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Waycock Cross, Barry

PRELIMINARY DRAINAGE STRATEGY REPORT

prepared for

PERSIMMON HOMES EAST WALES

Date: May 2025

Document ref no. 25088-R-600-DRAINAGE STRATEGY-A

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DRAINAGE STRATEGY

25088

Document Control

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Revision History

Revision	Date	Purpose/Status	Approved
0	12.05.25	First Issue - Draft	A. Villis
A	03.06.25	Draft removed, section 4.4, 6.2, 8.2 revised	A. Villis
B			
C			
D			
E			
F			

Distribution

	Function Title	Company	Name
1		PERSIMMON HOMES EAST WALES	Luke Davies
2			
3			

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References

1	CIRIA – The SuDS Manual (C753)
2	UK SUDS (www.uksuds.com)
3	Welsh Water Asset Plans
5	Google Maps
6	Ordnance Survey Mapping
7	BRE Digest 365 Soakaway Design
8	National Soil Resources Institute (SoilScapes)
10	NRW Online Flood Map for Planning
12	-

Abbreviations

DCWW	DWR Cymru Welsh Water
A.O.D.	Above Ordnance Datum
EA	Environment Agency
FW	Foul Water
SW	Surface Water
SuDS	Sustainable Drainage Systems
l/s	Litres Per Second
NRW	Natural Resources Wales
SAB	Suds Approval Body

This document has been created during the design stage of the project and should not be used as a replacement for the final operation and maintenance requirements of the proposed works. It shall remain relative only to those features identified on the attached plan. This document is intended to support the development of the official operation and maintenance document which shall be the responsibility of the principle contractor.

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1.0 INTRODUCTION

1.1 QuadConsult Ltd have been commissioned to produce a drainage strategy for Waycock Cross, Land off A4226, Barry, South Wales by Persimmon Homes East Wales.

1.2 This report will draw upon information supplied by the Client and that available within the public domain including the local authority Planning Portal.

1.3 The aim of this report is to demonstrate that a suitable site-specific surface and foul water drainage strategy can be implemented to service the proposed development.

2.0 SITE LOCATION & DESCRIPTION

2.1 The site is located at Waycock Cross, Land off A4226, Barry, nearest post code is CF62 3BA, site coordinates 309508, 168278.

2.2 The existing site topography (Appendix 1) can be considered as two parcels, with levels to the north falling in a south / southeastern direction, and southern site falling in a northerly / northeasterly direction. The site is currently open green space, the northern parcel is bounded to the east by existing estate / roads, to the north is an existing highway (A4226) and a farm, with a small lane to the west. The southern parcel is bounded by mature woodland to the south / southeast and a lane and further grassland to the west. A Local watercourses dissects the site running east into the adjacent housing development. A drainage survey shall be required to ascertain the route of watercourse and any likely associated structures.

2.3 The land parcel site boundary is 18.58ha in total, the development land area is circa 13.78ha only and does not include local highway land which require upgrade / improvement works.

Figure 1 – Site Location Plan

3.0 EXISTING DRAINAGE

3.1 Land Drainage

An existing drainage ditch / watercourse is noted through the centre of the proposed land parcel. OS mapping / NRW mapping indicates a possible connection via a culverted section into a wider watercourse network location with the area of Rope Swing Lane. The wider downstream offsite watercourse network runs south before discharging into the Bristol Channel. Greenfield Qbar rates for the existing 13.58ha site are calculated as 70.4/s based on FEH method, calculated using Wallingford Procedure design tools.

3.2 Overland Flow & Exceedance Routes

Existing exceedance, overland flow paths would follow the existing topography and discharge flows into the existing watercourse running through the development.
Small parts of the most southerly land flows east towards existing mature woodland, this area of land shall remain largely unchanged with the dedication of enhanced landscaping and restorative woodland.

3.3 Surface Water Drainage Network

Welsh Water Asset plans indicate no current surface water sewers within or immediately adjacent to the site. Several gravity networks are noted to the East, Southeast of the proposed land parcel servicing the existing residential development. These networks are shown discharging into local watercourses (Refer to Appendix 9)

3.4 Foul Water Drainage Network

Welsh Water Asset plans indicate no current foul water sewers within the site boundary. Several networks are noted to the West, East & Southeast of the proposed land parcel servicing the existing residential development and commercial properties. Preplanning advice from DCWW would be required to determine local network capacity and subsequent connection points.

3.5 Combined / Other Drainage

Welsh Water Asset plans show a very limited combined network, this is unlikely to offer any viable connection options (Refer to Appendix 9)

4.0 EXISTING FLOOD RISK

4.1 NRW flood map for planning indicates the development parcel is within a Flood Zone 1 – At little or no risk of fluvial or coastal / tidal flooding.

4.2 Flood Risk from Rivers

NRW flood map for planning (Refer to Appendix 3) indicates little / no risk of flooding from main Rivers

4.3 Flood Risk from Sea

NRW flood map for planning (Refer to Appendix 3) indicates little / no risk of flooding from the Sea

4.4 Flood Risk from Surface Water & Small Watercourses

NRW flood map for planning (Refer to Appendix 3) indicates a risk of flooding from Surface water / Local Watercourses over small areas of the proposed land parcel. Product 6 data has been requested from NRW, however unfortunately none is available for the area in question. Discussions to be held with LLFA to determine implications of onsite mitigation measures for flood extents indicated on maps.

4.5 Flood Risk from Reservoir

NRW flood map for planning (Refer to Appendix 3) indicates no risk of flooding from the Reservoirs

4.6 Other Flood Risk (Mines, Piped Network, etc)

NRW flood map for planning (Refer to Appendix 3) indicates no recorded flood events. The presence of live Welsh Water assets adjacent to the site could pose a very limited flood risk due to failure of infrastructure. The topography of the site would direct any exceedance flows onto existing Greenfields and local watercourses.

Following a site walk over and review of flood maps, it is evident the existing farm / green fields and lane adjacent the eastern boundary cause a small amount of overland flow onto the proposed development. The route of offsite overland flow shall need to be considered within the proposed development, with levels and positions of attenuation features considered not to disrupt route OR cause flood issues to proposed dwellings.

5.0 APPLICATION OF DRAINAGE HIERARCHY

5.1 Discharge to Ground

Preliminary information from SoilScapes online information indicates impeded drainage through infiltration with loamy and clayed soils. Existing catchment is indicated as draining to local stream network.

To be confirmed onsite through infiltration testing to BRE365 and geotechnical investigation / summary.

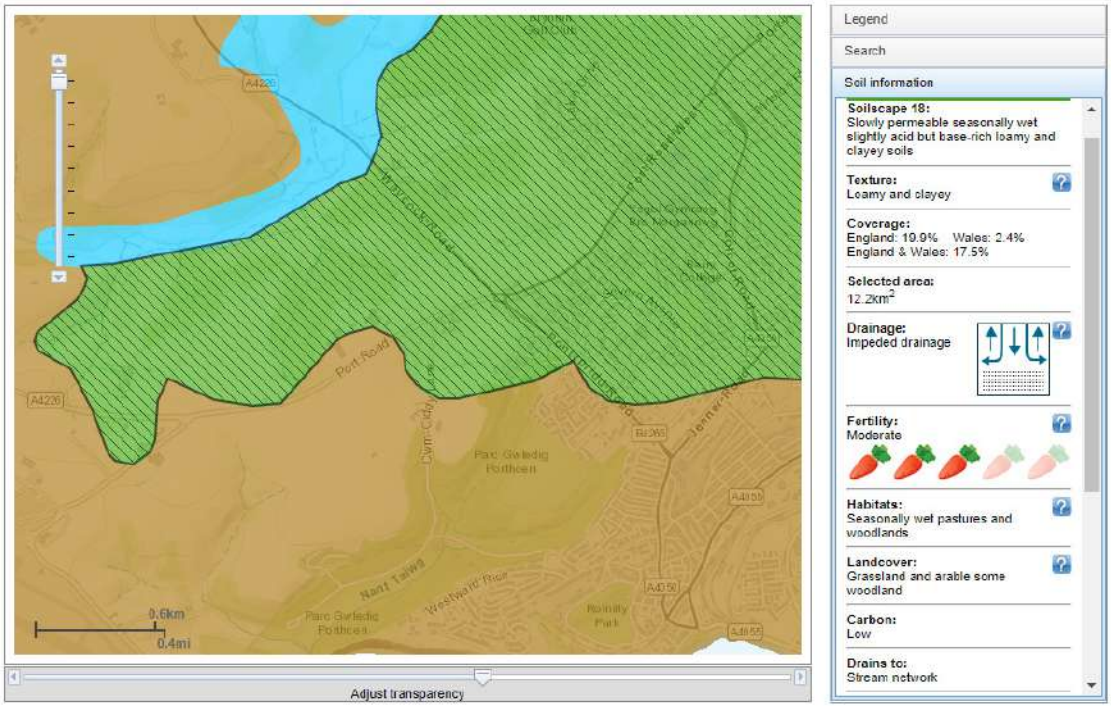

Figure 2 – Soilscapes map

5.2 Discharge to Surface Water Body

An existing local watercourse is located running through the middle of the overall development parcel, running in an easterly direction. The site topography indicates a direct connection into the watercourse may be viable at strategic points considering multiple connections from proposed basins OR one final connection to the east. The direction of the open watercourses indicates a possible culverted section running under or adjacent to Nant Talwg Way. Further investigation to confirm any potential connection and subsequent capacity into this asset.

5.3 Discharge to Surface Water Sewer (1. Highway Sewer, 2. Other SW Sewer)

Currently no highway sewers have been identified as a possible connection point. Investigation / confirmation from the local highway authority / SAB will be required if this option were to be pursued.

Welsh Water Asset plans indicate no current surface water sewers within or immediately adjacent to the site.

6.0 PROPOSED DRAINAGE STRATEGY

6.1 The proposed development consists of proposed residential areas with associated infrastructure including public open spaces and vehicular / pedestrian access arrangements. A large parcel of land to the south has been proposed to be dedicated as enhanced landscaping and new woodland planting.

6.2 Surface Water

The surface water drainage for the proposal will comply with SAB/SuDS protocols, and work within the site layout & constraints of the proposed development.

The proposed surface water generated by the new development site shall be attenuated, based on a 100-year storm event with 40% allowance for climate change. The proposed greenfield Qbar rates for the 10.1ha positively drained catchment (13.58ha development area) are calculated to be 70.4l/s. An allowance of 10% increase in development catchment through urban creep has also been included in non adoptable areas. The proposed design shall provide a final attenuation volume held within attenuation basins adjacent outfalls, however, SW flows shall be retarded within SUDs features providing further storage not considered within formal design.

Following the Drainage hierarchy set out in section 5.0, Infiltration testing will be undertaken to determine likelihood of strategic methods of SW disposal and interception satisfying SUDs criteria, potentially allowing Ground water recharge throughout development. However, Soilscapes mapping and information (Figure 2) indicates infiltration is unlikely to be a viable onsite.

As an initial approach an onsite watercourse connection limited to 70.4/s will be proposed with attenuation via open basins. Initial storage estimates (Appendix 10) indicate a volume requirement of 9581m3 based on the catchment and discharge rate noted above.

Under the current Welsh Government policy, any surface water infrastructure conveying flows from more than 1 curtilage requires adoption by the local authority SAB.

Open market plots will fall under this arrangement. Council & housing association developments can be treated as a single curtilage where houses are to be kept under their ownership and not offered for open market sales in the future.

Any infrastructure being adopted by the local authority SAB will be subject to commuted sums calculated for the lifetime maintenance and end of life replacement construction costs. Under a single development curtilage, the surface water elements can be kept private. In both instances the adopted / private network must be maintained in accordance with the project maintenance schedule and CIRIA SuDs manual guidance.

A strategy to manage the offsite SW overland flow may be discussed at detailed design stage with the local SAB Authority / LLFA, this is to consider any overland flows within attenuation basins and discharge rates for the new development. This reducing the existing flood issues and managing downstream flood risk significantly. An additional discharge rate would be proposed to be added to the 70.4 l/s.

The proposed surface water regime, limiting SW discharge to Qbar and attenuating surface water for storms over and above the Qbar event up to the 100 Year (with 40%cc) shall significantly improve flood risk downstream and likely reduce extents of onsite SW flood risk presented on NRW flood maps.

Suitable landscaping OR fences shall be provided to mitigate against risk of the public entering areas of existing flood risk, and future areas of attenuation.

All properties adjacent existing and proposed areas of flood risk too have a minimum 600mm height above water, with appropriate offsets to properties considered.

Information / details relating to the updated TAN 15 document shall need to be considered at detailed design stage, discussions with the Local SAB / LLFA is required to discuss mitigation measures to reduce extents of existing flooding indicated to Flood mapping. initial reviews highlight level differences of 2.5m between stream bed levels and areas of flooding indicating significant anomalies in mapping. In the absence of Product 6 data, these discussions shall help determine the existing extents of flooding likely to affect development footprint and mitigation measures required to improve existing flood risk both on and off site.

6.3 Foul Drainage

A pre planning enquiry will be required to allow DCWW to confirm capacity and preferred connection point of FW serving the development. Welsh Water Asset plans indicate no current surface water sewers within the site boundary. Several networks are noted to the North, East & Southeast of the proposed land parcel servicing the existing residential development (Refer to Appendix 9).

Options for disposal of FW effluent generated by the new development include:-

A connection to the north into the gravity sewer located within Pontypridd Road may also be viable but would require a pump station and rising main for connection. A pumping station could be positions to the east of the development towards the lowest lying land. This would require fairly significant works within an existing A Road if a grass verge is not available.

A gravity connection into the existing network within Nant Talwg Way may be a viable option but would require a sewer requisition / agreement with 3rd part landowners. There may however be capacity issues with the serving pump stations and no planned upgrade works by DC/WW.

In order to progress a limited number of properties on site a connection could potentially be made to the adopted pump station located to the west of site servicing an existing restaurant / public house.

A section 104 application with Welsh Water would be required for any sewers conveying flows from more than 1 dwelling or crossing land boundaries. A Section 106 agreement is required to allow a connection into any of the existing DCWW assets.

6.4 Land Drainage

Although no existing land drainage network is currently evident, additional confirmation is required.

The existing overland flow paths would follow the existing topography and discharge flows onto the existing watercourse along the southern boundary

6.5 Other Drainage

No other drainage is noted within the land boundary

7.0 COMPLIANCE WITH NATIONAL SUDS STANDARDS

The following sections detail the design principles that will be incorporated in the development proposals for the scheme, and the measures incorporated to satisfy the requirements for future SAB approval.

7.1 Standard S1 – Surface Water Destination

Priority Level 1 – Reuse of Rainwater

The use of SuDS planters, Rain gardens & Water Butts are proposed to intercept roof runoff and act as a point of source control. This will allow a limited re-use of rainwater and to facilitate the planter and associated flora.

Priority Level 2 – Infiltration to Ground - TBC

Soilscapes mapping indicates ground conditions may not be to be suitable for the use of drainage systems based on permeable ground techniques. Further testing will be carried out to confirm ground water level and infiltration feasibility.

Priority Level 3 – Discharge to Water Body - TBC

It is proposed to discharge surface water to the watercourse dissecting the development at restricted Greenfield runoff rates, improving existing small watercourse 'flood issues' significantly.

Priority Level 4 – Discharge to Surface Water Sewer, Highway Drain, or other System – TBC

Deemed as not required unless connection to watercourse proves unviable, further investigation required

Priority Level 5: Discharge to a Combined Sewer – N/A

Deemed not required for this development.

7.2 Standard S2 – Surface Water Runoff Hydraulic Control

It is proposed that the attenuation system be designed such that it is sufficient to store critical storm duration flows in the 100yr+40% event. Calculations are appended for storage volume requirements. As noted above there have been no reductions made to the sizing of the attenuation to reflect reductions afforded by the rain gardens or operation of the SuDS planters. Therefore, allowing for a worst-case scenario. An allowance of 10% increase in permeable catchment has also been included for future urban creep where applicable within private curtilages.

First 5mm Interception

Interception mechanisms will be required to ensure compliance with the requirement of zero runoff for the first 5mm rainfall for 80% of storm events during the summer and 50% in winter.
The provision of SuDS planter features and rain gardens along with flows through permeable drive subbase will contribute to the objective of first 5mm interception. Deemed to comply with the SAB standards. However consideration may be given to a wetland / basin feature adjacent the watercourse to satisfy this criteria, ensuring the longevity of interception criteria.

Exceedance/Blockage

Any exceedance flows will follow surface topography. The topography is such that any excess flows will be directed in a southern direction for 'northern' parcel and a northern direction for 'southern' parcel, towards the existing watercourse and open greenfield areas.

7.3 Standard S3 – Water Quality

The proposed SuDS treatment train devices (SuDS planters, Rain Gardens, Permeable paving, and Detention Basin) will deliver the requisite cleansing and filtration of runoff for this residential (low pollution hazard level) development.

7.4 Standard S4 – Amenity

The soft suds features (SuDS planters, Rain Gardens and Detention Basin) will be carefully designed and integrated into the landscaping scheme for the development, to promote aesthetics and well-being as well as any designed drainage function.

7.5 Standard S5 – Biodiversity

The soft suds features (SuDS planters, Rain Gardens and Detention Basin) will be carefully designed with gradients/profiles, planting species and soil properties selected to ensure suitable habitat is delivered to promote biodiversity. Planting information is included within the SUDS planting information. These proposals will augment the green infrastructure element of the design proposals to demonstrate a robust response to this Standard.

7.6 Standard S6 - Construction, Operation and Maintenance and Structural Integrity

Much of the infrastructure maintenance will be dealt with at a property level as many of the systems employed are contained within a single curtilage application. The online attenuation within the shared drive sub-base) will be offered for adoption through the SAB application process if agreed during pre-SAB discussions. All of the proposed SuDS infrastructure is in accessible areas for ease of maintenance. The surface water network including any land drainage will be designed to be fully roddable and jettable, with suitably positioned rodding eyes and mini-access chambers.

The SuDS devices are low maintenance surface/shallow items with established regular maintenance regimes.

The proposed design solution has been designed in accordance with the SuDS manual and is generally served by shallow SuDs features and accessible details. There are no inherent safety issues with the proposed scheme.

The on-property drainage infrastructure will be managed by the Tenant. The principal issue is the management of the SuDS planters, which primarily involves periodic inspection to check the overflows are clear and ensure the free-flowing operation. These inspections will also serve to monitor the build-up of any silt in the system to facilitate any cleaning required.

8.0 SUMMARY & RECOMMENDATIONS

8.1 SUMMARY

The proposed development will follow current Welsh Government, local authority, and Welsh Water guidance in relation to drainage strategy. Any element of the proposed foul network conveying flows from more than one dwelling will be offered to DCWW through the Section 104 application process. The surface water network with follow the principles set out the Ciria SuDs manual (C753) and Local SAB requirements. The surface water will be collected, treated, and discharged to a viable source at an acceptable rate following SAB hierarchy guidance. Where appropriate, surface water elements will be adopted by the local authority through SAB application process.

8.2 RECOMMENDATIONS

The following actions are recommended to allow a robust suitable site-specific surface and foul water drainage strategy can be implemented to service the proposed development.

- Geotechnical site investigation report, complete with soakaway suitability statement
- Infiltration testing to BRE365
- Possible Culverted watercourse to the Southeast of the site to be investigated
- Discussion / Pre-Planning application to DCWW to determine capacity and connection points.
- Pre SAB application with local authority to initiate dialogue to confirm discharge rates and connection point.
- Product 6 data is unavailable for the development, therefore discussions with the local SAB / LLFA is required to determine flood extents and mitigation measures, improving on and off-site flood risk. Analysed against detailed topographical survey, reviewed against flood mapping, ensuring safe access / egress routes for property owners are available.

APPENDIX 1 – EXISTING SITE SURVEY

Persimmon Homes East Wales
Waycock Cross
Barry
Extended Topographical Survey
Grid - Based on OS Grid and Datum (UKO-OSTN15)
Survey Date May 2022 / April 2025
Contours at 0.25m Intervals
OS Mapping Underlaid In Grey
Control Stations Located With GPS

Daren Oliver
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Contract
Persimmon Homes East Wales
Waycock Cross
Barry

Extended Topographical Survey
Drawing 1 of 3

Drawing Number 744/001/PHEW/DLO

Scale **1/500 @ A0**

Date 24/04/2025

Drawn by DLO

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Contract

Persimmon Homes East Wales
Waycock Cross
Barry

Extended Topographical Survey
Drawing 2 of 3

Drawing Number	744/001/PHEW/DLO
Scale	**1/500 @ A0**
Date	24/04/2025
Drawn by	DLO

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Contract

Persimmon Homes East Wales
Waycock Cross
Barry

Extended Topographical Survey
Drawing 3 of 3

Drawing Number	744/001/PHEW/DLO
Scale	**1/500 @ A0**
Date	24/04/2025
Drawn by	DLO

APPENDIX 2 – EXISTING DRAINAGE SURVEY
(To be included once further investigation has been concluded)

APPENDIX 3 – FLOOD MAP FOR PLANNING

Cyfoeth Naturiol Cymru
Natural Resources Wales

Flood Map for Planning - Detail

Waycock Cross

Legend

TAN15 Defended Zones
- Rivers
- Sea
- Rivers and Sea

Rivers
- Flood Zone 3
- Flood Zone 2

Sea
- Flood Zone 3
- Flood Zone 2

Surface Water and Small Watercourses
- Flood Zone 3
- Flood Zone 2
- Recorded Flood Extents
- Shoreline Management Plan policies

Coastal Erosion Risk with No Active Intervention scenario
- Short-term (2005-2025)
- Medium-term (2005-2055)
- Long-term (2005-2105)
- Flood Risk from Reservoirs
- Main Rivers
- NRW Local Model Manager

Scale at A3: 1:2,500

Date: 24/04/2025

0.1 0.05 0 0.1
km

British National Grid

Disclaimer

https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en

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APPENDIX 4 – CONCEPT MASTERPLAN

DEVELOPMENT

1. Dwellings to front Port Road West across a landscape edge
2. Key buildings to aid legibility
3. Medium to high density residential development to body of the site
4. Lower residential density towards the western residential area

ACCESS

5. Active travel accesses from the A4226 Port Road West
6. Active travel and vehicular access from A4226 Port Road West
7. A distinctive street hierarchy, including an internal vehicular loop, designed to adoptable gradients will encourage active travel and swales alongside the primary streets

LANDSCAPE & ECOLOGY

8. Landscape edge to soften the interface with Port Road West, with tree-lined entrance
9. Focal open spaces with equipped play areas
10. Central open space sitting along foot/cyclepath from Port Road West to Cwm Ciddy Lane
11. Wide west-east landscape corridor, with play trail, drainage features and foot/cyclepath
12. Green corridor accommodating retained hedgerow and tree planting to soften roofline
13. Multi-functional landscape edge along the western boundary
14. Extensive landscape edge alongside Knock Man Down Wood Site of Importance for Nature Conservation (SINC) including new community woodland

C	Off-site footpath routes added	MD	JE 02/06/2025
Amendments		By	Chk'd Date

SITE PROMOTION

Job No/Drawing No **24673**/3200C	Job Title **Weycock Cross, Barry**
Scale 1:2500 @ A3 · Date 11/24 · Drawn MD · Chk'd PG	Drawing Title Concept Masterplan
All Dimensions to be checked on site	pad MASTERPLANNING. ARCHITECTURE. URBAN DESIGN.

pad Design Ltd - The Tobacco Factory - Raleigh Road - Bristol BS3 1TF - Tel. 0117 9530059 - www.pad-design.com

APPENDIX 5 – PROPOSED DRAINAGE STRATEGY PLAN

NOTES:-

- Overall Site Boundary = 18.58ha
- Significant POS (South Site) = 4.8ha

Therefore; Developable Land = 13.78ha

Impermeable Area of developable Land (75%) inclusive of SUDs features, roofs and highways = 10.2ha

With reference to HR Wallingford Runoff Estimation / Volume calculations:-

Qbar Runoff Rate = 70.3 l/s

Estimated Storage for 100 Year (+40%) = 9581m³

LEGEND:-

- Proposed SW Carrier Drain
- Proposed SWALE
- Proposed Detention basin
- Proposed basin Earthworks
- Proposed Earthworks Bund - directing offsite overland flow to basin / watercourse
- Existing Watercourse
- Alternative SW Outfalls along Watercourse

EXISTING INFRASTRUCTURE:-

- DC/WW Pump Station
- DC/WW Rising Main
- DC/WW SW Sewer
- DC/WW FW Sewer

GENERAL NOTES

1. This drawing is to be read in conjunction with and checked against all other drawings, engineering details, specifications and any structural, geotechnical or other specialist document provided.
2. Any discrepancies within all relevant drawings are to be reported to QuadConsult Ltd immediately.
3. All dimensions and levels are in metres, U.N.O..
4. Do not scale from this drawing - use figured dimensions only.
5. This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.
6. Surface water drainage subject to S104 / SAB approval where appropriate with the relevant authority.
7. Foul Drainage subject to S104 approval with relevant water authority.
8. All private drainage to be installed in accordance with Part H of building regulations and the developers warranty provider.
9. The contractor is at risk if construction is progressed without relevant S104, S106, S278, S38, OWC etc agreement being in place with the relevant authorities.

Rev	Date	Description	By

Dimensions to be verified on site.
This drawing should not be scaled. Use figured dimensions only.
Any discrepancies should be referred to the Engineer prior to work being put in hand.
This drawing is copyright

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Client: PERSIMMON

Project: Waycock Cross, Barry

Title: Preliminary Drainage Strategy

Drawing Status: FOR COMMENT

Designed by	Drawn by	Checked by	Date	Scales @ A0 size
RWP	RWP	ACV	May '25	1:1000

Drawing No: 25088-SK-003-0

1:1000 0 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m
1:1 0 10 20 30 40 50 60 70 80 90 100

File name: 25088-SK-003-Drainage Strategy-1.dwg

APPENDIX 6 – PROPOSED LANDSCAPE ARCHITECTS LAYOUT AND SCHEDULE
(To be included when completed)

APPENDIX 7 – EXISTING DISCHARGE RATES

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

This is an estimation of the storage volume requirements that are needed 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). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	17/04/2025
Calculated by	RWP
Reference	25088
Model version	0.6.5

Location

Site name	Waycock Cross
Site location	Barry

Site easting	309467
Site northing	168159

Site areas

Total site area (ha)	13.78	ha

Roof area

Total roof area (ha)	5.1	ha
Contributing roof area (ha)	5.1	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	5.1	ha
Contributing paved area (ha)	5.1	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)		ha
Contributing grass / vegetated area (ha)		ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	10.2	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+10%	
Contributing roof area (adjusted for urban creep) (ha)	5.1	ha
Contributing paved area (adjusted for urban creep) (ha)	5.1	ha
Contributing grass / vegetated area (adjusted for urban creep) (ha)	0	ha

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (mm)	1000	mm
Storage side slope (1 in x)	1 in 3	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	FEH statistical

FEH statistical

	My value		Map/default value
SAAR (mm)	949 mm		949
BFIHOST	0.473		
QMed (l/s)	65.5 l/s		
QMed-QBar conversion	1.075		1.075
Total area for greenfield runoff calculation (ha)	10.2 ha		10.2
QBar (l/s)	70.4 l/s		
Hydrological region	9		9
Return period (years)	Qbar (1:2.3 years)		
Growth curve factor	1		
Flow rate (FEH statistical) (l/s)	70.4 l/s		

Final discharge rate

Runoff calculation method	FEH statistical
Design flow rate (l/s)	70.4 l/s

Blockage risk

Specify the method	Flow rate
Minimum discharge flow rate to prevent blockage	2l/s

	My value		Calculated value
Design orifice diameter (mm)	188 mm		188
Flow rate of orifice (l/s)	70.3 l/s		

Rainfall and runoff

Upload FEH22 rainfall file:

FEH_Point_Rainfall_FEH22_AM_309511_168263.csv

Distance from FEH location to site (km)	0.1 km
Climate change allowance factor	140%

Model results

- **Maximum discharge flow rate:** 70.3 (l/s)
- **Outflow orifice diameter:** 188 (mm)
- **Storage base length:** 163.64 (m)
- **Storage base width:** 54.55 (m)
- **Storage base area:** 8926 (m^2)
- **Storage total volume:** 9580.7 (m^3)
- **Storage total water volume:** 9580.7 (m^3)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
200	1440	75.6	1.14	11031.3	11031.3
100	1080	70.3	1	9580.7	9580.7
30	1080	62.9	0.82	7739.1	7739.1
10	1080	56.2	0.67	6298.1	6298.1
2	1440	43.5	0.44	4052.3	4052.3
1	2160	39.7	0.38	3506.6	3506.6

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APPENDIX 8 – INFILTRATION TEST RESULTS
(To be included once further investigation has been concluded)

APPENDIX 9 – WELSH WATER ASSET MAPS

Dŵr Cymru
Welsh Water

Weycock cross (Land Off A4226) Barry Vale of Glamorgan CF62 6LZ

N
W E
S

LEGEND(Representative of most common features)

Waste network:

	Foul chamber		Outfall
	Surface water chamber	LH	Lamphole
	Combined chamber		Storm Overflow
	Combined sewer overflow		Rising main
	Special purpose chamber		Gravity sewer
	Treatment works		Private sewer
	Pumping station	S 104	Private sewer subject to Sect. 104 adoption agreement
			Private Sewer Transfer
			Lateral Drain
			Inspection Chamber

NB: Sewer symbol colour indicates the type.
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases, pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied to the Company, in done so in accordance with statutory requirements of sections 196 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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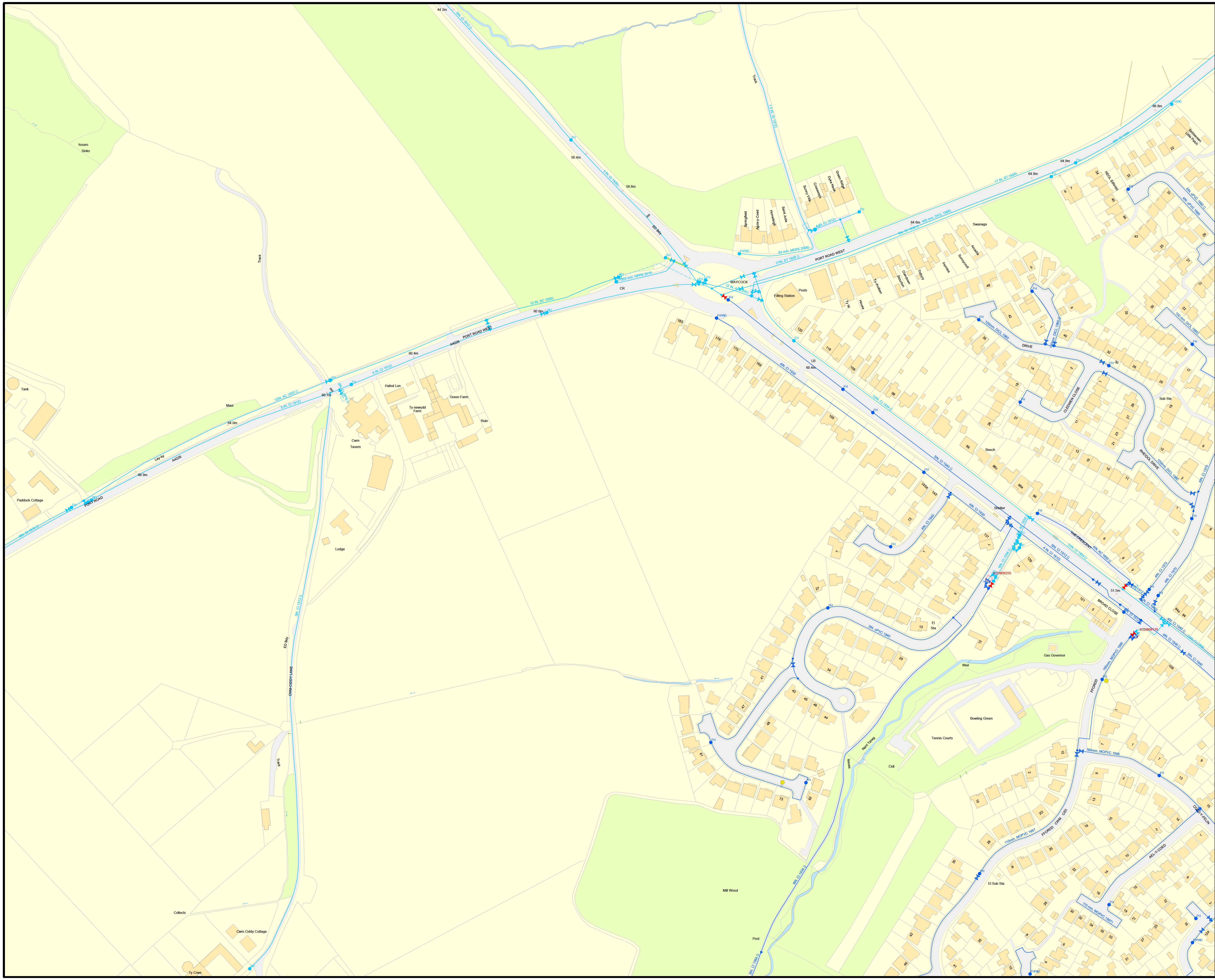
Map Ref:	309563,168341
Map scale:	1:1000
Printed by:	Zara Howells
Printed on:	27 Apr 2022



Dŵr Cymru
Welsh Water

Weycock cross (Land Off A4226) Barry Vale of Glamorgan CF62 6LZ

N
W E
S

LEGEND

Clean network:

- Sluice valve
- Pressure reducing valve
- Meter
- Bulk meter
- Hydrant (FH)
- Cap end
- Air valve
- Stop tap
- Water Treatment Works
- Water Pumping Station
- Existing main
- Non-operational main
- Raw Water

NB: Water main symbol colour indicates the type.

LIGHT BLUE	- Trunk
DARK BLUE	- Distribution
YELLOW	- Raw Water

Notes:

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Map Ref:	309569,168389
Map scale:	1:1000
Printed by:	Zara Howells
Printed on:	27 Apr 2022

APPENDIX 10 – PROPOSED SURFACE WATER CALCULATIONS

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

This is an estimation of the storage volume requirements that are needed 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). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	17/04/2025
Calculated by	RWP
Reference	25088
Model version	0.6.5

Location

Site name	Waycock Cross
Site location	Barry

Site easting	309467
Site northing	168159

Site areas

Total site area (ha)	13.78	ha

Roof area

Total roof area (ha)	5.1	ha
Contributing roof area (ha)	5.1	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	5.1	ha
Contributing paved area (ha)	5.1	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)		ha
Contributing grass / vegetated area (ha)		ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	10.2	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+10%	
Contributing roof area (adjusted for urban creep) (ha)	5.1	ha
Contributing paved area (adjusted for urban creep) (ha)	5.1	ha
Contributing grass / vegetated area (adjusted for urban creep) (ha)	0	ha

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	3:1	
Storage design depth (mm)	1000	mm
Storage side slope (1 in x)	1 in 3	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	FEH statistical

FEH statistical

	My value		Map/default value
SAAR (mm)	949 mm		949
BFIHOST	0.473		
QMed (l/s)	65.5 l/s		
QMed-QBar conversion	1.075		1.075
Total area for greenfield runoff calculation (ha)	10.2 ha		10.2
QBar (l/s)	70.4 l/s		
Hydrological region	9		9
Return period (years)	Qbar (1:2.3 years)		
Growth curve factor	1		
Flow rate (FEH statistical) (l/s)	70.4 l/s		

Final discharge rate

Runoff calculation method	FEH statistical
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APPENDIX 11 – RAINWATER HARVESTING VIABILITY STATEMENT

Rainwater Harvesting Viability Assessment

The developer has confirmed there is no requirement for rainwater harvesting for the proposed development from the point of construction or throughout the design life of the development.

The proposed site is currently within easy connectivity to the Welsh Water potable water network. Barry is not currently or likely to be in the future classed as in danger of suffering regular drought water rationing. Welsh Water draft Drought Plan 2020 also states the unlikelihood of any water rationing being realised within the next 30 years. Welsh Water highlight 2018 as being a very hot year with increased demand on their network but like other parts of the UK did not have to introduce any restriction in the form of hosepipe bans or limited access to the potable water supply.

References:

https://www.dwrcymru.com/en/our-services/water/water-resources/draft-drought-plan-2020

APPENDIX 12 – PROPOSED POLLUTION REMOVAL CALCULATIONS

POLLUTION REMOVAL & WATER QUALITY MANAGEMENT SCHEDULE

CIRIA 753 The SuDS Manual Chapter 26, provides design advice to meet water quality standards by adopting the SuDS train treatment mechanism and thereby reduce the risk of pollution by evaluating potential pollution hazards at the outset.

As the proposed drainage strategy proposes to discharge runoff to ground, Chapter 26.3 'Protecting Groundwater' is particularly relevant.

Runoff from residential roofing and pedestrian areas is viewed as low risk (Table 4.3) and the proposed site layout provides the opportunity to introduce SuDS into the scheme to reduce potential contaminant risk still further. For example, the use of porous paving reduces flow velocities and increase retention times promoting a level of absorption into the upper soils (intergranular flow) prior to discharge to ground (fracture flow).

We propose to apply a simple qualitative method to assess the risk (Simple Index Approach), and proposed mitigation measures as defined in Table 26.1 CIRIA SuDS Manual.

Total SuDS Mitigation Index = Mitigation Index$_1$ + 0.5 Mitigation Index$_2$

Plot Discharge - Assuming a roof/hard surface split of 70/30 and using a weighted mean:

Residential Roof 0.5 (70%)	Pollution Hazard Level (Very Low)	Total Suspended Solids (0.2)	Metals (0.2)	Hydrocarbons (0.05)
Weighted value		0.14	0.14	0.035
Individual Property Driveways & Home zones (30%)	Pollution Hazard Level (Low)	Total Suspended Solids (0.5)	Metals (0.4)	Hydrocarbons (0.4)
Weighted value		0.15	0.12	0.12
Total hazard Index		**0.29**	**0.26**	**0.155**

Development Highway only - using a weighted mean:

Weighted value		0.00	0.00	0.00
Private Drive / Highway (100%)	Pollution Hazard Level (Low)	Total Suspended Solids (0.5)	Metals (0.4)	Hydrocarbons (0.4)
Weighted value		0.5	0.4	0.4
Total hazard Index		**0.5**	**0.4**	**0.4**

Comparing against the mitigation indices shown below.

SuDS Individual Component Mitigation Indices

	Suspended Solids	Metals	Hydrocarbons
Bioretention Planter	0.8	0.8	0.8
Rain Garden (Swale)	0.5	0.6	0.6
Pervious Pavement	0.7	0.6	0.7

However, within the outline drainage scheme a multi staged treatment is proposed for the majority of the site where practical, creating a Suds Management Train improving treatment locally and further reducing risk with the best and worst case outlined within Table 4.

Table 4 – Total SuDS Mitigation Index

Total SuDS Mitigation Index = Mitigation Index$_1$ + 0.5 Mitigation Index$_2$

	Suspended Solids	Metals	Hydrocarbons
SCENARIO 1 (Roof Runoff) Bioretention – Pervious Paving	1.15	1.10	1.15
SCENARIO 2 (Roof Runoff) Rain Garden – Pervious Paving	0.85	0.9	0.65
SCENARIO 3 (Driveway Runoff) Pervious Paving	0.7	0.6	0.7
SCENARIO 4 (Shared Drive / Highway) Basin	0.5	0.5	0.6
Comparison with Hazard Index	**ALL PASS >0.29-0.5**	**ALL PASS >0.26-0.4**	**ALL PASS >0.155-0.4**

APPENDIX 13 – SURFACE WATER MAINTENANCE SCHEDULE

Maintenance Plan for the surface water system.

To ensure the surface water systems to function as intended it is important appropriate maintenance arrangements are in place.

The surface water from the proposed development will be maintained in accordance to CIRIA C753 Chapter 32.

Storm Water Maintenance Management Schedule (CIRIA C753 – The SuDS Manual)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management[1]	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

■ will be required

□ may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Proposed Site SuDS Features

1. Pervious Surfacing

2. Bio Retention Planter / Rain Garden

3. Piped Network Elements

4. Detention Basin

The maintenance management will be highlighted in 3 categories: -

Regular Maintenance

Regular maintenance comprises tasks that are likely to be required regularly to maintain and observe the drainage system typically on a monthly programme.

- Inspection - (Elements - 1, 2, 3, 4)
- Litter and Debris Removal - (Elements - 1, 2, 3,4)
- Grass Cutting - (Elements – 2,4)
- Shrub Management - (Elements – 2,4)

Occasional Maintenance

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks, typically annually.

- Sediment management - (Elements - 1, 2, 3,4)
- Catchpit / Silt trap cleaning - (Elements - 3)
- Pipe jetting if required - (Elements – 1, 3)
- Vegetation Replacement - (Elements – 2, 4)
- Vacuum Sweeping and Brushing - (Elements - 1)

Remedial Maintenance

Remedial maintenance describes the intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design, construction and regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and so timings are difficult to predict.

- Structure Rehabilitation / Repair - (Elements - 1, 2, 3, 4)

Site Specific Maintenance Plan

1. Permeable Surfacing

Maintenance to be carried in accordance with Ciria Suds Manual (Chapter 20 & Table 20.1.5) and to include but not limited to the following actions: -

- Annual visual inspections to be undertaken of the pervious system with litter and debris removed.
- Brush / Vacuum, replacing any lost jointing material every year. Sediment management to be undertaken at the same time. Upstream chamber of discharge pipe to be inspected and cleaned yearly.
- Remedial maintenance will be undertaken intermittently following the outcome of monthly inspections if required. This may consist of the following items –
    - Weed control
    - Replacement of damaged blocks
    - Repair any rutting
    - Cleaning for aesthetics of the paving blocks
    - De-icing during winter months
    - Inspection of ponding during or following heavy rainfall

2. Bioretention Planting / Rain Gardens

<u>Site specific method statement</u>

Maintenance to be carried in accordance with Ciria Suds Manual (Chapter 18 & Table 18.3) and to include but not limited to the following actions: -

- Quarterly visual inspections to be undertaken along with litter and debris removed. planting inspection to be undertaken at the same time but will be less frequent during winter months.

- Remedial maintenance will be undertaken intermittently following the outcome of quarterly inspections if required. This may consist of the following items –
    - Weed control
    - Replacement of damaged planting
    - Structure Rehabilitation / Repair
    - Surface Reconditioning

3. Piped Network

- Gully / catchpit / channel drain cleaning and pipe jetting to be undertaken typically every year. If a blockage is present and flooding occurs, cleaning and clearing the blockage should be undertaken immediately. If item is defective, this should also be repaired or replaced.