

CENTRAL CLUB/ READING /RG1 2SQ



Sustainable Urban Drainage (SUD) Strategy

Application for the Demolition of existing building (mural wall to be retained and restored), construction of new building to accommodate a community hall (Use Class F2) and 17 no. residential flats (Use Class C3), with associated works & landscaping, to Central Club, 36-42 London Street, Reading RG1 2SQ

Issue: Planning

Date: October 2022

Ref: 426



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1. Sustainable Urban Drainage Strategy

In conjunction with drainage engineers (CMQuebral Consulting Engineers) the SUDs & Utility plan drawing 05-01-A has been supported by the following design assumptions.

- 1.1. The existing building fully covers the extent of the site and the drains to the existing surface water system.
- 1.2. The existing roof has an area of 532m² and discharges into 5 rain water outlets, positioned on the south and western elevation.
- 1.3. The rainwater pipes connect directly to the surface water network as the property does not benefit from on site surface water disposal, attenuation or soakaways.
- 1.4. The proposal replaces the existing building and nearly completely fills the site, with a new roof area of 490m², some circa 40m² less than the existing building.
- 1.5. The proposal also provides two small external areas, that total 40m², which will be connected to the surface water drainage system.
- 1.6. As there is no space further than 5m from the building, it is not possible to drain the buildings surface water via soakaway on site, instead the proposal will re-use the existing surface water connection.
- 1.7. The final connection will require consent by Thames Water, which will be sought prior to commencement.
- 1.8. To represent a betterment and lessen the burden on the surface water system, an attenuation tank will be placed to the central courtyard, with an Volume of 12m³. The size of the tank considers 10% increase in rainfall over 10 / 30 / and 100 years.
- 1.9. The water will collect in the courtyard attention tank and discharge to the regional surface water system at a rate agreed with Thames water and the size of the tank will be adjusted to suit the agreed allowable.

2. Appendix 1: Alutec flat roof rainwater drainage calculator

Alutec flat roof rainwater drainage Calculator

03 October 2022



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Comments	

Design Criteria

Location	Reading
Rainfall Intensity	0.056
Design Category	2
Building Design Life	60 years
Storm Return Period	90.0 years

Roof Catchment Areas

Roof Area Reference	Area 1
Roof area (m ²)	532.0
Additional roof areas (m ²)	0.0
Vertical walls (up to 10m high) (m ²)	0.0
Total catchment area (m ²)	532.0
Total water runoff (l/s)	29.8

Rainwater Outlets

Outlet Part Code	AR110F
Min. localised sump depth (mm)	0
Pipe connection size (mmØ)	110
Grate type	Flat
Number of outlets	5

Results

Roof Area Reference	Area 1
Required capacity (l/s)	6.0
Max. outlet capacity (l/s)	10.7
Max. drainage area per outlet (m ²)	191.1
Additional safety margin	44%
Result	PASS

All calculations are in accordance with BS EN12056-3:2000 (Gravity drainage systems - roof drainage layout and calculation)

Calculations and recommendations are based on input data therefore please check that all data shown is correct. No liability can be accepted for inadequate designs based on discrepancies within this document.

3. Appendix 2: Attenuation tank design calculations

 CMQ Consulting Engrs Office 3 11a Station Road, Slough SL1 6JJ	Project The Central Hub				Job no.	
	Calcs for Attenuation Tank				Start page no./Revision 1	
	Calcs by C	Calcs date 05/10/2022	Checked by	Checked date	Approved by	Approved date

ATTENUATION DESIGN

In accordance with CIRIA publication C753 - The SUDS Manual

Tedds calculation version 1.0.03

EA_Defra method

Site characteristics

Location	Other
Hydrological region	6
Soil type (Wallingford Procedure W.R.A.P map)	4
Standard percentage runoff	SPR = 0.47
Average annual rainfall	SAAR = 650 mm
5 year return period rainfall of 60 minute duration	M5_60min = 20.0 mm
Ratio 60-minute to 2 day rainfalls of 5 year return	r = 0.42
Rainfall intensity increase due to global warming	p _{climate} = 10%
Impervious area req. attenuation storage	α = 100.0 %

Catchment details

Subcatchment	Name	Area (ha)	PIMP (%)	Impermeable. area (ha)
1;	Main Roof;	1.00;	10.0	0.10;
Total		1.00;	10.0	0.10;

Greenfield runoff rates

Catchment area	AREA = 50.00 hectare
Greenfield runoff rate (50 hectare site)	$\bar{Q}_{\text{rural}} = 0.00108 \text{ m}^3/\text{s} \times (\text{AREA}/1\text{km}^2)^{0.89} \times (\text{SAAR}/1\text{mm})^{1.17} \times \text{SPR}^{2.17} =$ 221.3 l / s
Greenfield runoff rate	$\bar{Q} = \bar{Q}_{\text{rural}} / \text{AREA} \times A =$ 4.4 l / s
Greenfield runoff rate per unit area	$\bar{Q}_A = \bar{Q} / A =$ 4.4 l / s / hectare

Estimated site discharges

FSR growth rate (1 year)	FSR _{1yr} = 0.85
Discharge (1 year)	Q _{1yr} = $\bar{Q} \times \text{FSR}_{1\text{yr}} =$ 3.8 l/s
FSR growth rate (30 year)	FSR _{30yr} = 2.30
Discharge (30 year)	Q _{30yr} = $\bar{Q} \times \text{FSR}_{30\text{yr}} =$ 10.2 l/s
FSR growth rate (100 year)	FSR _{100yr} = 3.19
Discharge (100 year)	Q _{100yr} = $\bar{Q} \times \text{FSR}_{100\text{yr}} =$ 14.1 l/s

Estimated attenuation volume - 1 year

Attenuation storage vol (fig A7.1 - A7.8)	Uvol _{1yr} = 52.9 m ³ / hectare
Basic storage volume	BSV _{1yr} = Uvol _{1yr} × α × A = 52.87 m ³
FEH rainfall factor (figs A11.1, A6.1.1 - A6.3.4)	FF _{1yr} = 1.05
Storage volume ratio (fig A8.1 - A8.8)	SVR _{1yr} = 1.06
Adjusted storage volume	ASV _{1yr} = SVR _{1yr} × BSV _{1yr} = 56.04 m ³
Hydrological regional volume ratio (fig A9.1)	HR _{1yr} = 1.01
Final estimated attenuation storage	Vol _{1yr} = HR _{1yr} × ASV _{1yr} = 56.48 m ³

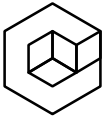
Library item: Estimated attenuation output

Estimated attenuation volume - 30 year

Attenuation storage vol (fig A7.1 - A7.8)	Uvol _{30yr} = 131.8 m ³ / hectare
Basic storage volume	BSV _{30yr} = Uvol _{30yr} × α × A = 131.80 m ³
FEH rainfall factor (figs A11.1, A6.1.1 - A6.3.4)	FF _{30yr} = 1.00

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	Calcs for Attenuation Tank				Start page no./Revision 2	
	Calcs by C	Calcs date 05/10/2022	Checked by	Checked date	Approved by	Approved date

Storage volume ratio (fig A8.1 - A8.8)	$SVR_{30yr} = 1.13$
Adjusted storage volume	$ASV_{30yr} = SVR_{30yr} \times BSV_{30yr} = 148.41 \text{ m}^3$
Hydrological regional volume ratio (fig A9.1)	$HR_{30yr} = 1.02$
Final estimated attenuation storage	$Vol_{30yr} = HR_{30yr} \times ASV_{30yr} = 151.20 \text{ m}^3$
Library item: Estimated attenuation output	
Estimated attenuation volume - 100 year	
Attenuation storage vol (fig A7.1 - A7.8)	$Uvol_{100yr} = 170.7 \text{ m}^3 / \text{hectare}$
Basic storage volume	$BSV_{100yr} = Uvol_{100yr} \times \alpha \times A = 170.73 \text{ m}^3$
FEH rainfall factor (figs A11.1, A6.1.1 - A6.3.4)	$FF_{100yr} = 0.95$
Storage volume ratio (fig A8.1 - A8.8)	$SVR_{100yr} = 1.20$
Adjusted storage volume	$ASV_{100yr} = SVR_{100yr} \times BSV_{100yr} = 204.72 \text{ m}^3$
Hydrological regional volume ratio (fig A9.1)	$HR_{100yr} = 1.03$
Final estimated attenuation storage	$Vol_{100yr} = HR_{100yr} \times ASV_{100yr} = 211.26 \text{ m}^3$
Library item: Estimated attenuation output	
Attenuation storage required	
Vol. increase due to head-discharge relationship	$p_{hydro} = 1.25$
Maximum attenuation storage required	$V_{req_max} = Vol_{30yr} \times p_{hydro} = 189.0 \text{ m}^3$
Interception storage	
Interception rainfall depth	$d_{int} = 5 \text{ mm}$
Volume of interception storage required	$V_{int_req} = 0.8 \times A_{imp} \times d_{int} = 4.00 \text{ m}^3$
Long term storage	
Proportion of paved area draining in to network	$\alpha = 1.0$
Proportion of pervious area draining in to network	$\beta = 0.5$
Rainfall depth for 100years, 6 hour event	$RD = M100_{360} = 66.8 \text{ mm}$
Extra runoff vol of dev.runoff over greenfield runoff	$Vol_{xs} = \max(RD \times A \times (PIMP \times \alpha \times 0.8 + ((1 - PIMP) \times \beta \times SPR) - SPR), 0 \text{ m}^3) = 0.00 \text{ m}^3$
Treatment volume	
Treatment volume (assume 80% runoff)	$T_{vol} = 0.8 \times A \times 15 \text{ mm} \times PIMP = 12.00 \text{ m}^3$



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