



Ysgol Y Deri SAB Drainage Report

Jubb

Contents

1	Project Information.....	2
1.1	Project Information.....	2
1.2	Project Details.....	2
1.3	Report Details	2
1.4	Project Authorisation.....	2
2	Introduction	3
3	Standard 1: Surface water runoff destination.....	3
3.1	Level 1 Surface water runoff is collected for use	3
3.2	Level 2 Surface water runoff is infiltrated to ground.....	3
3.3	Level 3 Surface water runoff is discharged to a surface water body	3
3.4	Level 4 Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system 3	
3.5	Level 5 Surface water runoff is discharged to a combined sewer	4
4	Standard 2: Surface water runoff hydraulic control.....	4
4.1	Runoff Rate	4
4.2	Attenuation	4
4.3	Interception	4
4.4	Exceedance	5
5	Standard 3: Water Quality.....	5
5.1	Water Quality Management Criteria	5
5.2	Water Quality Treatment Strategy	6
6	Standard 4: Amenity, and Standard 5: Biodiversity	7
7	Standard 6: Construction, Operation and Maintenance	7
7.1	Construction	7
7.2	Operation and Maintenance	7
	Appendix A: List of supporting documents	8

1 Project Information

1.1 Project Information

Client ISG

1.2 Project Details

Project Name Ysgol Y Deri

Location Lavernock Road, Comeston, CF64 5UP

Jubb Project Number 22112

1.3 Report Details

Version 03

Status First Issue

Date 22.09.22

1.4 Project Authorisation

ISSUE HISTORY:

Version	Date	Detail
01	18.03.22	First Issue
02	11.04.22	Updated to new layout
03	22.09.22	Various updates

AUTHORISATION:

Prepared By	Approved By
NC	MS
MS	GS
MS	GS

2 Introduction

This document details the drainage strategy for the proposed construction of the new Ysgol Y Deri Primary school and supports the Sustainable Drainage Systems (SuDS) application to the Sustainable Drainage Approval Body (SAB) and is subject to SAB approval. The location is on Lavernock road, Comeston with a National Grid Reference of ST 17859 68833.

As part of the advancement in Sustainable Drainage Systems (SuDS) design, legislature was implemented on 7th January 2019 in Wales to enforce Schedule 3 of the Flood and Water Management Act 2010. This led to the establishment of SuDS Approval Bodies (SABs) for each LLFA. In the case of this development and under requirements of the above legislature, Vale of Glamorgan Council would look to review and approve any surface water drainage design proposed for the development, with the intention of adopting possible SuDS features. Any SuDS proposed would need to conform to CIRIA C753, 'The SuDS Manual' and any additional guidance or information provided by the LLFA. Any drainage design previously proposed to connect to a Dwr Cymru surface water (SW) or highway asset would now be subject to a detailed application & formal approval process, prior to construction and/or communication of drainage flows from the development.

This document aims to demonstrate that the drainage strategy has been developed in accordance with the 6 standards detailed in the Sustainable Drainage System Standards for Wales (2018). The supporting documents and drawings for this SAB application have been outlined in the table given in Appendix A.

3 Standard 1: Surface water runoff destination

The following hierarchy has been followed before deciding upon the discharge destination of surface water runoff from the development.

3.1 Level 1 Surface water runoff is collected for use

Reuse has been discounted for this site due to the lack of demonstratable yield/demand. Re-use in toilets would not be economically viable due to the school only being used for 1/3 of the day.

3.2 Level 2 Surface water runoff is infiltrated to ground

The results of in-situ soak-away testing carried out at the site detailed in Hydrock Phase 2 Ground Investigation Report show that infiltration systems are considered unsuitable for the site due to the presence of shallow groundwater which demonstrates low infiltration rates. Refer to Ysgol Y Deri 2 Phase 2 Ground Investigation Report by Hydrock, document "YYD-HYD-XX-XX-RP-GE-003".

3.3 Level 3 Surface water runoff is discharged to a surface water body

The application proposes a discharge to highways gullies that discharge to Sully brook, located north of the site.

3.4 Level 4 Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system

Prior to discharging to the existing Sully brook, the surface water runoff drains into highway gullies.

3.5 Level 5 Surface water runoff is discharged to a combined sewer

The application does not propose to discharge to an existing combined sewer.

4 Standard 2: Surface water runoff hydraulic control

4.1 Runoff Rate

The proposed discharge rate for the site is set to the Greenfield runoff rate, Q_{Bar} , of 12.0l/s for all return periods up to and including 1 in 100-year return period with a 40% allowance for climate change. Refer to the Micro Drainage greenfield and detailed model calculations for more details.

The development also includes widening works to Fort Rd, adjacent to the site. The brownfield discharge rate for the area has been calculated and the drainage will be restricted to this rate with an additional 30% betterment to give a discharge rate of 14.3 l/s.

4.2 Attenuation

Attenuation is provided using geocellular attenuation tanks, ranging between 1.2m & 0.8m deep, which have been sized to accommodate storm events up to the 1-in-100-year event +40% CC. Surface water runoff from all areas of the site are attenuated within the system when flows are above 12.0l/s flow control restriction.

An additional flow control is included on the upper part of the drainage network for the MUGA and artificial pitch to help control the flows. This flow control is limited to 8 l/s and attenuation will be provided via geocellular attenuation.

A small volume of flooding was calculated in the 100 year event in a few areas around the development. These occur in pipes that have subbase storage available in the permeable surfacing and will be managed in the subbase voids as follows:

5.001 – 0.336m³ of flooding is minor and will be managed in the upper part of the resin bound gravel subbase near to the MUGA.

7.001 – 3.893m³ of flooding will be managed in the subbase of the resin bound gravel. The subbase at 225mm deep, and a porosity of 0.3, this flooding can be managed over an area of 58m² of porous surfacing.

8.000 – 0.307m³ of flooding will be managed in the subbase of the Porous surfacing.

The Fort Rd widening works will have a separate storage structure in the form of a swale. The runoff volume from the site has been modelled in Micro Drainage using the network module for storms up to the 1 in 100-year event +40%CC.

4.3 Interception

Surface water is managed to prevent, so far as possible, any discharge from the site for rainfall events of less than 5mm through a system comprising of rain gardens, green roofs, a swale and permeable surfacing. The site has been designed holistically so that all catchments drain via SuDS features as much as possible prior to discharging, this also relates to treatment - see Standard 3 below.

Table G2.1 of the "Statutory Standards for Sustainable Drainage Systems – Designing, Constructing, Operating and Maintaining Surface Water Drainage Systems" have been used to ensure that the interception criteria are satisfied.

For the Fort Rd widening works, only the additional impermeable area has been considered for interception, and the swale base area sized to achieve this.

4.4 Exceedance

A high level overflow pipe is included on the flow control devices, set above the top level of attenuation. Site levels are designed to convey surface water during exceedance events away from the proposed development and nearby buildings. Overland flows will flow freely over the development towards the north to Lavernock Road. Fort Rd widening works exceedance route will be via the gully to Lavernock Rd as it is the low spot of the drainage network.

5 Standard 3: Water Quality

This section sets out the water quality treatment and pollution prevention strategy for the proposed Ysgol Y Deri Primary School.

5.1 Water Quality Management Criteria

The surface water drainage network serving the proposed development consists of various SuDS features to ensure that all impermeable catchments are drained via SuDS features as much as possible to improve the water quality of the run-off and mitigate the risk of polluting the downstream network. The criteria noted in this technical note is based on the requirements set out in Chapter 4 and 26 of the Ciria SuDS Manual.

Table 3 below sets out the minimum water quality management requirements for discharges to receiving surface waters.

Table 3: Minimum water quality management

Land Use	Pollution Hazard Levels	Requirements for discharge to surface waters
Development building roof/footways	Low	Simple index approach
Development access road (low traffic)	Low	Simple index approach
Development car park (low traffic)	Low	Simple index approach

Based on the site-specific land use noted in Table 3, Table 4 sets out the pollution hazard indices for the different land uses. The indices range from 0 (no pollution hazard for this contaminant type) to 1 (high pollution hazard for this contaminant type).

Table 4: Pollution hazard indices for different land use classifications

Land Use	Pollution Hazard Levels	Total suspended solids (TSS)	Metals	Hydrocarbons
Development building roof	Low	0.3	0.2	0.05
Development access road (low traffic)	Low	0.5	0.4	0.4
Development car park (low traffic)	Low	0.5	0.4	0.4

5.2 Water Quality Treatment Strategy

The water quality treatment strategy is based on the simple index approach noted in the Ciria SuDS Manual. To ensure that the SuDS features deliver adequate treatment they should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. The site-specific SuDS features for this development include:

- Bioretention systems (Rain gardens)
- Permeable surfacing
- Downstream defender

A Dwr Cymru Welsh Water major infrastructure is located beneath the development, bisecting the site from Northwest to Southeast. Due to this, no SuDS features are permitted within the easement zone other than unlined permeable surfacing.

Table 5 Mitigation indices for each SuDS feature against the pollution hazard indices.

	Pollution Hazard Indices	Mitigation indices				
		Bioretention Systems	Permeable surfacing	Green Roof	Swale	Total
Development building roof/footways						
Total suspended solids (TSS)	0.3	0.8	0.4	0.8		N/A
Metals	0.2	0.8	0.4	0.8		N/A
Hydrocarbons	0.05	0.8	0.5	0.8		N/A
Access road and car park (low traffic)						
Total suspended solids (TSS)	0.5	-	0.4		0.5	N/A
Metals	0.4	-	0.4		0.6	N/A
Hydrocarbons	0.4	-	0.5		0.6	N/A

The indices in Table 5 above illustrate that other than TSS in permeable surfacing, the proposed SuDS features exceed the minimum requirements noted in Table 4 to improve the water quality of the run-off and to mitigate the risk of polluting the downstream network.

6 Standard 4: Amenity, and Standard 5: Biodiversity

A rain garden provides amenity areas and green corridors while also serving as drainage features. The external hardstanding areas will be permeable allowing for amenity space to be used by the school.

Rain gardens, also provide the opportunity for biodiversity to be improved in the area. The bioretention systems will be planted to ensure vegetation is available and further encourage biodiversity. A green roof is also provided to the full extent of roof area which will contribute to increasing biodiversity.

7 Standard 6: Construction, Operation and Maintenance

7.1 Construction

The proposed drainage system has been designed in accordance with Building Regulations Part H. Each SuDS feature has been designed in-line with the CIRIA SuDS Manual. The drainage system has been designed so that it can be constructed easily and safely by using industry standard construction details (such as Sewers for Adoption 7th Edition manhole details). The drainage system has been designed so that it can be maintained easily and safely.

- Pipe protection to be incorporated where sufficient depths are not achieved.
- Raised pipe levels to avoid as far as possible existing rock strata (St Mary's Well Bay Member).
- Flow controls to be designed in accordance with manufacturer's guidance.
- Catchpits with a sump to be installed prior to the attenuation tank to help manage sediment and debris.
- Rain gardens not included in areas over DCWW culvert and associated 10m easement from centreline, in line with DCWW recommendations.
- Areas of rain gardens within 5m of the building to be lined with an impermeable membrane.

Refer to document reference: YYDE-JUB-XX-XX-RP-C-00004 for the Designer Risk Assessment which identifies that the designs have been developed with safe construction, operation, and maintenance, in accordance with the principles of Construction (Design and Management) Regulations 2015 and assuming competent contractors will be used.

7.2 Operation and Maintenance

The site, including the surface water drainage, will be owned by Vale of Glamorgan Council, as it is a public education building, of whom will provide maintenance to the external areas and surface water network. Access will be provided via the proposed car park. Refer to technical note YYDE-JUB-XX-XX-RP-C-00003 for details of the SuDS Operation and Maintenance Strategy to be used by those maintaining the drainage features. This technical note sets out the maintenance strategy for the development in line with Sustainable Drainage Systems Standards for Wales 2018 & CIRIA report C753.

Appendix A: List of supporting documents

Drawing/Doc Reference	Originator	Title
YYDE-JUB-XX-XX-DR-C-00500	Jubb	Proposed Drainage Layout Sheet 1 of 2
YYDE-JUB-XX-XX-DR-C-00501	Jubb	Proposed Drainage Layout Sheet 2 of 2
YYDE-JUB-XX-XX-DR-C-00503	Jubb	Existing Catchment Plan
YYDE-JUB-XX-XX-DR-C-00504	Jubb	Interception Layout
YYDE-JUB-XX-XX-DR-C-00510	Jubb	Drainage Standard Details Sheet 1 of 4
YYDE-JUB-XX-XX-DR-C-00511	Jubb	Drainage Standard Details Sheet 2 of 4
YYDE-JUB-XX-XX-DR-C-00512	Jubb	Drainage Standard Details Sheet 3 of 4
YYDE-JUB-XX-XX-DR-C-00513	Jubb	Drainage Standard Details Sheet 4 of 4
YYDE-JUB-XX-XX-DR-C-00520	Jubb	Proposed Catchment Plan Sheet 1 of 2
YYDE-JUB-XX-XX-DR-C-00521	Jubb	Proposed Catchment Plan Sheet 2 of 2
YYDE-JUB-XX-XX-DR-C-00551	Jubb	S278 Proposed Catchment Plan
YYDE-JUB-XX-XX-DR-C-00560	Jubb	S278 Proposed Drainage Layout
YYDE-JUB-XX-XX-DR-C-00570	Jubb	S278 Proposed Drainage Details
YYDE-JUB-XX-XX-DR-C-00600	Jubb	Proposed Contours Sheet 1 of 2
YYDE-JUB-XX-XX-DR-C-00601	Jubb	Proposed Contours Sheet 2 of 2
YYDE-JUB-XX-XX-DR-C-00602	Jubb	S278 Proposed Contours
YYDE-JUB-XX-XX-DR-C-00610	Jubb	Existing Levels
Kalzip Green Roof Details	Jubb	Kalzip Green Roof Details
Documents		
YYDE-JUB-XX-XX-RP-C-00003	Jubb	SuDS Operation and Maintenance Strategy
YYDE-JUB-XX-XX-RP-C-00004	Jubb	Designer Risk Assessment
YYDE-JUB-XX-XX-CA-C-00001	Jubb	Network Calculations
YYDE-JUB-XX-XX-CA-C-00002	Jubb	Greenfield runoff calculations
YYDE-JUB-XX-XX-CA-C-00102	Jubb	S278 Network Calculations
YYDE-JUB-XX-XX-CA-C-00103	Jubb	S278 Brownfield Runoff Calculations
Further information		
YYD-HYD-XX-XX-RP-GE-0003_S2_P2	Hydrock	Phase 2 Ground Investigation Report
17379-HYD-YD-XX-RP-FR-0001	Hydrock	Flood Consequence Assessment

YYDE-HLM-00-00-DR-L-45002	HLM Architects	Landscape Plan Sheet 1 of 3
YYDE-HLM-00-00-DR-L-45003	HLM Architects	Landscape Plan Sheet 2 of 3
YYDE-HLM-00-00-DR-L-45004	HLM Architects	Landscape Plan Sheet 3 of 3
YYDE-HLM-00-00-DR-L-45005	HLM Architects	Landscape Planting Schedule
YD2-HLM-00-00-DR-L-00001-P04	HLM Architects	Site Location Plan
Cosmeston SW Discharge point	VoG	Surface Water Discharge Correspondence
Site Surveys - Sewer plan PLA0058362	DCWW	DCWW Sewer Plan
RE_ Ysgol Y Deri - Cosmeston SW Discharge point	VoG	Discharge point correspondence