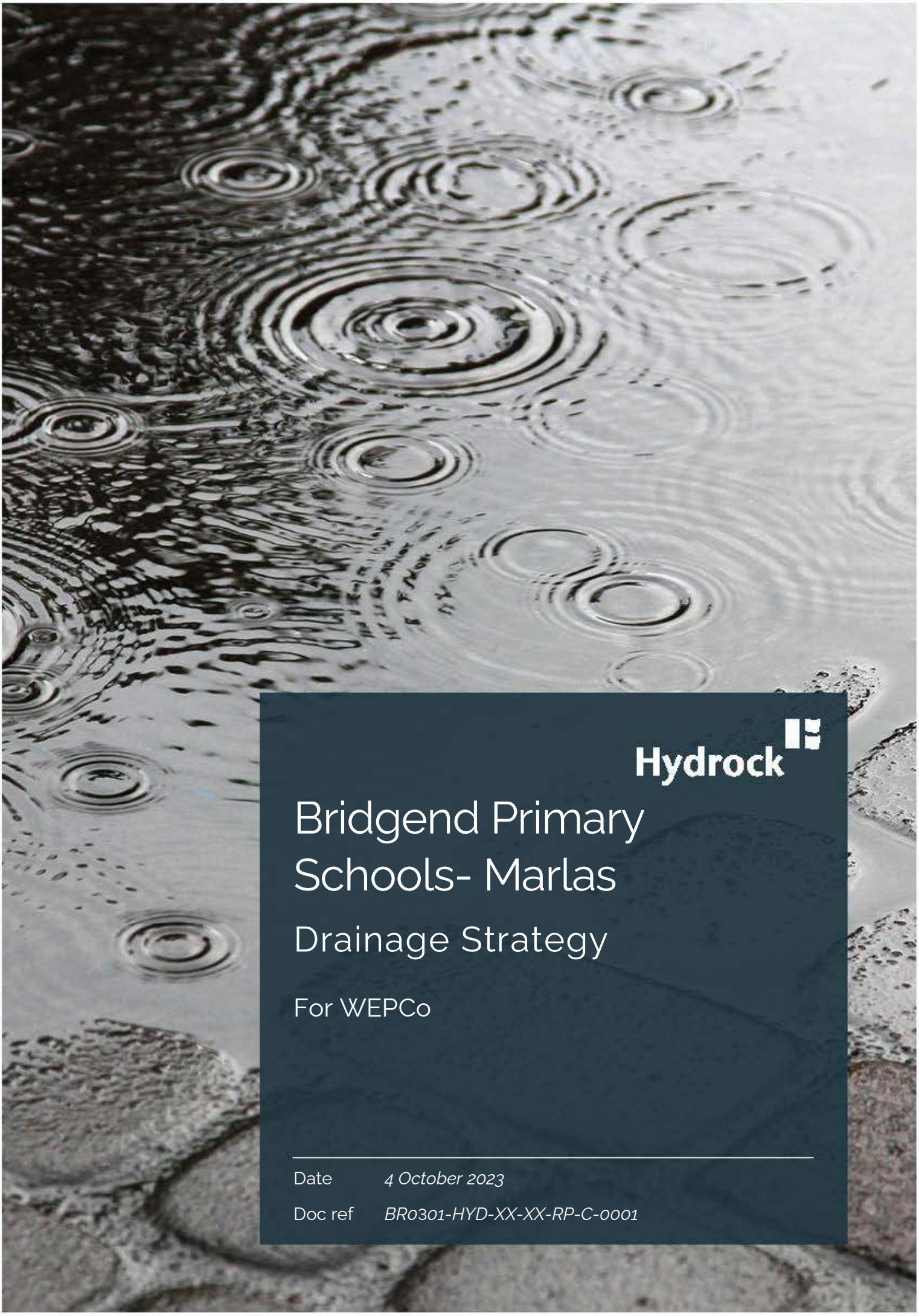

Hydrock

Bridgend Primary Schools- Marlas

Drainage Strategy

For WEPCo

Date	*4 October 2023*
Doc ref	*BR0301-HYD-XX-XX-RP-C-0001*

Document control sheet

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Introduction

Hydrock have been commissioned by WEPCo to provide a drainage strategy report and preliminary design for the proposed Bridgend Primary School at Gibbons Way, North Cornelly, Bridgend, CF33 4ND.

It is our understanding that the client is seeking to redevelop the current brownfield site and that this report is required to support the PAC and SAB pre-application submissions.

The objectives of the report are to;

- Review the existing drainage arrangements on site for both surface and foul water;
- Assess the feasibility of Sustainable Drainage Systems (SuDS) features within the development to control and discharge surface water runoff to comply with the requirements of the Welsh Government statutory "Sustainable Drainage Systems Standards for Wales" (SDSSW) document 2018;
- Assess the options for the disposal of foul water from the development; and
- Provide a preliminary design for surface water (SuDS) systems including indicative sizing of storage/attenuation features and conceptual plan suitable for inclusion in a pre-application submission to the local authority's SuDS Approval Body (SAB).

The following tasks will be undertaken to complete this report;

- Undertake a desktop investigation of the site's existing foul and surface water drainage arrangements;
- Outline anticipated solutions for foul sewage disposal and surface water disposal. This will include preliminary calculations, in order that the conceptual designs may be agreed with the relevant authorities. In preparing the surface water drainage strategy, we will consider inundation of the floodplain and assess flood levels in the location of attenuation features;
- Determine the area of impermeable surfaces that will be added by the proposed development and estimate the equivalent greenfield and brownfield run-off rates for this area;
- Assess the feasibility of using infiltration as a disposal method, based on soakaway test results or any other available information on ground and site conditions;
- Provide general information on the maintenance and adoption of SuDS via the SAB's approval process; and
- Give consideration to drainage exceedance. In particular, the use of topographic information to identify overland flow paths and areas susceptible to surface water ponding.

A number of sources have been used to compile this drainage strategy. Whilst Hydrock believe them to be trustworthy we are unable to guarantee the accuracy of the information that has been provided by others.

This report is based on information available at the time of preparation. Consequently, there is potential for further information to become available. These changes may lead to future alteration to the conclusions drawn in this report for which Hydrock cannot be held responsible.

1. Existing Site

1.1 Site Location

Figure 1 indicates the site location within the red circle, which is located at Gibbons Way, North Cornelly, Bridgend, CF33 4ND (Approximate Grid Reference X- 282057, Y- 181848). ©OpenStreetMap contributors.

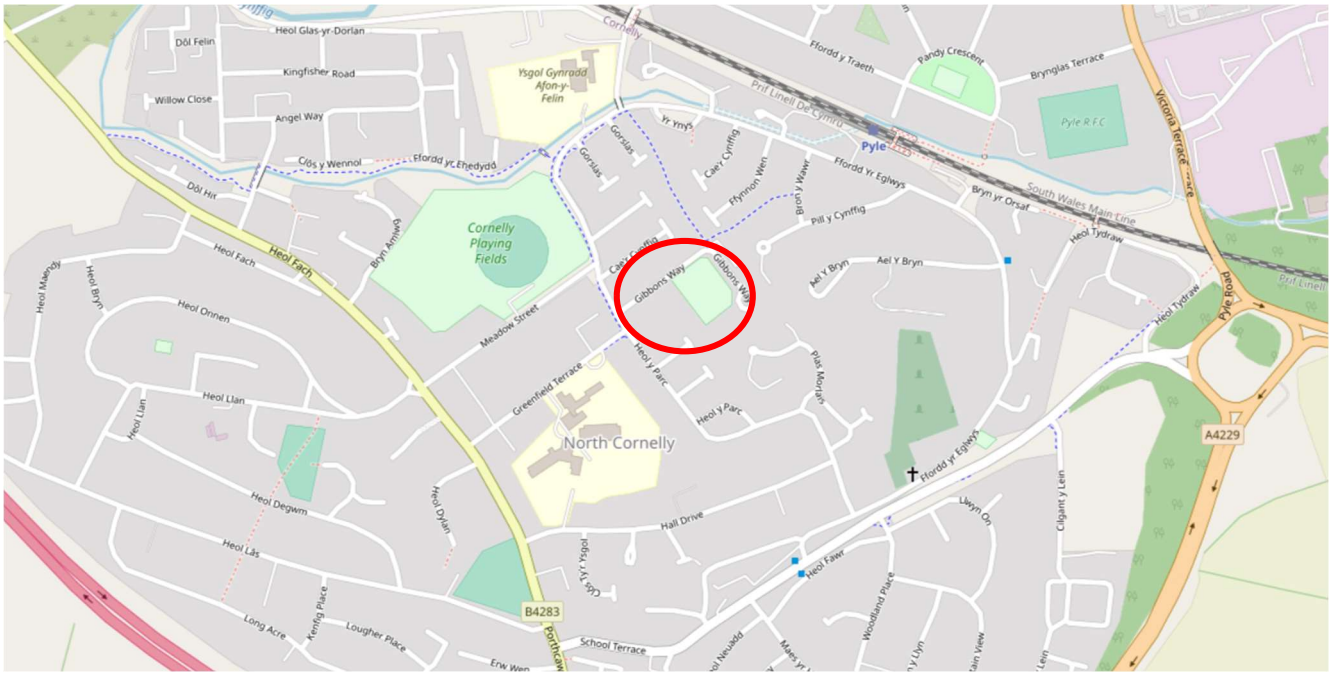


Figure 1 - Site Location Plan

1.2 Site Description

The site is approximately 1.88 hectares (ha) in area and is primarily greenfield in nature, with an area of existing hardstanding. The site falls from southeast to northwest at a gradient of approximately 1 in 11.

The site is bordered by existing residential dwellings to the northern, eastern, and southern boundaries of the site, and Heol-Y-Parc Road on the western boundary of the site. There is no existing direct access roads to the site, but the site can be accessed by vehicles from Gibbons Way located to the west.

1.3 Flood Risk

From available mapping information, the site is free from all types of flooding, Figure 2 contains an extract of the National Resources Wales (NRW) flood risk maps with the site boundary shown in red.

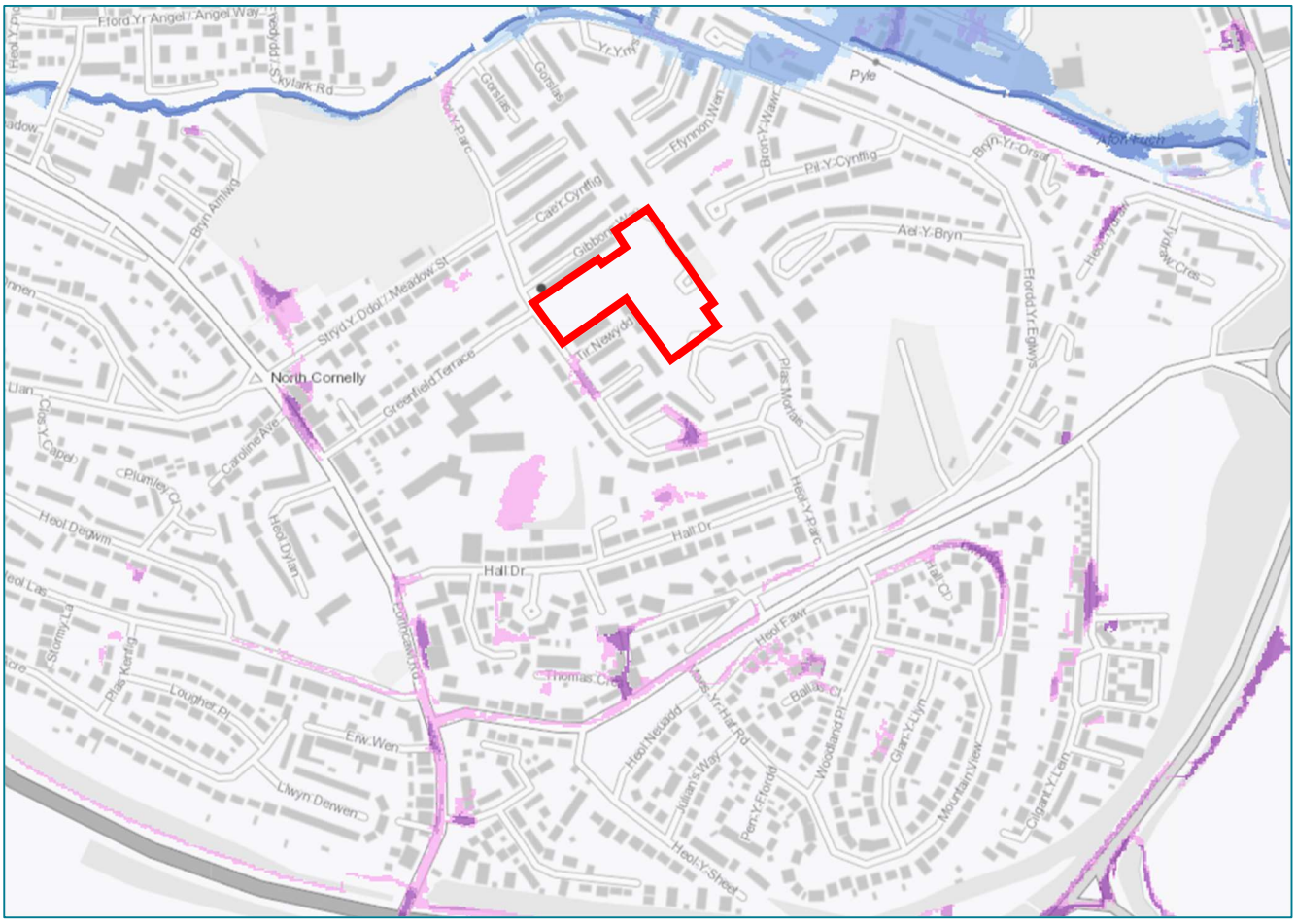


Figure 2 - Extract of NRW Flood Risk Map

1.4 Existing Drainage Arrangements

From available mapping information it has been established that the nearest watercourse is the Afon Fach, an existing river which is located approximately 280m north of the site's boundary. There are also private surface water networks located within the site's boundary, two existing private 150mm diameter surface water sewers located in the centre of the site's boundary and within Gibbons Way, which serve the existing hardstanding area, existing car park and Gibbons Way respectively. There is an existing private 600mm surface water sewer located along the western boundary of the site, which flows south to north. There is an existing 150mm diameter DCWW foul water sewer running from north to south, within the site along the western boundary of the site, and an existing 375mm diameter DCWW foul water sewer located within and along the eastern boundary of the site and flows northwest to southeast and crosses the southern part of the site in an east to west direction.

Figure 3 contains an extract of the DCWW asset plan for the area with the site boundary shown in red.

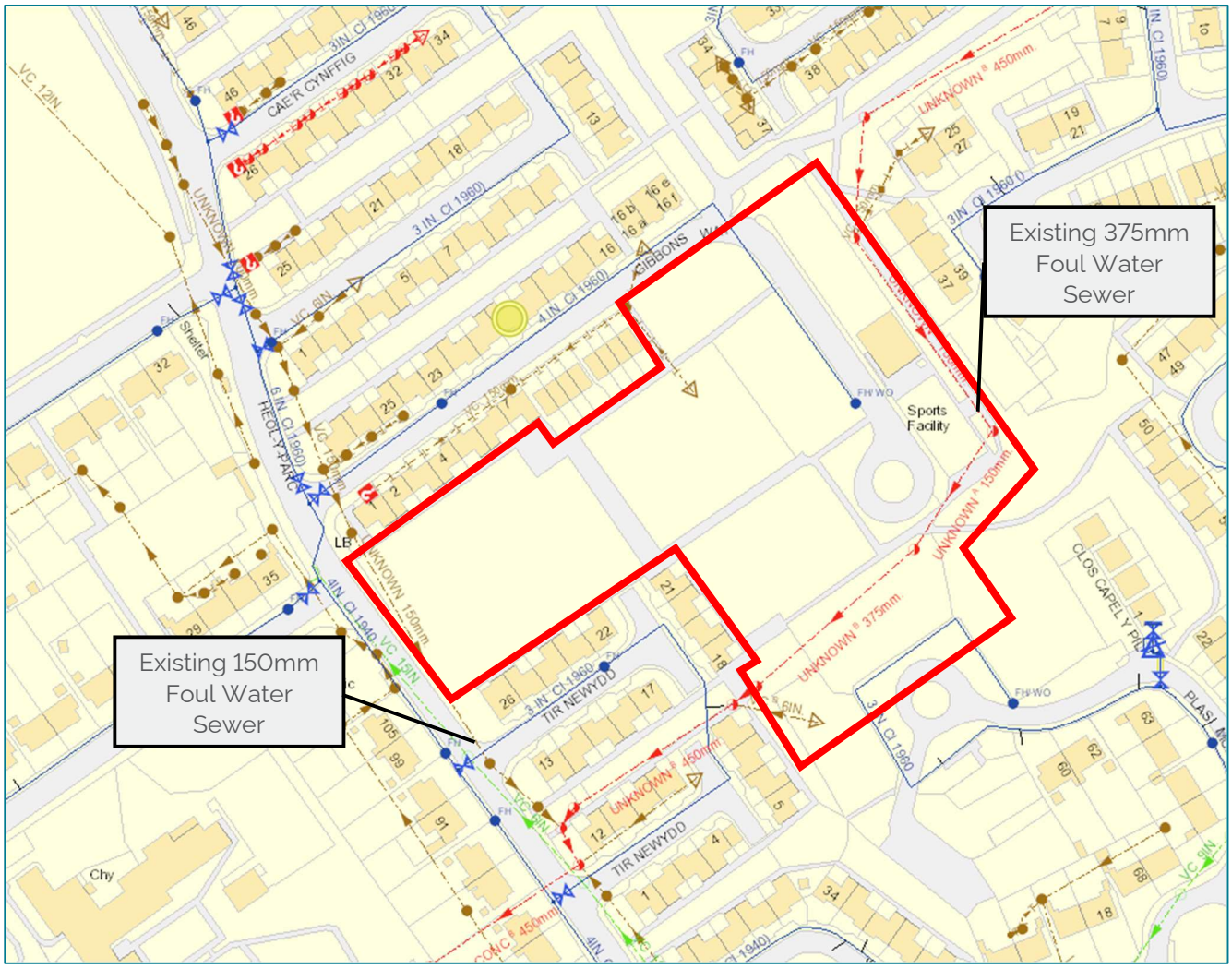


Figure 3 - Extract of DCWW Record Plan

1.5 Existing Contribution Areas and Run-off Rates

The total site area is circa 1.88ha. The global greenfield run-off rates have been calculated using the Wallingford Website with FEH rainfall data and table 1 summarises the runoff rates for each return period (1, 30 & 100). Calculations detailing the derivation of the values in these tables are available in Appendix A.

Table 1: Greenfield Run-off Rates by Return Period

Return Period	Greenfield Run-off Rate (l/s)
1 YRP	7.39
30 YRP	14.95
100 YRP	18.31

2. Proposed Development

2.1 Development Proposals

For assessment purposes the development of a proposed school comprising of MUGAs and a grass pitch with associated infrastructure.

2.2 Foul Drainage

The proposed new development will seek to discharge foul flows via gravity from the site to the existing public foul sewer system which is situated within the site and runs along the western boundary of the site and currently serves the existing residential dwellings north and south of the proposed site. It is proposed to create a new manhole on the line of the existing public foul sewer that runs within the site's boundary. Based on the GPR survey data, this drainage system is deep enough to allow a gravity connection without the need for pumping.

All works to the existing public foul sewer is subject to confirmation from DCWW the asset owner. All on site sewerage systems will be designed and constructed to comply with building regulations requirements with any adopted elements in accordance with the latest edition of "Sewers for Adoption" and any of the adopting authority's specific requirements.

2.3 Surface Water

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely as possible and adopt the principles of water management schemes as stated in section 2 of the SDSSW document 2018. The previous sections of this report have established the current drainage arrangements on site and have also determined the current discharge rates for surface water leaving the site.

From 7th January 2019 Schedule 3 of the Flood and Water Management Act has been implemented by the Welsh Government which requires any development of more than 1 unit or where the construction area is greater than 100m^2 to comply with the SuDS Approving Bodies (SAB's) design guidance and ministers' standards which will require all sites to adopt SuDs in their design. The standards are listed below;

- S1 – Surface Water Runoff Destination
- S2 – Surface Water Runoff Hydraulic Control
- S3 – Water Quality
- S4 – Amenity
- S5 – Biodiversity
- S6 – Design of Drainage for Construction, Operation and Maintenance

The Standards listed will need to be met by the design in order to comply with the SDSSW. S1 is a hierarchy standard with standards S2-S6 being fixed.

2.3.1 S1 - Surface Water Run-off Destination

In determining a suitable methodology for disposal of surface water flows from this development, it is necessary to explore the technical options outlined under Standard S1 of the SDSSW 2018 document published by Welsh Government. This states that disposal should be made through the hierarchical approach which are, in order of preference; surface water runoff collected for use, infiltration methods, discharge to surface water body, discharge to a surface water sewer, highway sewer or another drainage system and finally discharge to a combined sewer. Each of these options are considered below.

2.3.1.1 Collected for Use

The suitability of this option will depend on the proposed water usage of the development, if the development has low grey water demand, the collection of water for reuse would not be

economical or feasible, however if the demand for grey water is deemed to be high then rainwater harvesting would be an appropriate solution for parts of the development. The use of rainwater harvesting would need to be used in conjunction with one of the below methods of discharge in order to cater for exceedance flows in extreme rainfall events where the rainfall volume exceeds the volume of surface water storage provided by the rainwater harvesting tanks.

The school building could be suitable for the collection of water as this area will have some demand for grey water. The only roof area that would be suitable for rainwater harvesting would be areas of the main school roof. Other basic forms of rainwater harvesting have been considered for incorporation into the development in the form of rainwater butts that will collect water from rainwater downpipes and store it for irrigation of the soft landscaped areas and planting beds however the flow rates from the roof areas will be too high and also demand for these flows will again be low as the planted landscape areas will be accepting surface water runoff from the impermeable areas as part of the design. Further consideration will be given to rain water harvesting at the next design stage with the M&E consultants to determine if it is feasible and economical for this scheme.

2.3.1.2 Infiltration Methods

Based on the site investigation report from September 2020 - Phase II Supplementary Geo-Environmental Assessment Report, two soakaway tests were carried out across the site with one being unsuccessful as it failed to drain over twenty-four hours, and one showing insufficient levels of infiltration with an infiltration rate between 1.32 x 10^-6m/s – 2.03 x 10^-6m/s. Another test was to be carried out; however, it was not undertaken due to an obstruction that was encountered. Based on these results, it has been suggested that infiltration is not a viable means of disposal of surface water runoff from the site.

2.3.1.3 Discharge to Surface Water Body

Sequentially, the next consideration in the hierarchical approach is to discharge to a surface water body. The nearest watercourse is the existing river Afon Fach that is located approximately 280m north of the proposed site. The existing river is located outside of the proposed site's boundary which would require crossing third party land between the proposed site and the existing river to provide a direct connection. Based on the above constraint, we are not proposing to discharge the proposed surface water runoff from site to the existing river.

2.3.1.4 Discharge to Surface Water Sewer

Based on the information received to date there is an existing public surface water sewers located within the site's western boundary of the proposed site. This system currently serves the existing dwellings located to the north and south of the proposed site's boundary.

2.3.1.5 Discharge to Combined Sewer

Based on the above information there is no need to consider discharging into a combined public sewer system.

2.3.2 S2 - Surface Water Run-off Hydraulic Control

This standard requires surface water to be managed to prevent as far as possible any discharge from the development for rainfall events of less than 5mm and that the surface water runoff rate and volume for up to a 1 in 100-year return period should be managed to protect people, properties, and the receiving water body. Consideration is also required to the risk associated with runoff from events greater than a 1 in 100-year return period with mitigating proposals developed for the scheme.

2.3.2.1 *Interception of Run-off*

Interception will need to be considered under the statutory standards. Interception aims to mimic greenfield runoff conditions by preventing runoff from the majority of all small rainfall events. This can contribute to reducing pollution load to receiving surface water bodies. Meeting the interception criterion is not expected during particularly wet periods, when permeable surfaces and subsoils are saturated, so a suggested target is that 80% compliance should be achieved during the summer and 50% in winter. Refer to table G2.1 in the Statutory Standards for Sustainable Drainage Systems 2018 document published by Welsh Government for details of interception mechanisms and their assumed compliance with the standards. It is proposed that this scheme will utilise rain gardens and permeable paving to provide suitable levels of interception, refer to drawing BR301-HYDR-SW-XX-DR-C-4500 - Interception Plan within the pre-SAB application pack for further details.

2.3.2.2 *Hydraulic Control and Storage*

For the purposes of this section of the report infiltration will not be accounted for as a means of disposing surface water runoff generated from the development, therefore the discharge volume for the site will not decrease. In order to meet the standards this report has adopted the simple approach outlined in the statutory standards of restricting all runoff from the development site for all return periods up to and including the 1 in 100-year event to the current 1-year return period rates as given in table 1 of this report which equates to a maximum discharge rate of 7.39 l/s for the development.

In accordance with statutory guidelines, the development of this site should not increase flood risk elsewhere and as such, all runoff from impermeable areas on site should be contained within the site boundary for up to and including a 1 in 100-year design period storm, plus 40% climate change and urban creep allowance, these allowances will have to be agreed with the SAB prior to detailed design.

Surface water flows from the proposed development would need to be attenuated via several flow control chambers throughout the proposed surface water system to maximise storage capabilities, and on-site storage provided for surface water runoff for all rainfall events up to and including a 1 in 100-year event with 40% allowance for climate change and urban creep. Given the proposed site usage, storage in the form of rain gardens, permeable paving and an attenuation tank is achievable for the site. These features will be situated in throughout the site for ease of access and maintenance.

It is proposed to discharge surface water runoff from the development via gravity to the existing public surface water system through creating a new connection point on the existing manhole. Runoff rates are to be restricted to the 1-year greenfield runoff rate stated in table 1 for the whole development site, this will need to be agreed with the adopting SAB's authority and local authority's drainage department..

For the purposes of this report, storage has been modelled within InfoDrainage and the overall attenuated impermeable area for the development has been taken as 0.49ha. The maximum discharge is assumed at 7.39l/s for all rainfall events up to and including the 100-year return period with 40% allowance for climate change and urban creep. The minimum preliminary storage required has been calculated across the site in the different SuDS features and is summarised in table 2 below. These storage calculations will be further developed at detailed design stage. A copy of the InfoDrainage calculations can be found in Appendix B.

Table 2: Development Storage Summary

SuDS Feature	Approximate Area (m^2)	Attenuated Discharge Rate (l/s)	Indicative Storage Provided (m^3)
Rain Gardens	557.7	-	150.6
Permeable Paving	2813.0	Varies	435.9
Attenuation Tank	744	7.4	353.4

2.3.2.3 *Exceedance Flows and Flood Pathways*

"It is inevitable that as a result of extreme rainfall the capacities of sewers, covered watercourses and other drainage systems will be exceeded on occasion. Periods of exceedance occur when the rate of surface runoff exceeds the drainage system inlet capacity, when the pipe system becomes overloaded, or when the outfall becomes restricted due to flood levels in the receiving water. Underground conveyance cannot economically or sustainably be built large enough for the most extreme events and, as a result, there will be occasions when surface water runoff will exceed the design capacity of drains. When drainage exceedance capacity is exceeded the excess water (exceedance flow) is conveyed above ground, and will travel along streets and paths, between and through buildings and across open space. Indiscriminate flooding of property can occur when this flow of water is not controlled." (CIRIA C753).

Flood-flow pathways would be designed to convey the overland flows from rainfall events above a 1in100 year return period to suitable areas of open space, such as watercourses, landscaped areas, car parking areas and other hard surfaced areas in order to protect properties against flooding. Consideration should also be given to exceedance pathways from storage areas in the event of extreme rainfall or failure with allowance made to convey flows away from properties both on and off the site. These should be considered as part of the detailed drainage and levels design of the development.

2.3.2.4 *Flood Risk to People*

"People are at risk of suffering death or serious injury when flooding occurs. People are unable to stand in deep or fast flowing floodwater. Once they are unable to stand, there is a high risk of death or serious injury. Adults are unable to stand in still floodwater with a depth of about 1.5m or greater, although this is obviously affected by the height of a person. The depth of flowing floodwater where people are unable to stand is much less. For example, some people will be at risk when the water depth is only 0.5m, if the velocity is 1m/s (about 2 mph). If the velocity increases to 2m/s (about 4 mph) some people will be unable to stand in a depth of water of only 0.3m. Most people will be unable to stand when the velocity is 2m/s and the depth is 0.6m." (Defra/ Environment Agency, FD2321/TR2).

A hydraulic model has been built to assist the design of the proposed surface water drainage networks. An extreme storm event has been simulated within the model, which highlighted potential flooding locations and the flood flow pathways have been designed/defined based on the proposed layout and levels of the hard areas and landscaping. From site assessments it is reasonable to assume that flooding to a depth considered a 'risk to people' is highly unfeasible as the land lays relatively flat with little to no peaks and troughs where deep floodwaters could occur.

2.3.3 *S3 - Water Quality*

This standard requires treatment of surface water runoff to prevent negative impacts on the receiving water quality and/or to protect downstream drainage systems including sewers. The only exception to this

standard is where drainage connects directly to a combined sewer, where the quality requirements are limited to preventing the discharge of oil and sediments to the sewer system.

The management trains to be used on the project have been assessed using the Simple Index Assessment (SIA) tool available publicly (http://www.ukSuDS.com/drainage-calculation-tools/water-quality-assessment-for-SuDS-developments) which is built around the principles for simple assessment outlined in CIRIA C753 to assess the levels of treatment provided by the proposals.

The possible impact of accidental spills will need to be addressed with the most vulnerable areas to a spill or other pollution incident being any car park areas and access roads, therefore the highway areas and parking will be drained into the adjacent rain gardens and permeable paving, which will provide a level of treatment for pollution.

Planting within the SuDS features should form part of the water quality strategy. SuDS components like rain gardens provide water quality improvements by reducing sediment and contaminants from runoff either through settlement or biological breakdown of pollutants as part of their interceptor function, so only robust and tolerant species of planting should be specified. Once these species establish this will decrease the flow rate of water travelling through and filter pollutants and contaminants before entering the downstream network.

2.3.4 S4 - Amenity

This standard requires that the design of the surface water management system should maximise amenity benefits.

The primary amenity focus of the SuDS scheme should be to improve the health and well-being of the users. The scheme will be based on natural forms that mimic natural landscapes found within the region and the vegetated bio retention planting areas are designed with locally contextual species that will encourage natural colonisation. Other key amenity benefits should include improving air quality around the development, increasing carbon sequestration, and improving water quality through removal of pollutants via the rain gardens.

2.3.5 S5 - Biodiversity

This standard requires that the surface water management system should maximise biodiversity benefits.

The SuDS scheme's biodiversity strategy will revolve around the creation of significant and varied habitat to increase the overall biodiversity of the site and ecological value. The inclusion of plant species that will enhance the general eco system and simultaneously act as a water filtration system to clean pollutants and contaminants should be used where possible.

The plant species selected should be both locally contextual and appropriate for the varied habitat zones including primary characteristics that shall ensure:

- Good soil binding and filtration species
- Minimised erosion
- Improved filtration via dense root and stem species
- Tolerance to seasonal variations including droughts and inundations
- Good suspended solids retention
- Pollutant tolerant
- Emergent and pioneering species for natural ecological colonisation
- The creation of diverse, self-sustaining, and resilient ecosystems for high species biodiversity
- Support for local and regional habitat strategies

In general, the proposed rain garden areas will be the focal habitat points for the site and will enhance the site over the current site layout by adding areas of water and damp and vegetated soils. Exposed areas of the rain gardens will attract certain species and shaded areas under adjacent buildings and trees will further enhance the varied ecosystem potential.

2.3.6 S6 - Design of Drainage for Construction and Maintenance and Structural Integrity

The surface water drainage system will be designed with the overriding ethos of simplicity in construction, use and maintenance. This then allows a very simple translation from the principles described within standard S6, namely that all elements of the surface water drainage system should be designed so that they can be constructed, as well as maintained and operated "…easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy)." (SDSSW).

The proposed system will be private and therefore the client will be responsible for the maintenance of the surface water drainage elements of the system to ensure it continues to comply with SuDS standards.

Information with regards to the construction methodology and requirements of the proposed system have been developed and will be further developed as part of the detailed design stage of the project, likewise the maintenance requirements and regime of the proposed system has been developed and will be developed into the full maintenance strategy for the site during the next phase of design development. This will be developed in conjunction with the client's maintenance team, as it is not considered appropriate for these details to be developed by the design team in isolation from the end users. This will then need to be confirmed and submitted for approval to the SAB prior to construction commencing on site.

3. Conclusion

3.1 Foul Drainage

The most sustainable method for the disposal of foul water discharge from the proposed development site is via the existing main sewer network. The new development will seek to discharge foul flows, via gravity, from the site to the public foul sewer system located along the western boundary of the development. The capacity of the sewer and hence the suitability of this connection point will need to be confirmed by DCWW. It is proposed to create a connection point by constructing a new manhole on the line of the existing public foul sewer, which runs within the site's boundary. The existing sewer located to the west is 150mm diameter in size.

The proposed site plan in Appendix A shows the indicative layout for the foul sewer network across the site. All works to the existing public sewer system will need to be agreed with DCWW prior to construction.

All works to the existing private foul sewer is subject to confirmation from the asset owner. All on site sewerage systems will be designed and constructed to comply with building regulations requirements with any adopted elements in accordance with the latest edition of "Sewers for Adoption" and any of the adopting authority's specific requirements.

3.2 Surface Water Drainage

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely as possible and the proposed system will need to be designed in accordance with the statutory (SDSSW) document 2018 and any local authority's SAB requirements and CIRIA's C753 SuDS Manual as well as meeting the requirements of Building Regulations, Document H.

In determining a suitable methodology for disposal of surface water flows from this development, it is necessary to explore the technical options outlined under Standard S1 in the statutory (SDSSW) document 2018 published by the Welsh Government. It has been determined through preliminary investigation results and design that the discharge of surface water from the proposed site will discharge via gravity into the existing private surface water sewer located west of the proposed site boundary.

Infiltration has not been accounted for as a means of disposing surface water runoff generated from the development, therefore the discharge volume for the site will not decrease. In order to meet the standards this report has adopted the simple approach outlined in the statutory standards of restricting all runoff from the development site for all return periods up to and including the 1 in 100-year event to the current 1-year return period rates as given in table 1 of this report which equates to a maximum discharge rate of 7.39l/s.

In accordance with statutory guidelines, the development of this site should not increase flood risk elsewhere and as such, all runoff from impermeable areas on site should be contained within the site boundary for up to and including a 1 in 100-year design period storm, plus 40% climate change.

The school building could be suitable for the collection of water as this area will have some demand for grey water. The only roof area that would be suitable for rainwater harvesting would be areas of the main school roof. Other basic forms of rainwater harvesting have been considered for incorporation into the development in the form of rainwater butts that will collect water from rainwater downpipes and store it for irrigation of the soft landscaped areas and planting beds however the flow rates from the roof areas will be too high and also demand for these flows will again be low as the planted landscape areas will be accepting surface water runoff from the impermeable areas as part of the design. Further consideration will be given to rain water harvesting at the next design stage with the M&E consultants to determine if it is feasible and economical for this scheme.

Surface water flows from the proposed development would need to be attenuated via several flow control chambers throughout the proposed surface water system to maximise storage capabilities, and on-site storage provided for surface water runoff for all rainfall events up to and including a 1 in 100-year event with 40% allowance for climate change and urban creep. Given the proposed site usage, storage in the

form of rain gardens, permeable paving and an attenuation tank is achievable for the site. These features will be situated in throughout the site for ease of access and maintenance.

It is proposed to discharge surface water runoff from the development via gravity to the existing public surface water system through creating a new connection point on the existing manhole. Runoff rates are to be restricted to the 1-year greenfield runoff rate stated in table 1 for the whole development site, This will need to be agreed with the adopting SAB's authority and local authority's drainage department.

Amenity and biodiversity benefits to the site will be provided in the form of rain gardens which will be incorporated throughout the site and form part of the infiltration/attenuation storage for the site, these will maximise the available green infrastructure within the development site which will improve air quality and water quality of the site.

All on site sewerage systems will be designed and constructed to comply with building regulations requirements and all SuDs components should be designed and constructed in accordance with CIRIA report C756 the SuDs Manual C753 and CIRIA report C768 guidance on the construction of suds.

Appendix A Greenfield Run-off Rates

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Jessica Li
Site name:	WEPCo Marlas
Site location:	Bridgend

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.52316° N
Longitude:	3.70106° W
Reference:	255426213
Date:	Aug 22 2023 16:36

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 1.88

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.684
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.08

Hydrological characteristics

	Default	Edited
SAAR (mm):	1133	1130
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

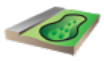
Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):		8.4
1 in 1 year (l/s):		7.39
1 in 30 years (l/s):		14.95
1 in 100 year (l/s):		18.31
1 in 200 years (l/s):		20.66

Appendix B Infodrainage Calculations

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		



Bioretention 4

Type : Bioretention

Ponding Area

Exceedance Level (m)	31.150
Depth (m)	0.150
Base Level (m)	31.000
Top Area (m²)	151.09
Side Slope (1:X)	3.00
Base Area (m²)	126.41
Freeboard (mm)	0
Porosity (%)	100
Length (m)	27.421
Long. Slope (1:X)	122.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	58.105

Filter Area

Base Level (m)	30.250

Filtration Layers

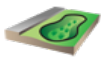
Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	500	44	35.0	Soil Type
	Storage	250	30	216.0	

Advanced

Ponding Area

Base Perimeter (m)	64.063
Top Perimeter (m)	65.863

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		



Bioretention 3

Type : Bioretention

Ponding Area

Exceedance Level (m)	31.540
Depth (m)	0.150
Base Level (m)	31.390
Top Area (m²)	61.90
Side Slope (1:X)	3.00
Base Area (m²)	49.96
Freeboard (mm)	0
Porosity (%)	100
Length (m)	13.269
Long. Slope (1:X)	31.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	23.500

Filter Area

Base Level (m)	30.640

Filtration Layers

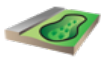
Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	500	44	35.0	Soil Type
	Storage	250	33	216.0	

Advanced

Ponding Area

Base Perimeter (m)	34.067
Top Perimeter (m)	35.867

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		



Bioretention 2

Type : Bioretention

Ponding Area

Exceedance Level (m)	31.245
Depth (m)	0.150
Base Level (m)	31.095
Top Area (m²)	19.26
Side Slope (1:X)	3.00
Base Area (m²)	9.15
Freeboard (mm)	0
Porosity (%)	100
Length (m)	11.240
Long. Slope (1:X)	47.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	4.830

Filter Area

Base Level (m)	30.345

Filtration Layers

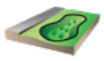
Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	500	44	35.0	Soil Type
	Storage	250	30	216.0	

Advanced

Ponding Area

Base Perimeter (m)	24.107
Top Perimeter (m)	25.907

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		



Bioretention 1

Type : Bioretention

Ponding Area

Exceedance Level (m)	30.450
Depth (m)	0.150
Base Level (m)	30.300
Top Area (m²)	289.71
Side Slope (1:X)	3.00
Base Area (m²)	240.44
Freeboard (mm)	0
Porosity (%)	100
Length (m)	54.743
Long. Slope (1:X)	60.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	110.692

Filter Area

Base Level (m)	29.550

Filtration Layers

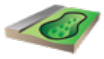
Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	500	44	35.0	Soil Type
	Storage	250	30	216.0	

Advanced

Ponding Area

Base Perimeter (m)	118.271
Top Perimeter (m)	120.071

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		



Bioretention 5

Type : Bioretention

Ponding Area

Exceedance Level (m)	31.335
Depth (m)	0.150
Base Level (m)	31.185
Top Area (m²)	35.74
Side Slope (1:X)	3.00
Base Area (m²)	25.42
Freeboard (mm)	0
Porosity (%)	100
Length (m)	11.464
Long. Slope (1:X)	188.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	12.085

Filter Area

Base Level (m)	30.435

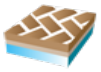
Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☑	Soil	500	44	35.0	Soil Type
	Storage	250	30	216.0	

Advanced

Ponding Area

Base Perimeter (m)	27.363
Top Perimeter (m)	29.163



Porous Paving 5

Type : Porous Paving

Dimensions

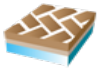
Exceedance Level (m)	31.050
Depth (m)	0.500
Base Level (m)	30.550
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	42.755
Long. Slope (1:X)	10000.00
Width (m)	4.960
Total Volume (m³)	24.067

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	150
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Paving 6

Type : Porous Paving

Dimensions

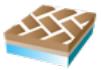
Exceedance Level (m)	31.050
Depth (m)	0.500
Base Level (m)	30.550
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	26.504
Long. Slope (1:X)	437.00
Width (m)	9.407
Total Volume (m³)	27.820

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Pitch 1

Type : Porous Paving

Dimensions

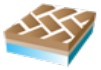
Exceedance Level (m)	31.440
Depth (m)	0.600
Base Level (m)	30.840
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	74.632
Long. Slope (1:X)	10000.00
Width (m)	35.146
Total Volume (m³)	370.253

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Pitch 2

Type : Porous Paving

Dimensions

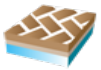
Exceedance Level (m)	34.510
Depth (m)	0.500
Base Level (m)	34.010
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	76.277
Long. Slope (1:X)	10000.00
Width (m)	17.948
Total Volume (m³)	152.378

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Paving 1

Type : Porous Paving

Dimensions

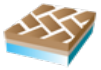
Exceedance Level (m)	30.405
Depth (m)	0.800
Base Level (m)	29.605
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	48.162
Long. Slope (1:X)	67.00
Width (m)	4.845
Total Volume (m³)	47.091

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Paving 4

Type : Porous Paving

Dimensions

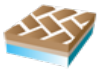
Exceedance Level (m)	30.900
Depth (m)	0.500
Base Level (m)	30.400
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	9.086
Long. Slope (1:X)	30.00
Width (m)	4.000
Total Volume (m³)	4.071

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Paving 3

Type : Porous Paving

Dimensions

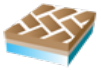
Exceedance Level (m)	30.235
Depth (m)	0.800
Base Level (m)	29.435
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	49.621
Long. Slope (1:X)	80.00
Width (m)	4.535
Total Volume (m³)	45.456

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Paving 2

Type : Porous Paving

Dimensions

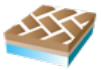
Exceedance Level (m)	30.220
Depth (m)	0.800
Base Level (m)	29.420
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	60.799
Long. Slope (1:X)	64.00
Width (m)	5.963
Total Volume (m³)	73.060

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Paving 8

Type : Porous Paving

Dimensions

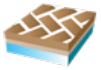
Exceedance Level (m)	31.500
Depth (m)	0.500
Base Level (m)	31.000
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	35.172
Long. Slope (1:X)	235.00
Width (m)	6.225
Total Volume (m³)	24.496

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0



Porous Paving 7

Type : Porous Paving

Dimensions

Exceedance Level (m)	31.200
Depth (m)	0.600
Base Level (m)	30.600
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	79.156
Long. Slope (1:X)	2500.00
Width (m)	11.279
Total Volume (m³)	126.316

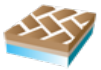
Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		



Porous Paving 9

Type : Porous Paving

Dimensions

Exceedance Level (m)	31.365
Depth (m)	0.700
Base Level (m)	30.665
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	41.379
Long. Slope (1:X)	330.00
Width (m)	9.238
Total Volume (m³)	65.594

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	100
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	216.0

Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.550
Depth (m)	0.500
Base Level (m)	29.050
Number of Crates Long	24
Number of Crates Wide	31
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	2
Crate Width (m)	0.5
Crate Height (m)	0.5
Total Volume (m³)	353.400

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Outfall Details Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
S01	Free Discharge		

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 2 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S05	FEH: 2 years: +40 %: 240 mins: Summer	31.103	29.717	29.770	0.053	3.7	0.060	0.000	3.7	20.878	OK
S06	FEH: 2 years: +40 %: 240 mins: Summer	31.117	29.794	29.848	0.054	3.7	0.061	0.000	3.7	20.890	OK
S22	FEH: 2 years: +40 %: 480 mins: Summer	31.308	30.594	30.638	0.044	2.6	0.013	0.000	2.6	47.056	OK
S20	FEH: 2 years: +40 %: 480 mins: Summer	31.295	30.485	30.530	0.045	2.6	0.013	0.000	2.6	47.043	OK
S17	FEH: 2 years: +40 %: 960 mins: Summer	31.184	30.203	30.250	0.047	3.0	0.030	0.000	3.0	110.053	OK
S15	FEH: 2 years: +40 %: 15 mins: Summer	31.303	30.003	30.060	0.057	5.8	0.036	0.000	5.4	2.669	OK
S14	FEH: 2 years: +40 %: 480 mins: Summer	31.378	29.922	29.976	0.054	5.3	0.034	0.000	5.3	106.688	OK
S13	FEH: 2 years: +40 %: 15 mins: Summer	31.475	29.651	29.753	0.102	18.7	0.065	0.000	15.8	8.831	OK
S12	FEH: 2 years: +40 %: 15 mins: Summer	31.473	29.484	29.585	0.101	15.8	0.064	0.000	14.2	8.772	OK
S11	FEH: 2 years: +40 %: 120 mins: Summer	31.424	29.441	29.538	0.097	14.2	0.062	0.000	14.1	51.079	OK
S02	FEH: 2 years: +40 %: 360 mins: Summer	30.284	28.920	29.351	0.431	11.3	0.488	0.000	9.5	211.584	Surcharged
S01	FEH: 2 years: +40 %: 360 mins: Summer	30.401	28.327	29.349	1.022	9.5	1.156	0.000	7.4	206.280	OK
S18	FEH: 2 years: +40 %: 480 mins: Summer	31.323	30.413	30.460	0.047	3.0	0.030	0.000	3.0	67.811	OK
S08	FEH: 2 years: +40 %: 240 mins: Summer	31.321	29.901	29.923	0.022	0.7	0.006	0.000	0.7	7.226	OK
S07	FEH: 2 years: +40 %: 240 mins: Winter	31.264	29.839	29.861	0.022	0.7	0.006	0.000	0.7	7.447	OK
S10	FEH: 2 years: +40 %: 120 mins: Summer	31.390	29.378	29.468	0.090	14.1	0.102	0.000	13.6	50.938	OK
S09	FEH: 2 years: +40 %: 360 mins: Summer	30.456	29.041	29.350	0.309	13.6	0.350	0.000	7.9	180.118	Surcharged
S03	FEH: 2 years: +40 %: 240 mins: Summer	30.939	29.256	29.367	0.111	7.6	0.126	0.000	8.6	46.016	OK
S04	FEH: 2 years: +40 %: 240 mins: Summer	31.103	29.606	29.665	0.059	6.5	0.067	0.000	6.4	33.312	OK

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S05	FEH: 30 years: +40 %: 60 mins: Summer	31.103	29.717	29.878	0.161	8.1	0.182	0.000	9.3	19.809	Surcharged
S06	FEH: 30 years: +40 %: 120 mins: Summer	31.117	29.794	29.905	0.111	9.9	0.126	0.000	9.3	31.791	OK
S22	FEH: 30 years: +40 %: 360 mins: Summer	31.308	30.594	30.653	0.059	4.4	0.017	0.000	4.4	84.291	OK
S20	FEH: 30 years: +40 %: 360 mins: Summer	31.295	30.485	30.545	0.060	4.4	0.017	0.000	4.4	84.261	OK
S17	FEH: 30 years: +40 %: 360 mins: Summer	31.184	30.203	30.264	0.061	5.0	0.039	0.000	5.0	104.931	OK
S15	FEH: 30 years: +40 %: 60 mins: Summer	31.303	30.003	30.092	0.089	8.5	0.057	0.000	9.3	32.408	OK
S14	FEH: 30 years: +40 %: 60 mins: Summer	31.378	29.922	30.080	0.158	9.7	0.101	0.000	10.7	34.688	OK
S13	FEH: 30 years: +40 %: 60 mins: Summer	31.475	29.651	30.053	0.402	34.3	0.256	0.000	29.4	69.179	Surcharged
S12	FEH: 30 years: +40 %: 60 mins: Summer	31.473	29.484	29.990	0.506	29.4	0.322	0.000	27.3	69.071	Surcharged
S11	FEH: 30 years: +40 %: 60 mins: Summer	31.424	29.441	29.965	0.524	27.3	0.333	0.000	25.3	68.984	Surcharged
S02	FEH: 30 years: +40 %: 60 mins: Summer	30.284	28.920	29.808	0.888	23.7	1.005	0.000	9.0	72.165	Surcharged
S01	FEH: 30 years: +40 %: 60 mins: Summer	30.401	28.327	29.806	1.479	9.0	1.673	0.000	7.2	42.342	OK
S18	FEH: 30 years: +40 %: 360 mins: Summer	31.323	30.413	30.475	0.062	5.0	0.039	0.000	5.0	105.035	OK
S08	FEH: 30 years: +40 %: 120 mins: Summer	31.321	29.901	29.967	0.066	5.1	0.019	0.000	5.2	10.382	OK
S07	FEH: 30 years: +40 %: 120 mins: Summer	31.264	29.839	29.912	0.073	5.2	0.021	0.000	5.1	10.367	OK
S10	FEH: 30 years: +40 %: 60 mins: Summer	31.390	29.378	29.933	0.555	25.3	0.628	0.000	25.4	68.645	Surcharged
S09	FEH: 30 years: +40 %: 60 mins: Summer	30.456	29.041	29.805	0.764	42.2	0.864	0.000	19.8	94.165	Surcharged
S03	FEH: 30 years: +40 %: 60 mins: Summer	30.939	29.256	29.827	0.571	19.6	0.645	0.000	21.4	50.618	Surcharged
S04	FEH: 30 years: +40 %: 60 mins: Summer	31.103	29.606	29.860	0.254	15.6	0.288	0.000	16.9	33.112	Surcharged

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S05	FEH: 100 years: +40 %: 60 mins: Summer	31.103	29.717	30.205	0.488	11.4	0.551	0.000	12.2	28.160	Surcharged
S06	FEH: 100 years: +40 %: 60 mins: Summer	31.117	29.794	30.256	0.462	11.3	0.523	0.000	11.4	28.023	Surcharged
S22	FEH: 100 years: +40 %: 240 mins: Summer	31.308	30.594	30.657	0.063	4.9	0.018	0.000	4.9	78.778	OK
S20	FEH: 100 years: +40 %: 480 mins: Summer	31.295	30.485	30.549	0.064	4.9	0.018	0.000	4.9	120.907	OK
S17	FEH: 100 years: +40 %: 60 mins: Summer	31.184	30.203	30.406	0.203	4.9	0.129	0.000	6.6	22.325	Surcharged
S15	FEH: 100 years: +40 %: 60 mins: Summer	31.303	30.003	30.380	0.377	13.2	0.240	0.000	13.8	43.804	Surcharged
S14	FEH: 100 years: +40 %: 60 mins: Summer	31.378	29.922	30.368	0.446	14.3	0.284	0.000	15.2	46.407	Surcharged
S13	FEH: 100 years: +40 %: 60 mins: Summer	31.475	29.651	30.333	0.682	39.7	0.434	0.000	37.7	90.348	Surcharged
S12	FEH: 100 years: +40 %: 60 mins: Summer	31.473	29.484	30.237	0.753	37.7	0.479	0.000	36.7	89.637	Surcharged
S11	FEH: 100 years: +40 %: 60 mins: Summer	31.424	29.441	30.201	0.760	36.7	0.484	0.000	36.2	89.534	Surcharged
S02	FEH: 100 years: +40 %: 60 mins: Summer	30.284	28.920	29.977	1.057	30.2	1.196	0.000	11.6	92.459	Surcharged
S01	FEH: 100 years: +40 %: 60 mins: Summer	30.401	28.327	29.975	1.648	11.6	1.864	0.000	7.3	42.891	OK
S18	FEH: 100 years: +40 %: 480 mins: Summer	31.323	30.413	30.479	0.066	5.6	0.042	0.000	5.6	152.451	OK
S08	FEH: 100 years: +40 %: 60 mins: Summer	31.321	29.901	30.281	0.380	6.3	0.107	0.000	6.2	8.814	Surcharged
S07	FEH: 100 years: +40 %: 60 mins: Summer	31.264	29.839	30.267	0.428	6.2	0.121	0.000	6.0	8.791	Surcharged
S10	FEH: 100 years: +40 %: 60 mins: Summer	31.390	29.378	30.154	0.776	36.2	0.878	0.000	36.0	89.190	Surcharged
S09	FEH: 100 years: +40 %: 60 mins: Summer	30.456	29.041	29.963	0.922	57.5	1.042	0.000	19.4	133.285	Surcharged
S03	FEH: 100 years: +40 %: 60 mins: Summer	30.939	29.256	30.045	0.789	26.9	0.892	0.000	27.7	73.045	Surcharged
S04	FEH: 100 years: +40 %: 60 mins: Summer	31.103	29.606	30.134	0.528	20.8	0.597	0.000	21.5	46.981	Surcharged

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 2 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving 5	FEH: 2 years: +40 %: 240 mins: Summer	30.737	30.710	0.183	0.160	5.1	11.281	0.000	0.000	2.8	12.589	53.126	OK
Porous Paving 6	FEH: 2 years: +40 %: 240 mins: Summer	30.789	30.730	0.178	0.180	5.5	13.599	0.000	0.000	3.1	13.798	51.120	OK
Porous Pitch 1	FEH: 2 years: +40 %: 1440 mins: Winter	31.028	31.024	0.180	0.184	4.9	143.608	0.000	0.000	0.5	67.900	61.214	OK
Porous Pitch 2	FEH: 2 years: +40 %: 1440 mins: Winter	34.178	34.172	0.161	0.162	2.6	66.437	0.000	0.000	0.5	50.503	56.400	OK
Porous Paving 1	FEH: 2 years: +40 %: 480 mins: Summer	30.436	29.918	0.112	0.313	2.5	10.980	0.000	0.000	0.7	15.787	76.684	OK
Porous Paving 4	FEH: 2 years: +40 %: 120 mins: Summer	30.767	30.463	0.064	0.063	0.7	0.694	0.000	0.000	0.3	1.437	82.955	OK
Porous Paving 3	FEH: 2 years: +40 %: 480 mins: Summer	30.168	29.711	0.113	0.276	2.2	9.965	0.000	0.000	0.7	13.548	78.078	OK
Bioretention 4	FEH: 2 years: +40 %: 15 mins: Summer	30.475	30.250	0.000	0.000	1.4	12.444	0.000	0.000	0.0	0.000	78.583	OK
Bioretention 3	FEH: 2 years: +40 %: 120 mins: Summer	31.824	30.654	0.755	0.014	3.6	10.650	0.000	0.000	0.7	4.802	54.682	OK
Bioretention 2	FEH: 2 years: +40 %: 30 mins: Summer	31.350	30.600	0.766	0.255	2.3	2.333	0.000	0.000	0.9	0.851	51.704	OK
Bioretention 1	FEH: 2 years: +40 %: 960 mins: Summer	30.713	29.800	0.250	0.250	2.3	47.766	0.000	0.000	0.5	18.497	56.848	OK
Porous Paving 2	FEH: 2 years: +40 %: 480 mins: Summer	30.462	29.561	0.092	0.141	2.5	12.719	0.000	0.000	0.9	12.878	82.591	OK
Cellular Storage	FEH: 2 years: +40 %: 960 mins: Summer	29.140	29.140	0.090	0.090	9.0	63.521	0.000	0.000	3.1	64.637	82.026	OK
Porous Paving 8	FEH: 2 years: +40 %: 360 mins: Summer	31.270	31.147	0.120	0.147	2.5	8.854	0.000	0.000	1.4	8.383	63.855	OK
Porous Paving 7	FEH: 2 years: +40 %: 960 mins: Summer	30.848	30.787	0.216	0.187	6.4	56.664	0.000	0.000	2.6	65.590	55.141	OK
Porous Paving 9	FEH: 2 years: +40 %: 960 mins: Summer	30.966	30.963	0.176	0.298	3.0	27.218	0.000	0.000	0.7	37.466	58.506	OK
Bioretention 5	FEH: 2 years: +40 %: 120 mins: Summer	31.256	30.698	0.760	0.263	5.6	6.720	0.000	0.000	5.5	9.271	44.390	OK

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving 5	FEH: 30 years: +40 %: 120 mins: Summer	30.801	30.763	0.246	0.213	13.0	15.022	0.000	0.000	7.3	19.882	37.581	OK
Porous Paving 6	FEH: 30 years: +40 %: 120 mins: Summer	30.908	30.761	0.297	0.211	14.1	19.594	0.000	0.000	5.2	21.578	29.569	OK
Porous Pitch 1	FEH: 30 years: +40 %: 1440 mins: Winter	31.144	31.139	0.297	0.299	7.9	234.846	0.000	0.000	0.7	91.386	36.572	OK
Porous Pitch 2	FEH: 30 years: +40 %: 1440 mins: Winter	34.280	34.276	0.262	0.266	4.1	108.798	0.000	0.000	0.7	81.970	28.600	OK
Porous Paving 1	FEH: 30 years: +40 %: 360 mins: Summer	30.450	30.150	0.126	0.545	4.9	18.643	0.000	0.000	0.9	24.382	60.411	OK
Porous Paving 4	FEH: 30 years: +40 %: 120 mins: Summer	30.814	30.554	0.111	0.154	1.3	1.408	0.000	0.000	0.5	2.782	65.408	OK
Porous Paving 3	FEH: 30 years: +40 %: 360 mins: Summer	30.181	29.925	0.126	0.490	4.5	16.751	0.000	0.000	0.9	21.564	63.148	OK
Bioretention 4	FEH: 30 years: +40 %: 15 mins: Summer	30.475	30.250	0.000	0.000	3.0	13.117	0.000	0.000	0.0	0.000	77.425	OK
Bioretention 3	FEH: 30 years: +40 %: 120 mins: Summer	31.828	30.895	0.760	0.255	6.7	13.118	0.000	0.000	5.1	10.396	44.182	OK
Bioretention 2	FEH: 30 years: +40 %: 15 mins: Summer	31.361	30.599	0.776	0.254	7.2	2.386	0.000	0.000	2.4	1.797	50.606	OK
Bioretention 1	FEH: 30 years: +40 %: 1440 mins: Summer	30.786	29.800	0.323	0.250	2.7	59.610	0.000	0.000	0.8	44.974	46.148	OK
Porous Paving 2	FEH: 30 years: +40 %: 120 mins: Summer	30.493	29.757	0.123	0.337	13.2	19.158	0.000	0.000	6.5	13.647	73.777	OK
Cellular Storage	FEH: 30 years: +40 %: 960 mins: Summer	29.396	29.396	0.346	0.346	18.7	244.420	0.000	0.000	5.4	214.673	30.838	OK
Porous Paving 8	FEH: 30 years: +40 %: 120 mins: Summer	31.293	31.191	0.143	0.191	8.2	11.320	0.000	0.000	3.8	10.626	53.788	OK
Porous Paving 7	FEH: 30 years: +40 %: 480 mins: Summer	30.982	30.852	0.350	0.252	17.8	86.268	0.000	0.000	4.4	97.005	31.705	OK
Porous Paving 9	FEH: 30 years: +40 %: 960 mins: Summer	31.132	31.128	0.342	0.463	4.9	46.207	0.000	0.000	0.9	62.616	29.555	OK
Bioretention 5	FEH: 30 years: +40 %: 30 mins: Summer	31.264	30.758	0.768	0.323	15.4	7.259	0.000	0.000	13.5	9.797	39.932	OK

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving 5	FEH: 100 years: +40 %: 60 mins: Summer	30.839	30.783	0.285	0.233	21.7	17.096	0.000	0.000	9.4	18.820	28.965	OK
Porous Paving 6	FEH: 100 years: +40 %: 120 mins: Summer	30.975	30.785	0.364	0.235	17.2	23.241	0.000	0.000	6.1	28.073	16.461	OK
Porous Pitch 1	FEH: 100 years: +40 %: 1440 mins: Winter	31.211	31.205	0.363	0.365	9.6	286.944	0.000	0.000	0.8	102.224	22.501	OK
Porous Pitch 2	FEH: 100 years: +40 %: 1440 mins: Winter	34.342	34.336	0.324	0.326	5.0	133.903	0.000	0.000	0.7	92.857	12.125	OK
Porous Paving 1	FEH: 100 years: +40 %: 360 mins: Summer	30.453	30.244	0.129	0.639	5.9	22.653	0.000	0.000	1.0	28.850	51.894	OK
Porous Paving 4	FEH: 100 years: +40 %: 60 mins: Summer	30.821	30.617	0.118	0.217	2.2	1.772	0.000	0.000	0.6	2.546	56.472	OK
Porous Paving 3	FEH: 100 years: +40 %: 360 mins: Summer	30.184	30.011	0.129	0.576	5.3	20.288	0.000	0.000	1.0	26.012	55.367	OK
Bioretention 4	FEH: 100 years: +40 %: 60 mins: Summer	30.475	30.295	0.000	0.045	3.3	14.778	0.000	0.000	1.5	0.564	74.567	OK
Bioretention 3	FEH: 100 years: +40 %: 60 mins: Summer	31.832	30.904	0.764	0.264	11.3	13.185	0.000	0.000	6.3	8.834	43.895	OK
Bioretention 2	FEH: 100 years: +40 %: 15 mins: Summer	31.364	30.629	0.779	0.284	8.8	2.543	0.000	0.000	8.3	2.508	47.339	OK
Bioretention 1	FEH: 100 years: +40 %: 960 mins: Summer	31.076	29.800	0.614	0.250	4.5	64.070	0.000	0.000	1.6	49.154	42.119	OK
Porous Paving 2	FEH: 100 years: +40 %: 60 mins: Summer	30.501	29.897	0.131	0.477	21.5	24.907	0.000	0.000	7.6	15.940	65.909	OK
Cellular Storage	FEH: 100 years: +40 %: 1440 mins: Summer	29.549	29.549	0.499	0.499	18.1	352.662	0.000	0.000	5.6	335.232	0.209	OK
Porous Paving 8	FEH: 100 years: +40 %: 120 mins: Summer	31.307	31.202	0.157	0.202	10.0	12.871	0.000	0.000	4.8	14.438	47.457	OK
Porous Paving 7	FEH: 100 years: +40 %: 480 mins: Summer	31.053	30.893	0.421	0.293	21.2	102.677	0.000	0.000	4.9	121.102	18.714	OK
Porous Paving 9	FEH: 100 years: +40 %: 960 mins: Summer	31.225	31.219	0.434	0.554	5.8	56.788	0.000	0.000	1.0	74.295	13.424	OK
Bioretention 5	FEH: 100 years: +40 %: 60 mins: Summer	31.275	31.274	0.779	0.839	17.5	9.139	0.000	0.000	13.9	18.815	24.379	OK

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 2 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe (1)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S06	S05	31.117	29.848	0.053	20.890	0.7	0.25	3.7	OK
Pipe (10)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S13	S12	31.475	29.753	0.102	8.831	0.9	0.37	15.8	OK
Pipe (11)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S12	S11	31.473	29.585	0.099	51.131	0.8	0.34	14.2	OK
Pipe (12)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	S14	S13	31.378	29.976	0.063	106.688	0.6	0.12	5.3	OK
Pipe (13)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S15	S14	31.303	30.060	0.054	2.669	0.7	0.13	5.4	OK
Pipe (14)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	S17	S15	31.184	30.250	0.050	67.746	0.6	0.21	3.0	OK
Pipe (15)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	S22	S20	31.308	30.638	0.045	47.056	0.6	0.18	2.6	OK
Pipe (16)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	S20	S18	31.295	30.530	0.046	47.043	0.6	0.18	2.6	OK
Pipe (16) (1)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	S18	S17	31.323	30.460	0.047	67.811	0.6	0.21	3.0	OK
Pipe (3)	FEH: 2 years: +40 %: 360 mins: Summer	Pipe	S02	S01	30.284	29.351	0.225	206.410	1.3	0.11	9.5	Surcharged
Pipe (5)	FEH: 2 years: +40 %: 120 mins: Winter	Pipe	S08	S07	31.321	29.923	0.022	4.799	0.4	0.05	0.7	OK
Pipe (7)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S11	S10	31.424	29.538	0.094	51.079	0.9	0.33	14.1	OK
Pipe (8)	FEH: 2 years: +40 %: 30 mins: Summer	Pipe	S10	S09	31.390	29.468	0.090	13.753	0.9	0.32	13.7	OK
Pipe (9)	FEH: 2 years: +40 %: 30 mins: Summer	Pipe	S09	S02	30.456	29.149	0.167	12.387	0.9	0.31	13.1	OK
Pipe (20)	FEH: 2 years: +40 %: 360 mins: Summer	Pipe	S03	S02	30.939	29.361	0.225	58.866	0.4	0.21	9.0	OK
Pipe (28)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	Bioretention 4	S13	31.375	30.250	0.051	0.000	0.0	0	0.0	OK
Pipe (31)	FEH: 2 years: +40 %: 1440 mins: Winter	Pipe	Porous Pitch 2	S14	34.518	34.172	0.027	50.497	0.5	0.02	0.5	Surcharged
Pipe (32)	FEH: 2 years: +40 %: 1440 mins: Winter	Pipe	Porous Pitch 1	S18	31.447	31.022	0.028	67.885	0.6	0.04	0.5	Surcharged
Pipe (17)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	Bioretention 1	Cellular Storage	31.362	29.800	0.047	10.002	1.0	0.04	0.6	Surcharged
Pipe (34)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	Cellular Storage	S09	29.550	29.135	0.152	0.000	0.4	0.13	3.6	OK
Pipe	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S05	S04	31.103	29.770	0.056	20.878	0.6	0.26	3.7	OK
Pipe (2)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S04	S03	31.103	29.665	0.084	33.312	0.7	0.15	6.4	OK

Pipe (4)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S07	S06	31.264	29.861	0.038	7.222	0.3	0.05	0.7	OK
Pipe (26)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	Porous Paving 7	S22	31.232	30.808	0.054	47.072	0.6	0.67	2.6	Surcharged
Pipe (27)	FEH: 2 years: +40 %: 360 mins: Summer	Pipe	Porous Paving 8	S15	31.650	31.135	0.036	8.263	0.5	0.07	1.4	OK
Pipe (29)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	Bioretention 5	S13	31.396	31.196	0.068	9.271	1.0	0.37	5.5	Surcharged
Pipe (30)	FEH: 2 years: +40 %: 960 mins: Summer	Pipe	Porous Paving 9	S13	31.490	30.902	0.039	37.462	0.4	0.03	0.7	Surcharged
Pipe (6)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	Porous Paving 6	S06	31.111	30.732	0.040	13.678	1.0	0.15	3.1	OK
Pipe (23)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	Porous Paving 5	S04	31.054	30.727	0.044	12.468	1.0	0.19	2.8	OK
Pipe (22)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	Porous Paving 4	S03	31.203	30.464	0.039	1.434	0.5	0.01	0.3	OK
Pipe (21)	FEH: 2 years: +40 %: 60 mins: Summer	Pipe	Bioretention 2	S03	31.484	31.104	0.023	1.676	1.8	0.11	2.1	Surcharged
Pipe (18)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	Porous Paving 1	S02	31.124	29.762	0.100	15.778	0.2	0.08	0.7	Surcharged
Pipe (19)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	Porous Paving 3	S02	30.855	29.583	0.100	13.539	0.1	0.08	0.7	Surcharged
Pipe (24)	FEH: 2 years: +40 %: 480 mins: Summer	Pipe	Porous Paving 2	S03	31.170	29.537	0.056	12.749	0.3	0.13	0.9	OK
Pipe (25)	FEH: 2 years: +40 %: 120 mins: Winter	Pipe	Bioretention 3	S08	31.968	31.391	0.018	4.812	0.7	0.04	0.7	Surcharged

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe (1)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S06	S05	31.117	29.905	0.135	31.791	0.8	0.63	9.3	OK
Pipe (10)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S13	S12	31.475	29.835	0.225	21.660	1.0	0.85	35.9	OK
Pipe (11)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S12	S11	31.473	29.793	0.225	21.614	1.0	0.8	34.1	Surcharged
Pipe (12)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S14	S13	31.378	30.021	0.221	66.365	0.7	0.27	11.4	OK
Pipe (13)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S15	S14	31.303	30.088	0.080	6.011	0.9	0.27	11.4	OK
Pipe (14)	FEH: 30 years: +40 %: 360 mins: Summer	Pipe	S17	S15	31.184	30.264	0.069	104.931	0.7	0.34	5.0	OK
Pipe (15)	FEH: 30 years: +40 %: 360 mins: Summer	Pipe	S22	S20	31.308	30.653	0.059	84.291	0.7	0.31	4.4	OK
Pipe (16)	FEH: 30 years: +40 %: 360 mins: Summer	Pipe	S20	S18	31.295	30.545	0.061	84.261	0.7	0.31	4.4	OK
Pipe (16) (1)	FEH: 30 years: +40 %: 360 mins: Summer	Pipe	S18	S17	31.323	30.475	0.061	105.035	0.7	0.34	5.0	OK
Pipe (3)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S02	S01	30.284	29.649	0.225	9.805	0.7	0.28	24.8	Surcharged
Pipe (5)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S08	S07	31.321	29.967	0.070	10.382	0.6	0.36	5.2	OK
Pipe (7)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S11	S10	31.424	29.776	0.225	21.555	1.1	0.78	33.0	Surcharged
Pipe (8)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S10	S09	31.390	29.753	0.225	21.133	1.1	0.71	30.1	Surcharged
Pipe (9)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S09	S02	30.456	29.662	0.225	10.449	1.4	0.61	25.9	Surcharged
Pipe (20)	FEH: 30 years: +40 %: 120 mins: Winter	Pipe	S03	S02	30.939	29.601	0.225	71.460	0.6	0.58	24.4	Surcharged
Pipe (28)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	Bioretention 4	S13	31.375	30.250	0.092	0.000	0.0	0	0.0	OK
Pipe (31)	FEH: 30 years: +40 %: 1440 mins: Winter	Pipe	Porous Pitch 2	S14	34.518	34.275	0.033	81.958	0.5	0.03	0.7	Surcharged
Pipe (32)	FEH: 30 years: +40 %: 1440 mins: Winter	Pipe	Porous Pitch 1	S18	31.447	31.138	0.035	91.368	0.6	0.06	0.7	Surcharged
Pipe (17)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Bioretention 1	Cellular Storage	31.362	29.802	0.090	5.640	1.9	0.16	2.4	Surcharged
Pipe (34)	FEH: 30 years: +40 %: 960 mins: Summer	Pipe	Cellular Storage	S09	29.550	29.396	0.225	0.000	0.6	0.2	5.4	Surcharged
Pipe	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S05	S04	31.103	29.876	0.150	31.767	0.7	0.69	10.0	Surcharged
Pipe (2)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S04	S03	31.103	29.827	0.225	51.522	0.7	0.44	18.6	OK

Pipe (4)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S07	S06	31.264	29.912	0.092	10.367	0.4	0.35	5.1	OK
Pipe (26)	FEH: 30 years: +40 %: 360 mins: Summer	Pipe	Porous Paving 7	S22	31.232	30.919	0.084	84.327	0.6	1.13	4.4	Surcharged
Pipe (27)	FEH: 30 years: +40 %: 240 mins: Summer	Pipe	Porous Paving 8	S15	31.650	31.171	0.057	15.195	0.8	0.2	3.8	OK
Pipe (29)	FEH: 30 years: +40 %: 30 mins: Winter	Pipe	Bioretention 5	S13	31.396	31.205	0.100	9.797	1.7	0.91	13.7	Surcharged
Pipe (30)	FEH: 30 years: +40 %: 960 mins: Summer	Pipe	Porous Paving 9	S13	31.490	31.068	0.051	62.611	0.5	0.04	0.9	Surcharged
Pipe (6)	FEH: 30 years: +40 %: 240 mins: Summer	Pipe	Porous Paving 6	S06	31.111	30.807	0.063	29.360	1.2	0.26	5.2	Surcharged
Pipe (23)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Porous Paving 5	S04	31.054	30.786	0.100	19.755	1.2	0.5	7.3	Surcharged
Pipe (22)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Porous Paving 4	S03	31.203	30.529	0.100	2.780	0.5	0.02	0.5	Surcharged
Pipe (21)	FEH: 30 years: +40 %: 30 mins: Winter	Pipe	Bioretention 2	S03	31.484	31.109	0.100	3.092	0.7	0.27	5.2	Surcharged
Pipe (18)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 1	S02	31.124	29.812	0.100	4.119	0.2	0.16	1.5	Surcharged
Pipe (19)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 3	S02	30.855	29.635	0.100	3.463	0.2	0.17	1.4	Surcharged
Pipe (24)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 2	S03	31.170	29.590	0.100	6.967	0.9	0.95	6.9	OK
Pipe (25)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Bioretention 3	S08	31.968	31.396	0.052	10.396	1.2	0.3	5.1	Surcharged

Project::	Date:		
WEPco Bridgend Primary Schools Marlas	03/10/2023		
	Designed by: JK	Checked by: CS	Approved By: CS
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:: Hydrock 13 Wharton Place Cardiff		

FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe (1)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S06	S05	31.117	30.144	0.150	41.385	0.8	0.81	11.9	Surcharged
Pipe (10)	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	S13	S12	31.475	30.050	0.225	28.884	1.1	0.97	41.1	Surcharged
Pipe (11)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S12	S11	31.473	29.985	0.225	28.819	1.0	0.95	40.4	Surcharged
Pipe (12)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S14	S13	31.378	30.292	0.225	82.726	0.7	0.45	18.9	Surcharged
Pipe (13)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S15	S14	31.303	30.305	0.225	76.389	0.9	0.37	15.7	Surcharged
Pipe (14)	FEH: 100 years: +40 %: 60 mins: Winter	Pipe	S17	S15	31.184	30.331	0.150	22.207	0.7	0.48	7.0	OK
Pipe (15)	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	S22	S20	31.308	30.657	0.063	78.778	0.7	0.34	4.9	OK
Pipe (16)	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	S20	S18	31.295	30.549	0.065	78.716	0.7	0.34	4.9	OK
Pipe (16) (1)	FEH: 100 years: +40 %: 480 mins: Summer	Pipe	S18	S17	31.323	30.479	0.066	152.451	0.8	0.39	5.6	OK
Pipe (3)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S02	S01	30.284	29.771	0.225	10.120	0.4	0.19	16.3	Surcharged
Pipe (5)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S08	S07	31.321	30.169	0.150	13.476	0.6	0.56	8.1	Surcharged
Pipe (7)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S11	S10	31.424	29.958	0.225	28.734	1.1	0.94	39.9	Surcharged
Pipe (8)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S10	S09	31.390	29.923	0.225	28.224	1.2	0.87	36.8	Surcharged
Pipe (9)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S09	S02	30.456	29.787	0.225	11.864	1.1	0.73	31.0	Surcharged
Pipe (20)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S03	S02	30.939	29.898	0.225	95.497	0.7	0.69	29.3	Surcharged
Pipe (28)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Bioretention 4	S13	31.375	30.261	0.100	0.000	0.2	0.16	1.5	OK
Pipe (31)	FEH: 100 years: +40 %: 1440 mins: Winter	Pipe	Porous Pitch 2	S14	34.518	34.336	0.036	92.844	0.6	0.03	0.7	Surcharged
Pipe (32)	FEH: 100 years: +40 %: 1440 mins: Winter	Pipe	Porous Pitch 1	S18	31.447	31.205	0.037	102.205	0.6	0.06	0.8	Surcharged
Pipe (17)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Bioretention 1	Cellular Storage	31.362	29.923	0.100	8.032	2.2	0.24	3.5	Surcharged
Pipe (34)	FEH: 100 years: +40 %: 1440 mins: Summer	Pipe	Cellular Storage	S09	29.550	29.549	0.225	21.025	0.6	0.2	5.6	Surcharged
Pipe	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S05	S04	31.103	30.083	0.150	41.366	0.7	0.85	12.3	Surcharged
Pipe (2)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S04	S03	31.103	29.996	0.225	67.198	0.7	0.52	22.0	Surcharged

Pipe (4)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S07	S06	31.264	30.155	0.150	13.462	0.4	0.43	6.2	Surcharged
Pipe (26)	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	Porous Paving 7	S22	31.232	30.969	0.100	78.854	0.6	1.26	4.9	Surcharged
Pipe (27)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Porous Paving 8	S15	31.650	31.196	0.100	14.318	0.9	0.25	4.7	OK
Pipe (29)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Bioretention 5	S13	31.396	31.244	0.100	18.815	1.8	0.92	13.9	Surcharged
Pipe (30)	FEH: 100 years: +40 %: 960 mins: Summer	Pipe	Porous Paving 9	S13	31.490	31.160	0.056	74.284	0.5	0.04	1.0	Surcharged
Pipe (6)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Porous Paving 6	S06	31.111	30.861	0.100	27.948	1.2	0.3	6.1	Surcharged
Pipe (23)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 5	S04	31.054	30.819	0.100	18.687	1.8	0.64	9.4	Surcharged
Pipe (22)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 4	S03	31.203	30.562	0.100	2.538	0.7	0.03	0.6	Surcharged
Pipe (21)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Bioretention 2	S03	31.484	31.116	0.100	2.508	2.8	0.44	8.3	Surcharged
Pipe (18)	FEH: 100 years: +40 %: 30 mins: Winter	Pipe	Porous Paving 1	S02	31.124	29.814	0.100	1.651	0.2	0.16	1.5	Surcharged
Pipe (19)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	Porous Paving 3	S02	30.855	29.583	0.100	0.105	0.2	0.2	1.7	Surcharged
Pipe (24)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 2	S03	31.170	29.649	0.100	12.562	1.0	1.07	7.7	Surcharged
Pipe (25)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Bioretention 3	S08	31.968	31.397	0.100	13.485	1.5	0.5	8.6	Surcharged