

Please note: You should only use this form for planning related queries. You cannot use it to apply for an Environmental Permit but you may submit a copy of the information you have provided for planning purposes in support of your Environmental Permit application. Further information on [how to apply for an environmental permit](#) and [general binding rules applicable to small discharges of domestic sewage effluent](#) is available on the gov.uk website.

APPLICANT DETAILS
Name Barney Townsend (Completed on behalf of Chris Hinksman)
Address Llanfair Farm, Marshfield, Cardiff CF3 2UF
Telephone No via 01275 560427
e-mail technical@enviren.co.uk

We will use the information you provide on this form to establish whether non-mains drainage, either a new system or connection to an existing system, would be acceptable. It is important that you provide full and accurate information. Failure to do this will delay the processing of your application.

You must provide evidence that a connection to the public sewer is not feasible.

Other than in very exceptional circumstances, we will not allow the use of non-mains drainage as part of your Planning or Building Regulation application unless you can prove that a connection to the public sewer is not feasible. We do not consider non-mains drainage systems to be environmentally acceptable in locations where it is feasible to connect to a public sewer. Please note that a lack of capacity in, or other operating problems with, the public sewer are not valid reasons to use a non-mains drainage system where it is otherwise feasible to connect to a public sewer.

Where connection to the public sewer is feasible, you may need to get the agreement of either the owners of any land through which the drainage will run or, if you intend to connect via an existing private drain, the owner of that private drain.

The National Planning Practice Guidance and [Building Regulations Approved Document H](#) give a hierarchy of drainage options that must be considered and discounted in the following order:

- 1 Connection to the public sewer
- 2 Package sewage treatment plant (which can be offered to the Sewerage Undertaker for adoption)
- 3 Septic Tank
- 4 If none of the above are feasible a cesspool

You must respond to all the following questions. If you wish to submit additional information please do so, marked clearly "Additional Information". **In some cases you will be required to provide further information in order to demonstrate that any non-mains foul drainage system proposed is acceptable.**



	YES	NO
<i>Feasibility of mains foul sewer connection</i>		
Have you provided a written explanation of why it is not feasible to connect to the public foul sewer with this form? <i>This must include a scaled map showing the nearest public foul sewer connection point - check with your local sewerage undertaker.</i>	☒	
Is the distance from your site to the closest connection point to the public foul sewer less than the number of properties to be built on the site multiplied by 30m? (see Guidance Note 2)	☒	
Does your proposal form part of a phased development or planned development of a wider area? <i>If YES, please provide further details including references of any planning permissions already granted.</i>		☒

Non-mains connection

Please provide a plan with dimensions that clearly shows the location of the whole system in relation to the proposed development and the position of the key elements e.g. septic tank, drainage fields and points of discharge.

	YES	NO
<i>1. Existing system</i>		
Do you intend to use an existing non-mains foul drainage system?		☒
If YES, does the system already have an Environmental Permit issued by the Environment Agency? (In the case of a cesspool write N/A)		
If YES, please provide Environmental Permit reference number.....		

	YES	NO
<i>2. Discharge</i>		
Do you propose to use a package treatment plant?	☒	
Do you propose to use a septic tank?		☒
Do you propose to use a cesspool? <i>If YES go to Q4</i>		☒
Have you considered having your system adopted by the sewerage undertaker? (see Guidance Note 7).		☒
Will all, or any part of, the discharge go to a drainage field or soakaway? (see Guidance Note 3) - this includes systems that combine a drainage field with a high level overflow to watercourse <i>If YES go to Q3.</i>	☒	
Do you intend to use a system that discharges solely to watercourse? (see Guidance Note 3) <i>If YES go to Q9.</i>		☒

	YES	NO
<i>3. Water abstraction</i>		
Do you receive your water from the public mains supply?	☒	
If not, where do you get your water supply from?		N/A

	YES	NO
<i>4. Cesspools (For methods other than cesspools write N/A)</i>		
Have you provided written justification for the use of a cesspool in preference to more sustainable methods of foul drainage disposal? (see Guidance Note 4)	N/A	N/A



5. Drainage field design (For cesspools write N/A)		YES	NO
Will the system discharge to a drainage field designed and constructed in accordance with British Standard BS6297:2007?		☒	
If not, why not?			
Will the discharge from the system be located in a Source Protection Zone 1 (SPZ1) ?			☒

6. Ground Conditions (For cesspools write N/A)		YES	NO
6a. Have you submitted a copy of the percolation test results with this form (see Guidance Note 6)?		☒	
6b. If NO please explain the justification for not undertaking or submitting these tests.			
6c. Is any part of the system in land which is marshy, water logged or subject to flooding?			☒
6d. Will the soakaway be located on artificially raised, made-up ground or ground likely to be contaminated? If YES please provide details as additional information. As the proposed has a high water table, it is necessary to build a drainage mound.		☒	
6e. Have you submitted the results of a trial hole at the site to establish that the proposed drainage field will be above any standing groundwater (see Guidance Note 6)?		☒	

7. Available Land		YES	NO
Is the application site plus any available area for a soakaway less than 0.025 hectares (250m ²)?		☒	

8. Siting of drainage field/soakaway discharge from a septic tank or package treatment plant or other secondary treatment. You may need to make local enquiries to get a full answer to these questions.		YES	NO
Will it be at least 10m from a watercourse, permeable drain or land drain?		☒	
Will it be at least 50m from any point of abstraction from the ground for a drinking water supply (e.g. well, borehole or spring)? This includes your own or a neighbour's supply.		☒	
Will the discharge be within a groundwater Source Protection Zone 1 ? If yes, you will need to apply for an environmental permit			☒
Are there any drainage fields/soakaways within 50m ? This includes any foul drainage discharge system (other than the subject of this application) or surface water soakaway on either your own or a neighbour's property.			☒
Will it be at least 15m from any building?		☒	
Will there be any water supply pipes or underground services within the disposal system, other than those required by the system? (For cesspools write N/A)			☒
Will there be any access roads, driveways or paved areas within the disposal area? (For cesspools write N/A)			☒

9. Siting of treatment plant, septic tank or cesspool		YES	NO
Is it at least 7m from the habitable part of a building?		☒	
Will there be vehicular access for emptying within 30m ?		☒	
Can the plant, tank or cesspool be maintained or emptied without the contents being taken through a dwelling or place of work?		☒	

10. Expected flow	
Please estimate the total flow in litres per day (see Guidance Note 5).	900



11. General Binding Rules for Small Sewage Discharges

	YES	NO
Does the system meet the requirements of the General Binding Rules for small sewage discharges ?	☒	☐

12. Maintenance

How do you propose to maintain the system? The system shall be maintained to the manufacturers' recommendations.
--

13. Declaration

I declare that the above information is factually correct.

Name	Signature	Date
Chris Hinksman (Completed on their behalf by EnvirEn Ltd)	<i>Barney Townsend</i>	13/02/2024

GUIDANCE NOTES:

- This form is for use with the [National Planning Practice Guidance](#), British Standard BS6297:2007 and [Building Regulations Approved Document H](#). It is intended to help Local Planning Authorities establish basic information about your non-mains drainage system and decide whether you need to submit a more detailed site assessment. If a detailed site assessment is requested but not submitted, your planning application might be refused.
- Where the distance from a site to the closest point of connection to the foul sewer is less than the number of properties that are proposed to be built on that site multiplied by 30m an Environmental Permit will be required and an applicant will need to demonstrate as part of any application for such a permit why connection to the public foul sewer is not feasible.

 Number of domestic properties served by the sewage treatment system x 30 metres = Answer metres
- In addition to Planning Permission and Building Regulation approval **you may also require an Environmental Permit from the Environment Agency (EA). Please note that the granting of Planning Permission or Building Regulation approval does not guarantee the granting of an Environmental Permit. Upon receipt of a correctly filled in application form the EA will carry out an assessment. It can take up to 4 months before the Agency is in a position to decide whether to grant a permit or not.**
- The use of cesspools is an option of last resort as set out in the non-mains drainage hierarchy of preference in [Building Regulations Approved Document H](#). In principle, a properly constructed and maintained cesspool, being essentially a holding tank with no discharges, should not lead to environmental, amenity or public health problems. However, in practice, it is known that such problems occur as a result of frequent overflows due to poor maintenance, irregular emptying, lack of suitable vehicular access for emptying and even through inadequate capacity. In addition to this the requirement for frequent emptying is usually carried out by a contractor involving road transport with associated environmental costs. For these reasons, the use of cesspools will not normally be



considered to be a long-term foul sewage disposal solution. In view of the environmental risks associated with their use, any proposal to use cesspools must be fully justified to the Local Planning Authority

- 5) Package treatment plants and septic tanks should be designed and sized according to the advice given in the current edition of Flows and Loads, published by British Water. Volumes for larger systems should be calculated based on expected flows arising from the development.
- 6) You should refer to [Building Regulations Approved Document H2](#) with regard to the general requirements for construction of non mains sewerage systems. **Sections 1.33 to 1.38** deal with the test requirements for trial holes and percolation tests and for convenience the text of these sections is repeated below:
 - 1.33 *A trial hole should be dug to determine the position of the standing groundwater table. The trial hole should be a minimum of 1m² in area and 2m deep, or a minimum of 1.5m below the invert of the proposed drainage field pipework. The ground water table should not rise to within 1m of the invert level of the proposed effluent distribution pipes. If the test is carried out in summer, the likely winter groundwater levels should be considered. A percolation test should then be carried out to assess the further suitability of the proposed area.*
 - 1.34 *Percolation test method – A hole 300mm square should be excavated to a depth 300mm below the proposed invert level of the effluent distribution pipe. Where deep drains are necessary the hole should conform to this shape at the bottom, but may be enlarged above the 300mm level to enable safe excavation to be carried out. Where deep excavations are necessary a modified test procedure may be adopted using a 300mm earth auger. Bore the test hole vertically to the appropriate depth taking care to remove all loose debris.*
 - 1.35 *Fill the 300mm square section of the hole to a depth of at least 300mm with water and allow it to seep away overnight.*
 - 1.36 *Next day, refill the test section with water to a depth of at least 300mm and observe the time, in seconds, for the water to seep away from 75% full to 25% full level (i.e. a depth of 150mm). Divide this time by 150mm. The answer gives the average time in seconds (V_p) required for the water to drop 1mm.*
 - 1.37 *The test should be carried out at least three times with at least two trial holes. The average figure from the tests should be taken. The test should not be carried out during abnormal weather conditions such as heavy rain, severe frost or drought.*
 - 1.38 *Drainage field disposal should only be used when percolation tests indicate average values of V_p of between 12 and 100 and the preliminary site assessment report and trial hole tests have been favourable. This minimum value ensures that untreated effluent cannot percolate too rapidly into groundwater. Where V_p is outside these limits effective treatment is unlikely to take place in a drainage field. However, provided that an alternative form of secondary treatment is provided to treat the effluent from the septic tanks, it may still be possible to discharge the treated effluent to a soakaway.*
- 7) Developers may requisition a sewer from the Sewerage Undertaker to connect their development to the public sewer. Should this not be feasible on the grounds of cost and practicability, on site treatment in the form of package plants and their associated sewers (if constructed to an acceptable standard) can be offered to the sewerage undertaker for adoption. This approach is in support of advice from the Government contained in the [National Planning](#)



[Practice Guidance](#) Developers are urged to discuss their requirements with the Sewerage Undertaker at the earliest possible opportunity.

8) Glossary

Package treatment plant

A package treatment plant is a system which offers varying degrees of biological sewage treatment and involves the production of an effluent which can be disposed of to ground via a drainage field or direct to a watercourse. There are many varieties of package treatment plant but all involve settling the solids before and/or after a biological treatment stage and almost all use electricity. Package treatment plants usually treat sewage to a higher standard than septic tanks but are vulnerable in the event of power failures and require more regular servicing and maintenance to ensure that they work effectively. The type of system chosen should be appropriate to the type of development proposed and take account of variations in flow and periods of inactivity, for example where the system will serve holiday accommodation where occupation and maintenance may be more irregular.

Septic tank

A septic tank is a two or three chamber system, which retains sewage from a property for sufficient time to allow the solids to form into sludge at the base of the tank, where it is partially broken down. The remaining liquid in the tank then drains from the tank by means of an outlet pipe.

Effluent from a septic tank is normally disposed of to ground via a drainage field and receives further treatment in the soils surrounding that drainage field, so that it does not generate a pollution risk to surface waters or groundwater resources (underground water). The most commonly used form of drainage field is a subsurface irrigation area, comprising a herringbone pattern of interconnecting dispersal pipes laid in shallow, shingle filled trenches. The dispersal pipes within the drainage field should be located at as shallow a depth as possible, usually within 1 metre of the ground surface. A septic tank typically needs to be desludged at least once a year in order to ensure that it continues to work effectively.

Cesspool

A cesspool is a covered watertight tank used for receiving and storing sewage and has no outlet. It relies on road transport for the removal of raw sewage and is therefore the least sustainable option for sewage disposal. It is essential that a cesspool is, and remains, impervious to the ingress of groundwater or



Appendix F Review of EA's General Binding Rules

(Press Alt + Left Arrow to return if using Hyperlinks)

Table F.1 – EA General Binding Rules			
Rules	Description	Site Condition	Compliance
Rule 1	The discharge must be 2 cubic metres or less per day in volume.	Using the EA's daily discharge calculator, a dwelling with four bedrooms shall only discharge 0.9m ³ per day.	✓
Rule 2	N/A	N/A	N/A
Rule 3	The sewage must only be domestic.	Only domestic sewage.	✓
Rule 4	The discharge must not cause pollution of surface water or groundwater.	Compliance with offsetting distances and groundwater proximity ensures that there will be no pollution of surface water or groundwater.	✓
Rule 5	The sewage must receive treatment from a septic tank and infiltration system (drainage field) or a sewage treatment plant and infiltration system.	Package Treatment Plant and drainage mound shall be used to treat sewage.	✓
Rule 6	N/A	N/A	N/A
Rule 7	The discharge must not be within a groundwater Source Protection Zone 1 or within 50 metres from any well, spring or borehole that is used to supply water for domestic or food production purposes.	As per the Natural Resources Wales- Source Protection Zones (SPZ) Merged, the proposed site does not sit within an SPZ. No well, spring or borehole is present within 50m of the site.	✓
Rule 8	N/A	N/A	N/A
Rule 9	All works and equipment used for the treatment of sewage effluent and its discharge must comply with the relevant design and manufacturing standards i.e. the	The Package Treatment Plant shall comply with the relevant British Standards (BS EN 12566).	✓



	British Standard that was in force at the time of the installation, and guidance issued by the appropriate authority on the capacity and installation of the equipment.		
Rule 10	The system must be installed and operated in accordance with the manufacturer's specification.	This will be undertaken.	✓
Rule 11	Maintenance must be undertaken by someone who is competent.	The system shall be maintained to the manufacturer's recommendations.	✓
Rule 12	Waste sludge from the system must be safely disposed of by an authorised person.	The system shall be emptied as per the manufacturer's instructions.	✓
Rule 13	If a property is sold, the operator must give the new operator a written notice stating that a small sewage discharge is being carried out and giving a description of the wastewater system and its maintenance requirements.	This will be done in writing if the applicant sells the property.	✓
Rule 14	The operator must ensure the system is appropriately decommissioned where it ceases to be in operation so that there is no risk of pollutants or polluting matter entering groundwater, inland fresh waters or coastal waters.	Maintenance company advice will be sought in this instance.	✓
Rule 15	New discharges must not be within 30 metres of a public foul sewer.	The nearest public sewer is over 30m away from the development.	✓



Rule 16	For new discharges, the operator must ensure that the necessary planning and building control approvals for the treatment system are in place.	The applicant will secure building control approval.	☒
Rule 17	N/A	N/A	N/A
Rule 18	New discharges must not be in, or within 50 metres of, a Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site, or biological Site of Special Scientific Interest (SSSI) and must not be in an Ancient Woodland.	The site is within an SSSI, therefore a permit will be required.	☐
Rule 19	N/A	N/A	N/A
Rule 20	N/A	N/A	N/A
Rule 21	N/A	N/A	N/A
Rule 22	A new discharge shall not use the same outlet as any other discharge if the combined volume of those discharges would exceed the volumetric general binding rules thresholds for groundwater or surface water.	New outlet to be created.	☒
Rule 23	A new discharge shall not be made to a discharge point within 50 metres of any other exempt groundwater activity or water discharge activity.	The discharge shall be at least 50m away from any other discharge.	☒