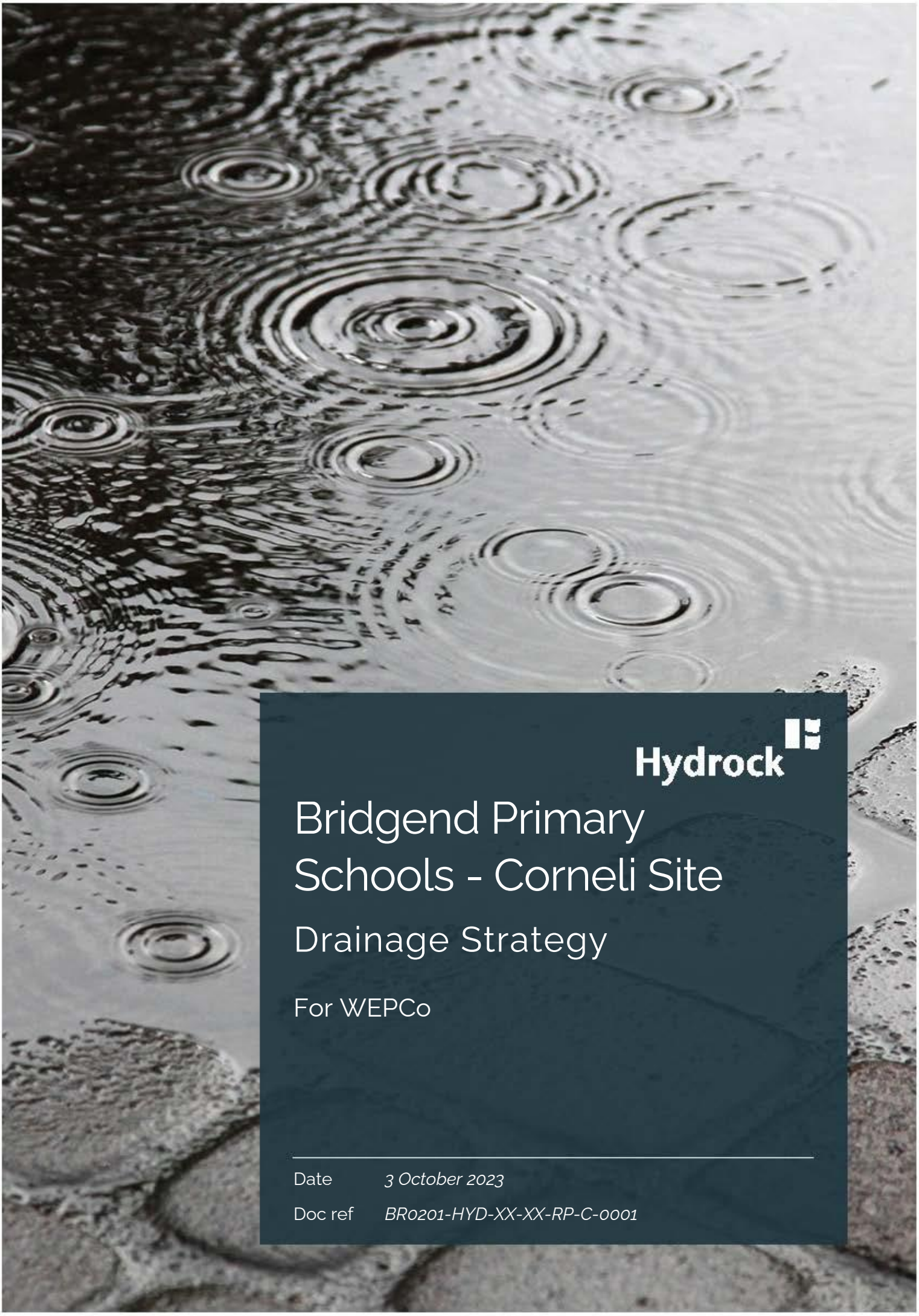

Hydrock

Bridgend Primary Schools - Corneli Site

Drainage Strategy

For WEPCo

Date	*3 October 2023*
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Introduction

Hydrock have been commissioned by WEPCo to provide a drainage strategy report and preliminary design for the proposed Welsh Medium School at Corneli Primary School, Greenfield Terrace, North Cornelly, Bridgend, CF33 4LW.

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 Greenfield Terrace, North Cornelly, Bridgend, CF33 4LW (Approximate Grid Reference X- 281869, Y- 181647). ©OpenStreetMap contributors.

Figure 1 - Site Location Plan

1.2 Site Description

The site is approximately 3.1 hectares (ha) in area with the site comprising of existing access roads to the existing Ysgol Y Ferch o'r Sgêr, Corneli Childrens Centre and Corneli Primary School, existing car parks and existing associated hard landscaping. The site falls from northeast to southwest at a gradient of approximately 1 in 166.

The site is bordered by existing residential dwellings to the northern, eastern, southern, and western boundaries of the site. The site has allowance for direct vehicle access via the existing access roads to the site off Greenfield Terrace and Hall Drive located to the north and south of the site's boundary respectively.

1.3 Flood Risk

From available mapping information a small portion of the site is subject to low risk of surface water and small watercourse flooding and free from all other types of flooding. This area of flooding occurs with the existing grass area at the lowest point of the site, this is likely due to a lack of positive drainage in this area. Figure 2 contains an extract of the National Resources Wales (NRW) flood risk maps with the SAB boundary shown in green.

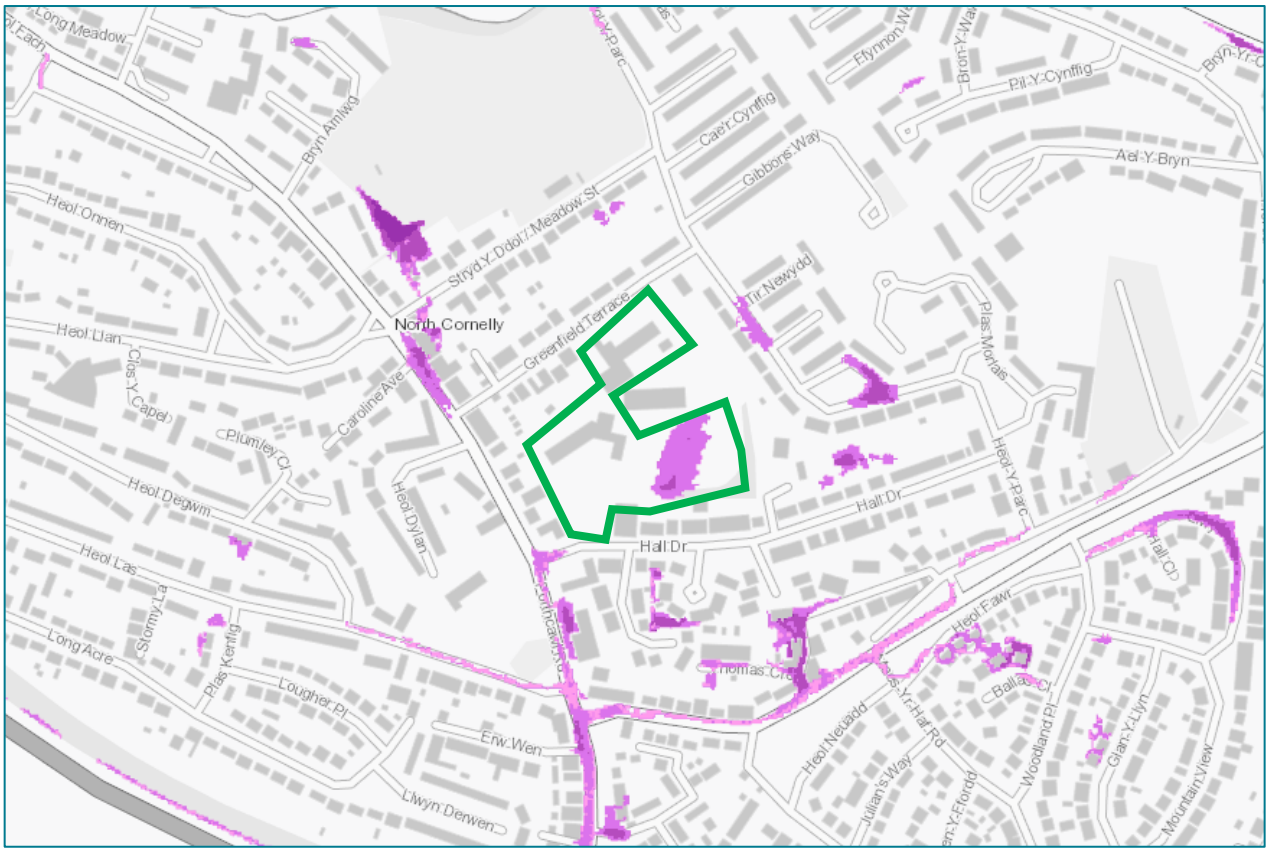


Figure 2 - Extract of NRW Flood Risk Map

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 385m north of the site. There are also private surface water and foul water sewers located within the site's boundary these sewers currently serve the existing Ysgol Y Ferch o'r Sgêr, Corneli Childrens Centre and Corneli Primary School, these existing private surface and foul water networks discharge into the surrounding public Dwr Cymru Welsh Water (DCWW) combined sewers and onsite soakaways.

Based on asset mapping and topographical survey data it has been established that the existing buildings on site discharge surface and foul water into the surrounding public combined sewers and onsite soakaways. Ysgol Y Ferch o'r Sgêr's foul water discharging into the public DCWW 300mm diameter combined sewer located within Heol Fach which flows northwest to southeast via a 150mm diameter private connection along Greenfield Terrace, the discharge location of the surface water is unclear as the drainage runs were heavily silted at the time of the survey, it is assumed that the building discharges to soakaways as no formal connection to the public surface network can be established. Corneli Children's Centre's surface water discharges into private onsite soakaways at 6 locations within the site's boundary, and the foul water discharges into the public DCWW 450mm diameter combined sewer located within the site's boundary which flows northeast to southwest via a 100mm diameter private connection. Corneli

Primary School's surface and foul water discharges into the public DCWW 300mm diameter combined sewer located within Heol Fach via a 150mm private combined connection.

The existing public foul water sewers in Heol Fach and the 450mm diameter public combined sewer within the site's boundary serve the existing school buildings and residential buildings which encompass the proposed development's site boundary to the north, east, south, and west. Figure 3 contains an extract of the DCWW asset plan for the area with the site's SAB boundary shown in green.

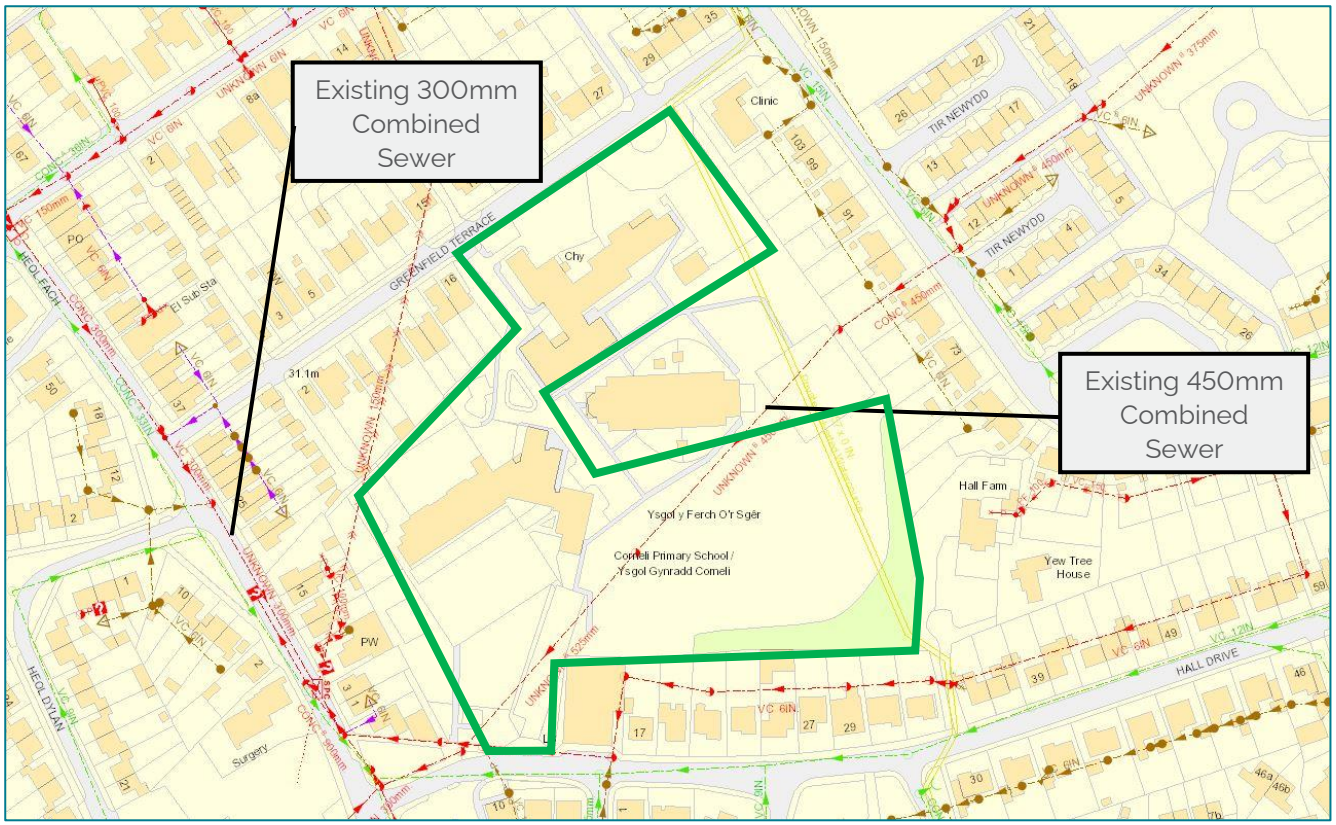


Figure 3 - Extract of DCWW Record Plan

1.5 Existing Contribution Areas and Run-off Rates

The total site area is circa 3.1ha, but the total SAB area is circa 2.53ha, as Corneli Childrens Centre is to remain as per the existing regime it has not been included in any calculations relating to SAB. 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	9.95
30 YRP	20.12
100 YRP	24.64

As the site is comprised of large areas of existing hardstanding (1.16ha), the existing peak discharge rate from the site has been calculated for each return period (1, 30 & 100) using a 30min rainfall event based on

FEH rainfall data using the Modified Rational Method. Table 2 summarises the runoff rates and calculations detailing the derivation of the values are available in Appendix A.

Table 2: Peak Discharge Rate for 30min Rainfall Event

Return Period	Peak Discharge Rate (l/s)
1 YRP	29.03
30 YRP	70.60
100 YRP	87.71

2. Proposed Development

2.1 Development Proposals

For assessment purposes the redevelopment of Ysgol Y Ferch o'r Sgêr and Corneli Primary School with a proposed school comprising of MUGAs and a grass pitch with associated infrastructure. Whilst Corneli Childrens Centre will remain as per the existing. The proposed development will utilise the existing site accesses off Greenfield Terrace and Hall Drive which are located along of the northern and southern boundaries of the site respectively.

2.2 Foul Drainage

The proposed new development will seek to discharge foul flows via gravity from the site to the existing public combined foul sewer system located in the southwestern corner of the site which currently serves the existing residential dwellings situated southeast of the development's site boundary. It is proposed to create a new connection point on the existing manhole of the existing public combined sewer which is located just outside of the proposed site's boundary to the south, based on the GPR survey data this existing drainage system is deep enough to allow a gravity connection without the need for pumping. The existing pipework will be reused where possible to minimise any required works to be carried out outside of the proposed site's boundary. It is recommended that prior to detailed design a survey of the existing private foul sewer system is undertaken to establish the condition is suitable for reuse.

As Corneli Children's Centre is to remain as per the existing the foul water drainage regime associated with Corneli Children's Centre will also remain as per the existing.

All works to the existing public combined sewer is subject to confirmation from DCWW. 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 - Phase II Supplementary Geo-Environmental Assessment Report seven soakaway tests were carried out across the site with two being unsuccessful and five showing sufficient levels of infiltration. At the time of writing this report we are awaiting further infiltration testing to be carried out in the area of the proposed grass pitch to establish if infiltration would be possible in this area. At this time based on the majority of the tests being successful we have assumed that infiltration is a viable means of disposal of surface water runoff from site therefore, it is proposed to discharge the development's surface water into four new onsite soakaways, these soakaways will be located within the proposed MUGA, grass pitch, rain garden and car park to the northwest, southwest, south and northeast of the site respectively. As Corneli Children's Centre is to remain as per the existing regime the surface water drainage associated with Corneli Children's Centre will remain in place.

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 385m north of the proposed site. The existing river is located outside of the proposed site 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 and the proposal to discharge surface water via infiltration 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 above information there is no need to consider discharging into a surface water sewer system.

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 infiltration as a means of discharging the proposed development's surface water, this coupled with Box 24.3 in the CIRIA Report C753 The SuDS Manual which states "Where SuDS are designed to infiltrate more than 5mm from the contributing catchment for all events, then Interception will be effectively delivered" (CIRIA C753). In addition to below ground soakaways providing infiltration this scheme will also utilise rain gardens and permeable paving to aid interception and water treatment.

2.3.2.2 *Hydraulic Control and Storage*

For the purposes of this section of the report infiltration will be accounted for as a means of disposing surface water runoff generated from the development, therefore the discharge volume for the site will decrease.

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 will be attenuated via on-site storage provided in the form of unlined cellular soakaway tanks while it infiltrates into suitable strata below, all soakaways are designed to store 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 some overland storage in the form of rain gardens and permeable paving is achievable in addition to the below ground soakaways for the site. These features will be situated in open space throughout the site for ease of access and maintenance.

For the purposes of this report the soakaways have been modelled within Infodrainage and the overall impermeable area for the development has been taken as 1.1ha. The minimum preliminary storage required has been calculated across the site in the form of soakaways is summarised in table 3 below, where table 3 should be read in conjunction with the Soakaway Catchment Plan BR0201-HYD_XX-XX-DR-C-4301, these storage calculations will be further developed at detailed design stage. A copy of the Infodrainage calculations can be found in Appendix B.

Table 3: Development Storage Summary

SuDS Feature	Approximate Area (m^2)	Infiltration Rate (m/hr)	Indicative Storage Provided (m^3)
Soakaway 1 (Green)	135	0.4176	288.56
Soakaway 2 (Yellow)	189	0.06408	403.99
Soakaway 3 (Orange)	36	0.6876	51.30
Soakaway 4 (Cyan)	120	0.25848	256.5

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 make the assumption 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. In addition, the existing area of flooding to the southeast of the site will be positively drained to a proposed soakaway via a land drain under the proposed pitch to alleviate the flooding.

2.3.2.5 Surface Water Flooding

As noted in section 1.3 of this report an area of the site is subject to surface water flooding this is due to this area of grass being the lowest point of the site and the area lacking in positive drainage. As part of the proposed design the new pitch area which is located in the area of surface water flooding will be reprofiled and positive drainage added to the pitch which will discharge to a soakaway to eliminate the surface water flooding in this area.

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

Based on asset mapping and topographical survey data it has been established that the existing buildings on site discharge foul water into the surrounding public combined sewers and onsite soakaways. With Ysgol Y Ferch o'r Sgêr's foul water discharging into the public DCWW 300mm diameter combined sewer located within Heol Fach which flows northwest to southeast via a 150mm diameter private connection along Greenfield Terrace. Corneli Children's Centre's foul water discharges into the public DCWW 450mm diameter combined sewer located within the site's boundary which flows northeast to southwest via a 100mm diameter private connection. Corneli Primary School's foul water discharges into the public DCWW 300mm diameter combined sewer located within Heol Fach via a 150mm private combined connection.

The existing public foul water sewers in Heol Fach and the 450mm diameter public combined sewer within the site's boundary serve the existing school buildings and residential buildings which encompass the proposed development's site boundary to the north, east, south, and west.

The proposed new development will seek to discharge foul flows via gravity from the site to the existing public combined foul sewer system located in the southwestern corner of the site which currently serves the existing residential dwellings situated southeast of the development's site boundary. It is proposed to create a new connection point on the existing manhole of the public combined sewer which is located just outside of the proposed site's boundary to the south, based on the GPR survey data this existing drainage system is deep enough to allow a gravity connection without the need for pumping. The existing pipework will be reused where possible to minimise any required works to be carried out outside of the proposed site's boundary. It is recommended that prior to detailed design a survey of the existing private foul sewer system is undertaken to establish the condition is suitable for reuse.

As Corneli Children's Centre is to remain as per the existing regime the foul water drainage associated with Corneli Children's Centre will remain as per the existing.

All works to the existing public combined sewer is subject to confirmation from DCWW. 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

Based on asset mapping and topographical survey data it has been established that the existing buildings on site discharge surface water into the surrounding public combined sewers and onsite soakaways. Corneli Children's Centre's surface water discharges into private onsite soakaways at 6 locations within the site's boundary. Corneli Primary School's surface water discharges into the public DCWW 300mm diameter combined sewer located within Heol Fach via a 150mm private combined connection. Ysgol Y Ferch o'r Sgêr's surface water discharge location is unclear as the drainage runs were heavily silted at the time of the survey, it is assumed that the building discharges to soakaways as no formal connection to the public surface network can be established.

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.

As noted in section 1.3 of this report an area of the site is subject to surface water flooding this is due to this area of grass being the lowest point of the site and the area lacking in positive drainage. As part of the proposed design the new pitch area which is located in the area of surface water flooding will be reprofiled and positive drainage added to the pitch which will discharge to a soakaway to eliminate the surface water flooding in this area.

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 infiltration in the form of four soakaways located within the site's boundary.

For the purposes of this report infiltration will be accounted for as a means of disposing surface water runoff generated from the development, therefore the discharge volume for the site will decrease.

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 will be attenuated via on-site storage provided in the form of unlined cellular soakaway tanks while it infiltrates into suitable strata below, all soakaways are designed to store 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 some overland storage in the form of rain gardens and permeable paving is achievable in addition to the below ground soakaways for the site. These features will be situated in open space throughout the site for ease of access and maintenance.

For the purposes of this report the soakaways have been modelled within Infodrainage and the overall impermeable area for the development has been taken as 1.1ha. 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 make the assumption 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. In addition, the existing area of flooding to the southeast of the site will be positively drained to a proposed soakaway via a land drain under the proposed pitch to alleviate the flooding.

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.

Amenity and biodiversity benefits to the site will be provided in the form of rain gardens which will be incorporated throughout the site and also form part of the infiltration 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 Corneli
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:	51.52140° N
Longitude:	3.70325° W
Reference:	1098986343
Date:	Aug 30 2023 14:10

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 2.53

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):	1090	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):		11.3
1 in 1 year (l/s):		9.95
1 in 30 years (l/s):		20.12
1 in 100 year (l/s):		24.64
1 in 200 years (l/s):		27.8

WEPCo Corneli : Global Runoff Rates

Duration in minutes	1 year rainfall mm	30 year rainfall mm	100 year rainfall mm	100+cc year rainfall mm
30	8.89	21.62	26.86	37.604
Existing Q (l/s)	29.03	70.60	87.71	122.80

Cardiff Office
Third Floor,
Wharton Place,
13 Wharton Street,
Cardiff,
CF10 1GS

Calculation & Parameters Used

Q = 3.6CvIA

I mm/hr — average rainfall intensity during the time of concentration

A 2.530 ha — Total Site Area

Cv = PR/100
when whole catchment is being considered

Cv (ex) 0.36 — Volumetric co-efficient

Cv = taken as 0.85
when impermeable area alone being considered

Cv 0.85 — Volumetric co-efficient

PR = 0.829PIMP +25.0SOIL + 0.078UCWI - 20.7

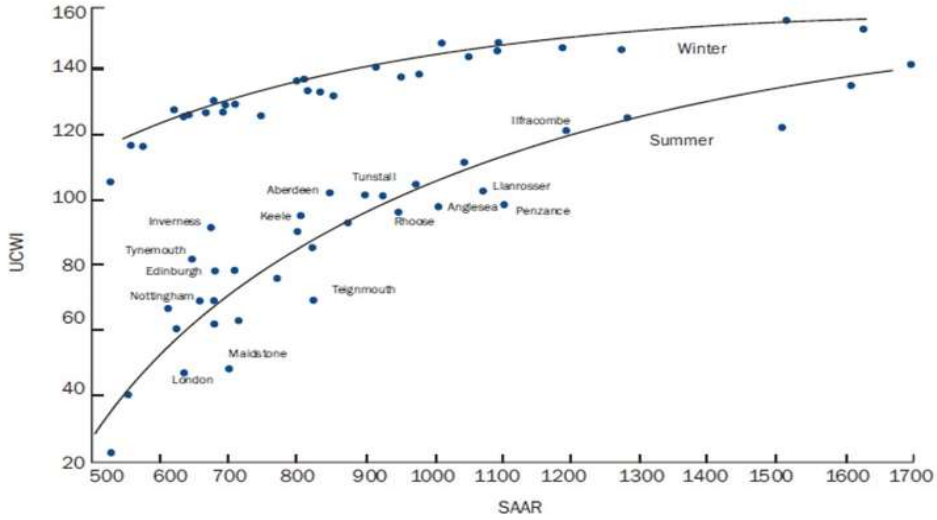
PIMP (existin 46.00 % — % of surface currently draining to the storm sewer

PR 35.85

SOIL 0.3 - — Soil Type Host Class 6 - SPR value 33.8%

UCWI 140 mm — antecedent wetness conditions (degree of wetness at start of storm event) taken as winter - worst case
Ref Figure 4.6 of SUDS Manual

SAAR 1130 mm



Appendix B Infodrainage Calculations

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 Area 4

Type : Bioretention

Ponding Area

Exceedance Level (m)	29.520
Depth (m)	0.150
Base Level (m)	29.370
Top Area (m²)	93.53
Side Slope (1:X)	3.00
Base Area (m²)	79.66
Freeboard (mm)	0
Porosity (%)	100
Length (m)	15.419
Long. Slope (1:X)	41.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	36.488

Filter Area

Base Level (m)	28.620

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)	41.170
Top Perimeter (m)	42.970

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 Area 1

Type : Bioretention

Ponding Area

Exceedance Level (m)	29.650
Depth (m)	0.150
Base Level (m)	29.500
Top Area (m²)	231.26
Side Slope (1:X)	3.00
Base Area (m²)	198.30
Freeboard (mm)	0
Porosity (%)	100
Length (m)	36.623
Long. Slope (1:X)	200.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	90.714

Filter Area

Base Level (m)	28.750

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)	84.075
Top Perimeter (m)	85.875

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 Area 2

Type : Bioretention

Ponding Area

Exceedance Level (m)	29.637
Depth (m)	0.150
Base Level (m)	29.487
Top Area (m²)	97.69
Side Slope (1:X)	3.00
Base Area (m²)	73.39
Freeboard (mm)	0
Porosity (%)	100
Length (m)	27.003
Long. Slope (1:X)	90.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	34.482

Filter Area

Base Level (m)	28.737

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)	59.442
Top Perimeter (m)	61.242

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 Area 3

Type : Bioretention

Ponding Area

Exceedance Level (m)	29.644
Depth (m)	0.150
Base Level (m)	29.494
Top Area (m²)	60.30
Side Slope (1:X)	3.00
Base Area (m²)	45.92
Freeboard (mm)	0
Porosity (%)	100
Length (m)	15.978
Long. Slope (1:X)	255.00
Filtration Rate (m/hr)	216.0
Friction Scheme	Manning's n
n	0.04
Total Volume (m³)	21.511

Filter Area

Base Level (m)	28.744

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)	37.703
Top Perimeter (m)	39.503

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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		

Permeable Paving 4

Type : Porous Paving

Dimensions

Exceedance Level (m)	29.740
Depth (m)	0.550
Base Level (m)	29.190
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	17.602
Long. Slope (1:X)	520.00
Width (m)	4.691
Total Volume (m³)	10.623

Under Drain

Height Above Base (m)	0.150
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 3

Type : Porous Paving

Dimensions

Exceedance Level (m)	31.070
Depth (m)	0.500
Base Level (m)	30.570
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	55.374
Long. Slope (1:X)	266.00
Width (m)	4.962
Total Volume (m³)	30.798

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

Permeable Paving 2

Type : Porous Paving

Dimensions

Exceedance Level (m)	31.200
Depth (m)	0.500
Base Level (m)	30.700
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	54.811
Long. Slope (1:X)	464.00
Width (m)	4.771
Total Volume (m³)	29.330

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

Permeable Paving 1

Type : Porous Paving

Dimensions

Exceedance Level (m)	31.468
Depth (m)	0.500
Base Level (m)	30.968
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	1.0
Porosity (%)	30
Length (m)	59.990
Long. Slope (1:X)	750.00
Width (m)	4.785
Total Volume (m³)	32.190

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 Corneli	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		

Soakaway 3

Type : Cellular Storage

Dimensions

Exceedance Level (m)	28.500
Depth (m)	1.500
Base Level (m)	27.000
Number of Crates Long	3
Number of Crates Wide	12
Number of Crates High	2
Porosity (%)	95
Crate Length (m)	2
Crate Width (m)	0.5
Crate Height (m)	0.75
Total Volume (m³)	51.300

Advanced

Side Infiltration Rate (m/hr)	0.6876
Safety Factor	2.0

Soakaway 2

Type : Cellular Storage

Dimensions

Exceedance Level (m)	28.230
Depth (m)	2.250
Base Level (m)	25.980
Number of Crates Long	7
Number of Crates Wide	27
Number of Crates High	3
Porosity (%)	95
Crate Length (m)	2
Crate Width (m)	0.5
Crate Height (m)	0.75
Total Volume (m³)	403.988

Advanced

Side Infiltration Rate (m/hr)	0.06408
Safety Factor	2.0

Soakaway 4

Type : Cellular Storage

Dimensions

Exceedance Level (m)	27.690
Depth (m)	2.250
Base Level (m)	25.440
Number of Crates Long	8
Number of Crates Wide	15
Number of Crates High	3
Porosity (%)	95
Crate Length (m)	2
Crate Width (m)	0.5
Crate Height (m)	0.75
Total Volume (m³)	256.500

Advanced

Side Infiltration Rate (m/hr)	0.25848
Safety Factor	2.0

Soakaway 1

Type : Cellular Storage

Dimensions

Exceedance Level (m)	29.800
Depth (m)	2.250
Base Level (m)	27.550
Number of Crates Long	9
Number of Crates Wide	15
Number of Crates High	3
Porosity (%)	95
Crate Length (m)	2
Crate Width (m)	0.5
Crate Height (m)	0.75
Total Volume (m³)	288.563

Advanced

Side Infiltration Rate (m/hr)	0.4176
Safety Factor	2.0

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 Corneli	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
S12	FEH: 2 years: +40 %: 15 mins: Summer	30.000	28.500	28.500	0.000	0.0	0.000	0.000	0.0	0.000	OK
S14	FEH: 2 years: +40 %: 15 mins: Summer	30.000	29.000	29.000	0.000	0.0	0.000	0.000	0.0	0.000	OK
S11	FEH: 2 years: +40 %: 15 mins: Summer	30.000	29.400	29.400	0.000	0.0	0.000	0.000	0.0	0.000	OK
S01	FEH: 2 years: +40 %: 15 mins: Summer	29.950	29.088	29.170	0.082	12.4	0.023	0.000	12.1	5.390	OK
S02	FEH: 2 years: +40 %: 15 mins: Summer	29.950	28.930	29.044	0.114	26.9	0.032	0.000	25.4	11.826	OK
S03	FEH: 2 years: +40 %: 15 mins: Summer	29.950	28.650	28.749	0.099	71.3	0.112	0.000	69.6	32.630	OK
S08	FEH: 2 years: +40 %: 15 mins: Summer	30.000	28.710	28.823	0.113	24.2	0.032	0.000	23.4	11.030	OK
S07	FEH: 2 years: +40 %: 15 mins: Summer	30.000	28.850	28.963	0.113	25.4	0.032	0.000	24.2	11.039	OK
S06	FEH: 2 years: +40 %: 15 mins: Summer	30.000	29.400	29.421	0.021	1.0	0.006	0.000	1.0	0.449	OK
S21	FEH: 2 years: +40 %: 15 mins: Summer	30.000	29.400	29.400	0.000	0.0	0.000	0.000	0.0	0.000	OK
S17	FEH: 2 years: +40 %: 15 mins: Summer	29.950	28.710	28.755	0.045	12.7	0.029	0.000	12.4	7.222	OK
S18	FEH: 2 years: +40 %: 120 mins: Summer	29.600	28.230	28.291	0.061	17.0	0.069	0.000	17.0	37.070	OK
S26	FEH: 2 years: +40 %: 120 mins: Summer	29.600	28.350	28.404	0.054	4.3	0.015	0.000	4.2	11.824	OK
S25	FEH: 2 years: +40 %: 120 mins: Summer	29.500	28.400	28.438	0.038	1.9	0.011	0.000	1.9	5.702	OK
S24	FEH: 2 years: +40 %: 120 mins: Summer	29.500	28.500	28.540	0.040	2.1	0.011	0.000	1.9	5.719	OK
S23	FEH: 2 years: +40 %: 120 mins: Summer	29.500	28.540	28.564	0.024	0.8	0.007	0.000	0.7	1.763	OK
S22	FEH: 2 years: +40 %: 120 mins: Summer	29.500	28.600	28.627	0.027	0.9	0.008	0.000	0.8	1.771	OK
S19	FEH: 2 years: +40 %: 15 mins: Summer	30.150	28.230	28.230	0.000	0.0	0.000	0.000	0.0	0.000	OK
S27	FEH: 2 years: +40 %: 15 mins: Summer	30.350	29.600	29.600	0.000	0.0	0.000	0.000	0.0	0.000	OK

S16	FEH: 2 years: +40 %: 120 mins: Summer	30.000	28.970	29.037	0.067	9.8	0.019	0.000	9.7	18.698	OK
S15	FEH: 2 years: +40 %: 15 mins: Summer	30.000	29.400	29.417	0.017	0.7	0.005	0.000	0.7	0.308	OK
S28	FEH: 2 years: +40 %: 15 mins: Summer	31.680	30.480	30.480	0.000	0.0	0.000	0.000	0.0	0.000	OK
S29	FEH: 2 years: +40 %: 15 mins: Summer	31.400	29.850	29.889	0.039	9.0	0.044	0.000	8.8	3.898	OK
S30	FEH: 2 years: +40 %: 15 mins: Summer	31.400	29.850	29.923	0.073	27.0	0.082	0.000	26.5	11.772	OK
S37	FEH: 2 years: +40 %: 360 mins: Summer	31.450	30.850	30.861	0.011	1.0	0.003	0.000	1.0	6.975	OK
S36	FEH: 2 years: +40 %: 360 mins: Summer	31.450	30.850	30.861	0.011	1.1	0.003	0.000	1.1	7.109	OK
S31	FEH: 2 years: +40 %: 15 mins: Summer	31.180	29.980	30.024	0.044	2.8	0.050	0.000	2.7	1.218	OK
S32	FEH: 2 years: +40 %: 240 mins: Summer	31.100	30.500	30.544	0.044	2.6	0.013	0.000	2.6	11.919	OK
S34	FEH: 2 years: +40 %: 240 mins: Summer	31.100	30.500	30.544	0.044	2.6	0.012	0.000	2.6	11.883	OK
S35	FEH: 2 years: +40 %: 240 mins: Summer	31.200	30.460	30.491	0.031	4.7	0.009	0.000	4.7	21.647	OK
S33	FEH: 2 years: +40 %: 240 mins: Summer	31.200	30.460	30.491	0.031	4.7	0.009	0.000	4.7	21.768	OK
S05	FEH: 2 years: +40 %: 15 mins: Summer	29.150	27.690	27.690	0.000	0.0	0.000	0.000	0.0	0.000	OK
S04	FEH: 2 years: +40 %: 15 mins: Summer	29.500	27.690	27.858	0.168	69.6	0.190	0.000	65.5	32.607	OK
S20	FEH: 2 years: +40 %: 120 mins: Summer	29.850	29.000	29.067	0.067	6.2	0.019	0.000	6.2	11.030	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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
S12	FEH: 30 years: +40 %: 15 mins: Summer	30.000	28.500	28.500	0.000	0.0	0.000	0.000	0.0	0.000	OK
S14	FEH: 30 years: +40 %: 15 mins: Summer	30.000	29.000	29.000	0.000	0.0	0.000	0.000	0.0	0.000	OK
S11	FEH: 30 years: +40 %: 15 mins: Summer	30.000	29.400	29.400	0.000	0.0	0.000	0.000	0.0	0.000	OK
S01	FEH: 30 years: +40 %: 15 mins: Summer	29.950	29.088	29.219	0.131	25.8	0.037	0.000	25.1	11.193	OK
S02	FEH: 30 years: +40 %: 15 mins: Summer	29.950	28.930	29.107	0.177	56.0	0.050	0.000	53.2	24.568	OK
S03	FEH: 30 years: +40 %: 15 mins: Summer	29.950	28.650	28.813	0.163	149.3	0.184	0.000	149.1	67.735	OK
S08	FEH: 30 years: +40 %: 15 mins: Summer	30.000	28.710	28.890	0.180	51.1	0.051	0.000	49.3	22.901	OK
S07	FEH: 30 years: +40 %: 15 mins: Summer	30.000	28.850	29.030	0.180	52.7	0.051	0.000	51.1	22.914	OK
S06	FEH: 30 years: +40 %: 15 mins: Summer	30.000	29.400	29.431	0.031	2.2	0.009	0.000	2.0	0.937	OK
S21	FEH: 30 years: +40 %: 15 mins: Summer	30.000	29.400	29.400	0.000	0.0	0.000	0.000	0.0	0.000	OK
S17	FEH: 30 years: +40 %: 30 mins: Summer	29.950	28.710	28.786	0.076	32.6	0.049	0.000	32.5	28.883	OK
S18	FEH: 30 years: +40 %: 30 mins: Summer	29.600	28.230	28.340	0.110	46.4	0.125	0.000	46.2	38.201	OK
S26	FEH: 30 years: +40 %: 240 mins: Summer	29.600	28.350	28.465	0.115	17.1	0.033	0.000	16.8	67.888	OK
S25	FEH: 30 years: +40 %: 240 mins: Summer	29.500	28.400	28.484	0.084	6.5	0.024	0.000	6.5	28.319	OK
S24	FEH: 30 years: +40 %: 30 mins: Summer	29.500	28.500	28.580	0.080	6.5	0.023	0.000	6.4	4.450	OK
S23	FEH: 30 years: +40 %: 30 mins: Summer	29.500	28.540	28.587	0.047	2.5	0.013	0.000	2.5	1.609	OK
S22	FEH: 30 years: +40 %: 30 mins: Summer	29.500	28.600	28.647	0.047	2.5	0.013	0.000	2.5	1.607	OK
S19	FEH: 30 years: +40 %: 15 mins: Summer	30.150	28.230	28.230	0.000	0.0	0.000	0.000	0.0	0.000	OK
S27	FEH: 30 years: +40 %: 15 mins: Summer	30.350	29.600	29.600	0.000	0.0	0.000	0.000	0.0	0.000	OK

S16	FEH: 30 years: +40 %: 30 mins: Summer	30.000	28.970	29.080	0.110	24.2	0.031	0.000	24.0	21.463	OK
S15	FEH: 30 years: +40 %: 15 mins: Summer	30.000	29.400	29.424	0.024	1.5	0.007	0.000	1.4	0.642	OK
S28	FEH: 30 years: +40 %: 15 mins: Summer	31.680	30.480	30.480	0.000	0.0	0.000	0.000	0.0	0.000	OK
S29	FEH: 30 years: +40 %: 60 mins: Summer	31.400	29.850	29.912	0.062	20.5	0.071	0.000	20.1	42.734	OK
S30	FEH: 30 years: +40 %: 15 mins: Summer	31.400	29.850	29.966	0.116	56.1	0.131	0.000	55.3	29.211	OK
S37	FEH: 30 years: +40 %: 120 mins: Summer	31.450	30.850	30.866	0.016	2.3	0.004	0.000	2.3	9.030	OK
S36	FEH: 30 years: +40 %: 120 mins: Summer	31.450	30.850	30.866	0.016	2.3	0.004	0.000	2.3	9.148	OK
S31	FEH: 30 years: +40 %: 15 mins: Summer	31.180	29.980	30.045	0.065	5.8	0.074	0.000	5.6	2.531	OK
S32	FEH: 30 years: +40 %: 60 mins: Summer	31.100	30.500	30.560	0.060	4.7	0.017	0.000	4.6	12.581	OK
S34	FEH: 30 years: +40 %: 60 mins: Summer	31.100	30.500	30.560	0.060	4.7	0.017	0.000	4.6	12.568	OK
S35	FEH: 30 years: +40 %: 60 mins: Summer	31.200	30.460	30.501	0.041	8.2	0.012	0.000	8.1	22.717	OK
S33	FEH: 30 years: +40 %: 60 mins: Summer	31.200	30.460	30.501	0.041	8.2	0.012	0.000	8.1	22.784	OK
S05	FEH: 30 years: +40 %: 15 mins: Summer	29.150	27.690	27.690	0.000	0.0	0.000	0.000	0.0	0.000	OK
S04	FEH: 30 years: +40 %: 15 mins: Summer	29.500	27.690	28.100	0.410	149.1	0.464	0.000	128.4	67.729	Surcharged
S20	FEH: 30 years: +40 %: 60 mins: Summer	29.850	29.000	29.112	0.112	14.6	0.032	0.000	14.6	18.250	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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
S12	FEH: 100 years: +40 %: 15 mins: Summer	30.000	28.500	28.500	0.000	0.0	0.000	0.000	0.0	0.000	OK
S14	FEH: 100 years: +40 %: 15 mins: Summer	30.000	29.000	29.000	0.000	0.0	0.000	0.000	0.0	0.000	OK
S11	FEH: 100 years: +40 %: 15 mins: Summer	30.000	29.400	29.400	0.000	0.0	0.000	0.000	0.0	0.000	OK
S01	FEH: 100 years: +40 %: 15 mins: Summer	29.950	29.088	29.242	0.154	31.7	0.044	0.000	30.8	13.743	OK
S02	FEH: 100 years: +40 %: 15 mins: Summer	29.950	28.930	29.134	0.204	68.7	0.058	0.000	65.5	30.175	OK
S03	FEH: 100 years: +40 %: 15 mins: Summer	29.950	28.650	28.821	0.171	184.0	0.193	0.000	174.1	83.207	OK
S08	FEH: 100 years: +40 %: 15 mins: Summer	30.000	28.710	28.909	0.199	62.9	0.056	0.000	61.0	28.135	OK
S07	FEH: 100 years: +40 %: 15 mins: Summer	30.000	28.850	29.057	0.207	64.8	0.059	0.000	62.9	28.148	OK
S06	FEH: 100 years: +40 %: 15 mins: Summer	30.000	29.400	29.435	0.035	2.7	0.010	0.000	2.5	1.150	OK
S21	FEH: 100 years: +40 %: 15 mins: Summer	30.000	29.400	29.400	0.000	0.0	0.000	0.000	0.0	0.000	OK
S17	FEH: 100 years: +40 %: 15 mins: Summer	29.950	28.710	28.798	0.088	40.9	0.056	0.000	39.4	24.957	OK
S18	FEH: 100 years: +40 %: 30 mins: Summer	29.600	28.230	28.358	0.128	57.7	0.144	0.000	57.5	50.752	OK
S26	FEH: 100 years: +40 %: 120 mins: Summer	29.600	28.350	28.508	0.158	28.2	0.045	0.000	27.8	59.779	OK
S25	FEH: 100 years: +40 %: 120 mins: Summer	29.500	28.400	28.551	0.151	11.4	0.043	0.000	11.3	24.605	Surcharged
S24	FEH: 100 years: +40 %: 120 mins: Summer	29.500	28.500	28.630	0.130	11.7	0.037	0.000	11.4	24.628	OK
S23	FEH: 100 years: +40 %: 120 mins: Summer	29.500	28.540	28.629	0.089	2.3	0.025	0.000	2.3	7.818	OK
S22	FEH: 100 years: +40 %: 30 mins: Summer	29.500	28.600	28.653	0.053	3.2	0.015	0.000	3.2	2.299	OK
S19	FEH: 100 years: +40 %: 15 mins: Summer	30.150	28.230	28.230	0.000	0.0	0.000	0.000	0.0	0.000	OK
S27	FEH: 100 years: +40 %: 15 mins: Summer	30.350	29.600	29.600	0.000	0.0	0.000	0.000	0.0	0.000	OK

S16	FEH: 100 years: +40 %: 30 mins: Summer	30.000	28.970	29.094	0.124	29.5	0.035	0.000	29.4	27.647	OK
S15	FEH: 100 years: +40 %: 15 mins: Summer	30.000	29.400	29.426	0.026	1.8	0.007	0.000	1.8	0.787	OK
S28	FEH: 100 years: +40 %: 15 mins: Summer	31.680	30.480	30.480	0.000	0.0	0.000	0.000	0.0	0.000	OK
S29	FEH: 100 years: +40 %: 60 mins: Summer	31.400	29.850	29.924	0.074	27.1	0.084	0.000	27.0	55.618	OK
S30	FEH: 100 years: +40 %: 15 mins: Summer	31.400	29.850	29.984	0.134	68.9	0.151	0.000	68.0	37.070	OK
S37	FEH: 100 years: +40 %: 60 mins: Summer	31.450	30.850	30.867	0.017	2.9	0.005	0.000	2.9	7.857	OK
S36	FEH: 100 years: +40 %: 120 mins: Summer	31.450	30.850	30.867	0.017	2.9	0.005	0.000	2.9	12.165	OK
S31	FEH: 100 years: +40 %: 15 mins: Summer	31.180	29.980	30.054	0.074	7.2	0.083	0.000	6.9	3.104	OK
S32	FEH: 100 years: +40 %: 60 mins: Summer	31.100	30.500	30.565	0.065	5.4	0.018	0.000	5.4	16.286	OK
S34	FEH: 100 years: +40 %: 60 mins: Summer	31.100	30.500	30.565	0.065	5.4	0.018	0.000	5.4	16.282	OK
S35	FEH: 100 years: +40 %: 60 mins: Summer	31.200	30.460	30.506	0.046	10.2	0.013	0.000	10.2	29.559	OK
S33	FEH: 100 years: +40 %: 60 mins: Summer	31.200	30.460	30.506	0.046	10.2	0.013	0.000	10.2	29.619	OK
S05	FEH: 100 years: +40 %: 15 mins: Summer	29.150	27.690	27.690	0.000	0.0	0.000	0.000	0.0	0.000	OK
S04	FEH: 100 years: +40 %: 15 mins: Summer	29.500	27.690	28.519	0.829	174.1	0.938	0.000	174.4	83.202	Surcharged
S20	FEH: 100 years: +40 %: 60 mins: Summer	29.850	29.000	29.126	0.126	17.5	0.036	0.000	17.4	23.829	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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
Soakaway 3	FEH: 2 years: +40 %: 960 mins: Summer	27.334	27.334	0.334	0.334	1.6	11.425	0.000	28.214	0.0	0.000	77.729	OK
Soakaway 2	FEH: 2 years: +40 %: 1440 mins: Summer	27.046	27.046	1.066	1.066	8.8	191.159	0.000	63.582	0.0	0.000	52.682	OK
Soakaway 4	FEH: 2 years: +40 %: 1440 mins: Summer	26.475	26.475	1.035	1.035	8.3	118.022	0.000	154.745	0.0	0.000	53.988	OK
Soakaway 1	FEH: 2 years: +40 %: 1440 mins: Summer	28.420	28.420	0.870	0.870	9.7	111.557	0.000	185.832	0.0	0.000	61.340	OK
Bioretention Area 4	FEH: 2 years: +40 %: 360 mins: Summer	29.577	28.870	0.581	0.250	4.5	19.354	0.000	0.000	2.4	20.463	46.957	OK
Bioretention Area 1	FEH: 2 years: +40 %: 1440 mins: Summer	29.684	29.000	0.751	0.250	2.9	53.646	0.000	0.000	1.5	49.041	40.862	OK
Bioretention Area 2	FEH: 2 years: +40 %: 960 mins: Summer	29.697	28.987	0.660	0.250	1.6	18.982	0.000	0.000	0.7	18.901	44.953	OK
Bioretention Area 3	FEH: 2 years: +40 %: 960 mins: Summer	29.238	28.994	0.431	0.250	0.8	9.785	0.000	0.000	0.4	8.524	54.514	OK
Permeable Paving 4	FEH: 2 years: +40 %: 120 mins: Summer	29.457	29.437	0.233	0.247	7.1	5.980	0.000	0.000	6.2	11.207	43.700	OK
Porous Paving 3	FEH: 2 years: +40 %: 240 mins: Summer	30.932	30.742	0.153	0.172	8.3	15.818	0.000	0.000	5.2	24.058	48.638	OK
Permeable Paving 2	FEH: 2 years: +40 %: 240 mins: Summer	30.988	30.862	0.169	0.162	7.2	14.724	0.000	0.000	4.2	19.866	49.798	OK
Permeable Paving 1	FEH: 2 years: +40 %: 360 mins: Summer	31.194	31.108	0.146	0.140	4.1	13.686	0.000	0.000	2.1	14.330	57.485	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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
Soakaway 3	FEH: 30 years: +40 %: 480 mins: Summer	27.597	27.597	0.597	0.597	6.3	20.410	0.000	37.575	0.0	0.000	60.215	OK
Soakaway 2	FEH: 30 years: +40 %: 1440 mins: Winter	27.785	27.785	1.805	1.805	11.7	323.699	0.000	107.504	0.0	0.000	19.874	OK
Soakaway 4	FEH: 30 years: +40 %: 960 mins: Summer	27.098	27.098	1.658	1.658	18.1	189.072	0.000	190.976	0.0	0.000	26.288	OK
Soakaway 1	FEH: 30 years: +40 %: 960 mins: Summer	29.029	29.029	1.479	1.479	20.2	189.705	0.000	252.851	0.0	0.000	34.259	OK
Bioretention Area 4	FEH: 30 years: +40 %: 60 mins: Winter	29.751	28.871	0.755	0.251	15.9	20.408	0.000	0.000	11.1	14.899	44.069	OK
Bioretention Area 1	FEH: 30 years: +40 %: 240 mins: Summer	29.690	29.001	0.757	0.251	17.5	55.826	0.000	0.000	11.0	39.629	38.459	OK
Bioretention Area 2	FEH: 30 years: +40 %: 240 mins: Summer	29.793	28.988	0.756	0.251	7.1	19.918	0.000	0.000	5.2	19.221	42.236	OK
Bioretention Area 3	FEH: 30 years: +40 %: 360 mins: Summer	29.563	28.994	0.756	0.250	2.6	11.675	0.000	0.000	1.3	11.200	45.725	OK
Permeable Paving 4	FEH: 30 years: +40 %: 60 mins: Summer	29.564	29.512	0.340	0.322	17.8	8.329	0.000	0.000	14.6	18.415	21.594	OK
Porous Paving 3	FEH: 30 years: +40 %: 120 mins: Summer	31.086	30.770	0.308	0.200	21.4	25.334	0.000	0.000	8.5	36.289	17.740	OK
Permeable Paving 2	FEH: 30 years: +40 %: 120 mins: Summer	31.123	30.889	0.305	0.189	18.5	22.475	0.000	0.000	7.3	30.356	23.373	OK
Permeable Paving 1	FEH: 30 years: +40 %: 240 mins: Summer	31.269	31.134	0.221	0.166	9.1	18.631	0.000	0.000	4.6	25.938	42.123	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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
Soakaway 3	FEH: 100 years: +40 %: 480 mins: Summer	27.750	27.750	0.750	0.750	7.5	25.640	0.000	45.966	0.0	0.000	50.019	OK
Soakaway 2	FEH: 100 years: +40 %: 1440 mins: Winter	28.205	28.205	2.225	2.225	14.3	398.965	0.000	132.524	0.0	0.000	1.243	OK
Soakaway 4	FEH: 100 years: +40 %: 960 mins: Summer	27.436	27.436	1.996	1.996	21.8	227.698	0.000	229.992	0.0	0.000	11.229	OK
Soakaway 1	FEH: 100 years: +40 %: 960 mins: Summer	29.362	29.362	1.812	1.812	23.7	232.449	0.000	309.085	0.0	0.000	19.446	OK
Bioretention Area 4	FEH: 100 years: +40 %: 60 mins: Summer	29.755	28.873	0.759	0.253	24.7	20.793	0.000	0.000	24.3	21.064	43.015	OK
Bioretention Area 1	FEH: 100 years: +40 %: 120 mins: Summer	29.693	29.001	0.760	0.251	31.5	56.813	0.000	0.000	18.9	35.248	37.371	OK
Bioretention Area 2	FEH: 100 years: +40 %: 120 mins: Summer	29.795	28.988	0.758	0.251	12.8	20.342	0.000	0.000	10.0	16.841	41.007	OK
Bioretention Area 3	FEH: 100 years: +40 %: 240 mins: Summer	29.563	28.994	0.756	0.250	4.2	11.855	0.000	0.000	2.7	11.794	44.890	OK
Permeable Paving 4	FEH: 100 years: +40 %: 60 mins: Summer	29.627	29.554	0.403	0.364	22.3	9.676	0.000	0.000	17.5	23.997	8.915	OK
Porous Paving 3	FEH: 100 years: +40 %: 120 mins: Summer	31.133	30.778	0.355	0.208	26.1	30.090	2.745	0.000	10.1	46.087	2.298	OK
Permeable Paving 2	FEH: 100 years: +40 %: 120 mins: Summer	31.180	30.900	0.362	0.200	22.5	26.818	1.295	0.000	9.2	38.779	8.565	OK
Permeable Paving 1	FEH: 100 years: +40 %: 240 mins: Summer	31.314	31.141	0.266	0.173	10.8	21.453	0.000	0.000	5.3	32.844	33.356	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 (2)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S14	S12	30.000	29.000	0.000	0.000	0.0	0	0.0	OK
Pipe (3)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S11	S12	30.000	29.400	0.000	0.000	0.0	0	0.0	OK
Pipe (4)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S15	S16	30.000	29.417	0.035	0.308	0.2	0.03	0.7	OK
Pipe (5)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S16	S17	30.000	29.037	0.056	18.694	1.3	0.17	9.7	OK
Pipe (6)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S17	S18	29.950	28.755	0.053	25.258	1.9	0.08	12.8	OK
Pipe (7)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S18	Soakaway 2	29.600	28.291	0.058	37.070	2.1	0.13	17.0	OK
Pipe (8)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S19	Soakaway 2	30.150	28.230	0.000	0.000	0.0	0	0.0	OK
Pipe (9)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S20	S16	29.850	29.067	0.067	11.026	0.6	0.16	6.2	OK
Pipe (10)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S22	S23	29.500	28.627	0.025	1.771	0.4	0.07	0.8	OK
Pipe (11)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S23	S24	29.500	28.564	0.032	1.763	0.3	0.06	0.7	OK
Pipe (12)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S24	S25	29.500	28.540	0.039	5.719	0.5	0.15	1.9	OK
Pipe (13)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S25	S26	29.500	28.438	0.046	5.702	0.4	0.14	1.9	OK
Pipe (14)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S27	S26	30.350	29.600	0.000	0.000	0.0	0	0.0	OK
Pipe (15)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	S26	S18	29.600	28.404	0.057	11.824	0.6	0.12	4.2	OK
Pipe (17)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S02	S03	29.950	29.044	0.107	11.826	1.1	0.28	25.4	OK
Pipe (18)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S03	S04	29.950	28.749	0.134	32.630	2.3	0.23	69.6	OK
Pipe (19)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S04	Soakaway 4	29.500	27.858	0.161	32.607	1.7	0.53	65.5	OK
Pipe (20)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S08	S03	30.000	28.823	0.106	11.030	1.0	0.26	23.4	OK
Pipe (16)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S01	S02	29.950	29.170	0.098	5.390	0.7	0.29	12.1	OK

Pipe (21)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S05	Soakaway 4	29.150	27.690	0.000	0.000	0.0	0	0.0	OK
Pipe (22)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S21	S17	30.000	29.400	0.023	0.000	0.0	0	0.0	OK
Pipe (23)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S06	S07	30.000	29.421	0.067	0.449	0.1	0.05	1.0	OK
Pipe (24)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S07	S08	30.000	28.963	0.113	11.039	1.0	0.27	24.2	OK
Pipe (25)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S28	S29	31.680	30.480	0.020	0.000	0.0	0	0.0	OK
Pipe (26)	FEH: 2 years: +40 %: 360 mins: Summer	Pipe	S36	S29	31.450	30.861	0.023	7.109	0.7	0.01	1.1	OK
Pipe (27)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S35	S29	31.200	30.491	0.034	21.647	1.6	0.09	4.7	OK
Pipe (28)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S34	S35	31.100	30.544	0.038	11.883	0.8	0.18	2.6	OK
Pipe (29)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S32	S33	31.100	30.544	0.038	11.919	0.8	0.18	2.6	OK
Pipe (30)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	S33	S30	31.200	30.491	0.040	21.768	1.4	0.09	4.7	OK
Pipe (31)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S31	S30	31.180	30.024	0.058	1.218	0.4	0.19	2.7	OK
Pipe (32)	FEH: 2 years: +40 %: 360 mins: Summer	Pipe	S37	S30	31.450	30.861	0.027	6.975	0.6	0.01	1.0	OK
Pipe (33)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S30	Soakaway 1	31.400	29.923	0.067	11.772	2.7	0.16	26.5	OK
Pipe (34)	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S29	Soakaway 1	31.400	29.889	0.037	3.898	2.0	0.05	8.8	OK
Pipe (37)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	Porous Paving 3	S34	31.278	30.762	0.035	11.887	1.3	0.13	2.6	OK
Pipe (38)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	Porous Paving 3	S32	31.278	30.762	0.035	11.923	1.1	0.12	2.6	OK
Pipe (39)	FEH: 2 years: +40 %: 360 mins: Summer	Pipe	Permeable Paving 1	S37	31.548	31.127	0.014	6.976	1.6	0.05	1.0	OK
Pipe (40)	FEH: 2 years: +40 %: 360 mins: Summer	Pipe	Permeable Paving 1	S36	31.548	31.127	0.013	7.111	1.7	0.04	1.1	OK
Pipe (41)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	Permeable Paving 2	S35	31.318	30.888	0.026	9.767	1.3	0.09	2.1	OK
Pipe (42)	FEH: 2 years: +40 %: 240 mins: Summer	Pipe	Permeable Paving 2	S33	31.318	30.888	0.025	9.853	1.3	0.08	2.1	OK
Pipe (43)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	Permeable Paving 4	S20	29.774	29.431	0.048	11.030	1.3	0.07	6.2	OK
Pipe (45)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	Bioretention Area 1	S26	29.833	29.022	0.038	6.173	1.0	0.12	2.7	Surcharged
Pipe (46)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	Bioretention Area 2	S24	29.937	29.037	0.030	3.972	1.0	0.08	1.4	Surcharged

Pipe (47)	FEH: 2 years: +40 %: 120 mins: Summer	Pipe	Bioreten tion Area 3	S22	29.707	28.994	0.021	1.780	0.7	0.05	0.9	Surch arged
Pipe (44)	FEH: 2 years: +40 %: 30 mins: Summer	Pipe	Bioreten tion Area 4	Soakaw ay 3	29.896	28.870	0.026	1.827	5.5	0.07	3.4	Surch arged
Pipe	FEH: 2 years: +40 %: 15 mins: Summer	Pipe	S12	Soakaw ay 3	30.000	28.500	0.000	0.000	0.0	0	0.0	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 (2)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S14	S12	30.000	29.000	0.000	0.000	0.0	0	0.0	OK
Pipe (3)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S11	S12	30.000	29.400	0.000	0.000	0.0	0	0.0	OK
Pipe (4)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S15	S16	30.000	29.424	0.052	0.642	0.3	0.06	1.4	OK
Pipe (5)	FEH: 30 years: +40 %: 30 mins: Summer	Pipe	S16	S17	30.000	29.080	0.093	21.421	1.5	0.42	24.0	OK
Pipe (6)	FEH: 30 years: +40 %: 30 mins: Summer	Pipe	S17	S18	29.950	28.786	0.093	28.883	2.2	0.21	32.5	OK
Pipe (7)	FEH: 30 years: +40 %: 30 mins: Summer	Pipe	S18	Soakaway 2	29.600	28.340	0.102	38.201	2.6	0.36	46.2	OK
Pipe (8)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S19	Soakaway 2	30.150	28.230	0.000	0.000	0.0	0	0.0	OK
Pipe (9)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	S20	S16	29.850	29.112	0.110	18.231	0.8	0.38	14.6	OK
Pipe (10)	FEH: 30 years: +40 %: 30 mins: Summer	Pipe	S22	S23	29.500	28.647	0.047	1.607	0.5	0.2	2.5	OK
Pipe (11)	FEH: 30 years: +40 %: 30 mins: Summer	Pipe	S23	S24	29.500	28.587	0.063	1.592	0.4	0.19	2.5	OK
Pipe (12)	FEH: 30 years: +40 %: 240 mins: Summer	Pipe	S24	S25	29.500	28.579	0.081	28.338	0.7	0.52	6.5	OK
Pipe (13)	FEH: 30 years: +40 %: 240 mins: Summer	Pipe	S25	S26	29.500	28.484	0.099	28.319	0.6	0.47	6.5	OK
Pipe (14)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S27	S26	30.350	29.600	0.000	0.000	0.0	0	0.0	OK
Pipe (15)	FEH: 30 years: +40 %: 240 mins: Summer	Pipe	S26	S18	29.600	28.465	0.100	67.888	1.0	0.49	16.8	OK

Pipe (17)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S02	S03	29.950	29.107	0.170	24.568	1.3	0.59	53.2	OK
Pipe (18)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S03	S04	29.950	28.813	0.287	67.735	2.1	0.49	149.1	OK
Pipe (19)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S04	Soakaway 4	29.500	28.100	0.300	67.729	1.8	1.04	128.4	Surcharged
Pipe (20)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S08	S03	30.000	28.890	0.171	22.901	1.2	0.54	49.3	OK
Pipe (16)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S01	S02	29.950	29.219	0.154	11.193	0.9	0.59	25.1	OK
Pipe (21)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S05	Soakaway 4	29.150	27.690	0.000	0.000	0.0	0	0.0	OK
Pipe (22)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S21	S17	30.000	29.400	0.034	0.000	0.0	0	0.0	OK
Pipe (23)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S06	S07	30.000	29.431	0.105	0.937	0.2	0.1	2.0	OK
Pipe (24)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S07	S08	30.000	29.030	0.180	22.914	1.2	0.56	51.1	OK
Pipe (25)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S28	S29	31.680	30.480	0.030	0.000	0.0	0	0.0	OK
Pipe (26)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S36	S29	31.450	30.866	0.036	9.148	0.9	0.02	2.3	OK
Pipe (27)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	S35	S29	31.200	30.501	0.052	22.717	1.7	0.16	8.1	OK
Pipe (28)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	S34	S35	31.100	30.560	0.050	12.568	0.9	0.31	4.6	OK
Pipe (29)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	S32	S33	31.100	30.560	0.050	12.581	0.9	0.31	4.6	OK
Pipe (30)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	S33	S30	31.200	30.501	0.070	22.784	1.7	0.16	8.1	OK
Pipe (31)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S31	S30	31.180	30.045	0.091	2.531	0.5	0.4	5.6	OK
Pipe (32)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	S37	S30	31.450	30.866	0.050	9.030	0.8	0.02	2.3	OK

Pipe (33)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S30	Soakaway 1	31.400	29.966	0.102	29.211	3.1	0.33	55.3	OK
Pipe (34)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	S29	Soakaway 1	31.400	29.912	0.058	42.734	2.5	0.12	20.1	OK
Pipe (37)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 3	S34	31.278	30.858	0.049	12.591	1.4	0.23	4.7	Surcharged
Pipe (38)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 3	S32	31.278	30.858	0.048	12.605	1.6	0.22	4.7	Surcharged
Pipe (39)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Permeable Paving 1	S37	31.548	31.179	0.021	9.034	2.0	0.11	2.3	Surcharged
Pipe (40)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Permeable Paving 1	S36	31.548	31.179	0.020	9.151	2.1	0.09	2.3	Surcharged
Pipe (41)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Permeable Paving 2	S35	31.318	30.986	0.034	15.002	1.5	0.17	3.6	Surcharged
Pipe (42)	FEH: 30 years: +40 %: 120 mins: Summer	Pipe	Permeable Paving 2	S33	31.318	30.986	0.034	15.100	1.6	0.15	3.7	Surcharged
Pipe (43)	FEH: 30 years: +40 %: 60 mins: Summer	Pipe	Permeable Paving 4	S20	29.774	29.526	0.081	18.237	1.5	0.17	14.6	Surcharged
Pipe (45)	FEH: 30 years: +40 %: 240 mins: Summer	Pipe	Bioretention Area 1	S26	29.833	29.511	0.084	39.629	1.6	0.47	11.0	Surcharged
Pipe (46)	FEH: 30 years: +40 %: 240 mins: Summer	Pipe	Bioretention Area 2	S24	29.937	29.495	0.060	19.221	1.1	0.3	5.2	Surcharged
Pipe (47)	FEH: 30 years: +40 %: 30 mins: Summer	Pipe	Bioretention Area 3	S22	29.707	28.997	0.038	1.622	0.9	0.15	2.5	Surcharged
Pipe (44)	FEH: 30 years: +40 %: 60 mins: Winter	Pipe	Bioretention Area 4	Soakaway 3	29.896	29.375	0.100	14.899	5.6	0.21	11.1	Surcharged
Pipe	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	S12	Soakaway 3	30.000	28.500	0.000	0.000	0.0	0	0.0	OK

Project::	Date:		
WEPco Bridgend Primary Schools Corneli	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 (2)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S14	S12	30.000	29.000	0.000	0.000	0.0	0	0.0	OK
Pipe (3)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S11	S12	30.000	29.400	0.000	0.000	0.0	0	0.0	OK
Pipe (4)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S15	S16	30.000	29.426	0.070	0.787	0.2	0.07	1.8	OK
Pipe (5)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S16	S17	30.000	29.094	0.105	27.602	1.6	0.52	29.4	OK
Pipe (6)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S17	S18	29.950	28.797	0.107	36.871	2.4	0.25	40.0	OK
Pipe (7)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S18	Soakaway 2	29.600	28.358	0.116	50.752	2.8	0.45	57.5	OK
Pipe (8)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S19	Soakaway 2	30.150	28.230	0.000	0.000	0.0	0	0.0	OK
Pipe (9)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S20	S16	29.850	29.126	0.124	23.813	0.9	0.45	17.4	OK
Pipe (10)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S22	S23	29.500	28.653	0.057	2.299	0.5	0.26	3.2	OK
Pipe (11)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	S23	S24	29.500	28.600	0.076	2.282	0.4	0.24	3.2	OK
Pipe (12)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S24	S25	29.500	28.630	0.140	24.628	0.7	0.91	11.4	OK
Pipe (13)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S25	S26	29.500	28.551	0.150	24.605	0.6	0.82	11.3	Surcharged
Pipe (14)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S27	S26	30.350	29.600	0.000	0.000	0.0	0	0.0	OK
Pipe (15)	FEH: 100 years: +40 %: 240 mins: Summer	Pipe	S26	S18	29.600	28.506	0.134	89.296	1.1	0.82	27.9	OK

Pipe (17)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S02	S03	29.950	29.134	0.187	30.175	1.4	0.73	65.5	OK
Pipe (18)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S03	S04	29.950	28.821	0.300	83.207	2.5	0.57	174.1	OK
Pipe (19)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S04	Soakaway 4	29.500	28.519	0.300	83.202	2.5	1.41	174.4	Surcharged
Pipe (20)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S08	S03	30.000	28.909	0.185	28.135	1.3	0.67	61.0	OK
Pipe (16)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S01	S02	29.950	29.242	0.179	13.743	0.9	0.73	30.8	OK
Pipe (21)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S05	Soakaway 4	29.150	27.690	0.000	0.000	0.0	0	0.0	OK
Pipe (22)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S21	S17	30.000	29.400	0.044	0.000	0.0	0	0.0	OK
Pipe (23)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S06	S07	30.000	29.435	0.121	1.150	0.2	0.13	2.5	OK
Pipe (24)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S07	S08	30.000	29.057	0.203	28.148	1.2	0.69	62.9	OK
Pipe (25)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S28	S29	31.680	30.480	0.033	0.000	0.0	0	0.0	OK
Pipe (26)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S36	S29	31.450	30.867	0.042	12.165	0.9	0.03	2.9	OK
Pipe (27)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S35	S29	31.200	30.506	0.060	29.559	1.8	0.2	10.2	OK
Pipe (28)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S34	S35	31.100	30.565	0.055	16.282	0.9	0.37	5.4	OK
Pipe (29)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S32	S33	31.100	30.565	0.055	16.286	0.9	0.37	5.4	OK
Pipe (30)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S33	S30	31.200	30.506	0.082	29.619	1.8	0.2	10.2	OK
Pipe (31)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S31	S30	31.180	30.054	0.104	3.104	0.5	0.49	6.9	OK
Pipe (32)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	S37	S30	31.450	30.867	0.058	12.018	0.9	0.03	2.9	OK

Pipe (33)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S30	Soakaway 1	31.400	29.984	0.117	37.070	3.3	0.41	68.0	OK
Pipe (34)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	S29	Soakaway 1	31.400	29.924	0.068	55.618	2.7	0.17	27.0	OK
Pipe (37)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 3	S34	31.278	31.077	0.053	16.318	1.3	0.27	5.4	Surcharged
Pipe (38)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Porous Paving 3	S32	31.278	31.077	0.053	16.323	1.3	0.26	5.4	Surcharged
Pipe (39)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Permeable Paving 1	S37	31.548	31.216	0.023	12.022	2.1	0.14	2.9	Surcharged
Pipe (40)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Permeable Paving 1	S36	31.548	31.216	0.022	12.170	2.3	0.12	2.9	Surcharged
Pipe (41)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Permeable Paving 2	S35	31.318	31.201	0.040	13.303	1.7	0.22	4.8	Surcharged
Pipe (42)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Permeable Paving 2	S33	31.318	31.201	0.039	13.359	1.7	0.19	4.8	Surcharged
Pipe (43)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Permeable Paving 4	S20	29.774	29.581	0.092	23.819	1.6	0.2	17.5	Surcharged
Pipe (45)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Bioretention Area 1	S26	29.833	29.515	0.100	35.248	2.4	0.81	18.9	Surcharged
Pipe (46)	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	Bioretention Area 2	S24	29.937	29.499	0.096	16.841	1.3	0.58	10.0	Surcharged
Pipe (47)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	Bioretention Area 3	S22	29.707	29.153	0.043	2.316	1.0	0.18	3.2	Surcharged
Pipe (44)	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Bioretention Area 4	Soakaway 3	29.896	29.378	0.100	21.064	4.8	0.47	24.3	Surcharged
Pipe	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	S12	Soakaway 3	30.000	28.500	0.000	0.000	0.0	0	0.0	OK