

14th October 2025

REV P02

Open Harth, Newport

Drainage Technical Note – 2307-PHG-RP-C-0003

Prepared by Anthony Owens-Redwood – Director PHG Consulting Ltd.

This technical note is prepared to provide NCC SAB with information on how the designers aim to comply with Standard S2 – Runoff Rates and Volumes for the development

Site Information

Standard S2 sets out how surface water runoff should be controlled to prevent flood risk being increased. The surface water design should as far as practicable prevent runoff for the majority of rainfall events less than 5mm. The runoff rate should be controlled to the 1 in 1 year rate and the 1 in 100 discharge volume should not be increased.

The interception of the first 5mm of rainfall is assessed in line with table G2.1 of the National Standard for SuDS.

Current Runoff

The current site is brownfield, and although the buildings have been demolished, the hardstanding areas still drain to the surface water drainage system.

At present there is **4,663m²** of impermeable surfacing at the site and based on FEH Rainfall Intensities (I) and the rational method:

1-year event: 8.86 mm/hr

30-year event: 31.08 mm/hr

100-year event: 39.6 mm/hr

Runoff Coefficient (C): Typically 0.9 for impermeable surfaces like concrete or tarmac

Rational Method

$$Q=2.78 \times C \times I \times A$$

Where:

Q = Peak runoff rate (litres/second)

C = Runoff coefficient (dimensionless)

I = Rainfall intensity (mm/hr)

A = Area (hectares)

2.78 = Unit conversion factor

Existing runoff		
1-Year Return Period	30-Year Return Period	100-Year Return Period
$Q_{1yr}=2.78 \times 0.9 \times 8.86 \times 0.33=7.31$ l/s	$Q_{30yr}=2.78 \times 0.9 \times 31.08 \times 0.33=25.65$ l/s	$Q_{100yr}=2.78 \times 0.9 \times 39.6 \times 0.33=32.68$ l/s

Table 1. Existing runoff from impermeable surfacing

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Greenfield Runoff

As per the national standards for SuDS, we have assessed the greenfield runoff rates for the site using the UK SuDS online tool and Micro Drainage software and considering the proposed impermeable area only. The total area used to calculate the greenfield runoff is 0.331ha, this represents the roof areas (+10%), parking/drives and highway;

Greenfield runoff QMED		
1-Year Return Period	30-Year Return Period	100-Year Return Period
3.1l/s	6.3l/s	7.8l/s

Table 2. Greenfield runoff UK SUDS Tool

Greenfield runoff QBAR		
QBAR	30-Year Return Period	100-Year Return Period
2.7l/s	6.6l/s	7.7l/s

Table 3. Greenfield runoff Mirco Drainage

Post Development Runoff

As requested by NCC SAB, post-development all runoff from the site will be restricted to the greenfield runoff rate. The catchment areas used in the assessment also includes green SuDS features and surrounding embankment. From tables 2 and 3 above, post-development runoff will be restricted to 2.7l/s;

Greenfield runoff QBAR		
1-Year Return Period	30-Year Return Period	100-Year Return Period (with a 40% increase for climate change)
2.7l/s	2.7l/s	2.7l/s

Table 4. Post-Development Runoff

Runoff Betterment

From tables 1-4 above, post development there will be a reduction in the rate surface water is discharged from the site, this is outlined in table 5;

Post Development Runoff Betterment					
Return Period	Existing Runoff	Greenfield	Post Development	Betterment Post – Existing	Betterment Post – Greenfield
1 year	7.3l/s	3.1l/s	2.7l/s	63%	13%
30 year	25.6l/s	6.3l/s	2.7l/s	89%	58%
100 year (40% increase to post development)	32.7l/s	7.8l/s	2.7l/s	92%	65%

Table 5. Post-Development Runoff Betterment

Current Discharge Volume

As stated in the National Standards for SuDS, where possible, the volume of runoff from the site area should not exceed the volume of runoff from the equivalent area in its natural undeveloped or “greenfield” state (for the same rainfall event).

NCC SAB has requested a comparison of the 1 in 100 year greenfield against the 1 in 100 year developed 6 hour storm duration.

From the undeveloped site, the discharge volume has been calculated;

- Area A = 4,360 m²
- Runoff coefficient C=0.3 (SPR taken from UK SuDS tool)
- Rainfall depth D = 68.83mm FEH22 data (1-in-100, 6-hr depth)

Rainfall modelling FEH22

FEH22
FEH13

Design Rainfall

Duration* 6 Hours Sliding

Event Rarity

Return period* 100 Years

Annual Max. Peaks over threshold

Calculate
↻
↓ Export

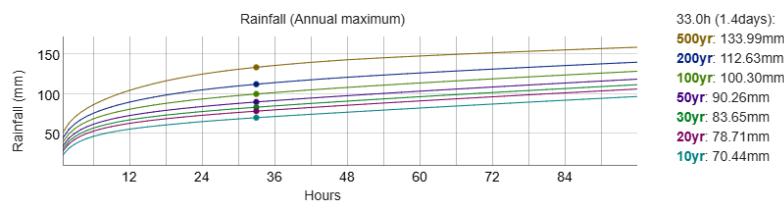
Depth

68.83

mm

A design rainfall of 68.83 mm was calculated.

This design rainfall has been calculated for a return period on the annual maximum scale.



$$\text{Runoff volume } V \text{ (m}^3\text{)} = \frac{D \text{ (mm)} \times A \text{ (m}^2\text{)} \times C}{1000}$$

$$V = (68.83 \times 4360 \times 0.3) / 1000$$

$$V = 90.03\text{m}^3$$


Post-Development Discharge Volume

Post-development discharge rates have been calculated using the Info Drainage software, and found to be 91.23m³;

Junction	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m ³)	Max. Flooded Volume (m ³)	Max. Outflow (L/s)	Total Discharge Volume (m ³)	Status
Outlet	12.050	10.690	10.706	0.016	2.4	0.000	0.000	2.4	91.229	OK

Therefore, post development there is a **1.2m³ increase** in the discharge volume during a 1 in 100 year 6 hour storm event.

RUNOFF RATE CALCULATIONS

PHG Consulting Engineers		Page 1
107 Cowbridge Road East Cardiff Wales, CF11 9AG	Hendre Farm Greenfield Runoff	
Date 30/04/2025 File	Designed by TOR Checked by SJD	
Innovyze	Source Control 2020.1.3	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.500
Area (ha)	0.331	Urban	0.300
SAAR (mm)	992	Region Number	Region 9

Results 1/s

QBAR Rural	2.7
QBAR Urban	4.1
Q2 years	3.9
Q1 year	3.6
Q30 years	6.6
Q100 years	7.7