



Company Remote Engineering Design Services				Project Big Green Farm - Penley	
Item Attenuation storage volume for House Type 3B				Job Ref RED-EDL-001	Sheet no. 1
MasterDrain	Calc. by JGW	Date 18/11/20	Checked by KB	Date	Approved by Date

Hydrological region	(R)	5		Note 1
Hydrological rainfall zone	(Z)	8		Note 2
Development area - ha	(A)	0.005	ha	Note 3
Proport. of imp.area requiring storage	(a)	1.000		Note 4
Greenfield flow rate per unit area	(Q _{BAR} /A)	4.26	l/s/ha	Note 5
% impermeable area of catchment	(PIMP)	100.0	%	Note 6

Attenuation storage volumes per unit area:-

(Uvol _{1yr})	160.0	m ³ /ha	Note 7
(Uvol _{30yr})	350.0	m ³ /ha	
(Uvol _{100yr})	440.0	m ³ /ha	

Basic storage volumes :-

(Uvol x a x A)	(BSV _{1yr})	0.8	m ³	Note 8
	(BSV _{30yr})	1.8	m ³	
	(BSV _{100yr})	2.3	m ³	

Climate change factor	(CC)	1.3		Note 9
FEH factor		1.0		Note 10
Critical storm duration		6.0	hrs	Note 11

FEH Rainfall factor :-

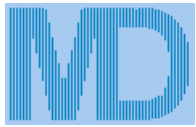
(FF _{1yr})	1.40	Note 12
(FF _{30yr})	1.40	
(FF _{100yr})	1.40	

**Storage volume ratio :-
f (CC/FF)**

(SVR _{1yr})	0.907	Note 13
(SVR _{30yr})	0.907	
(SVR _{100yr})	0.907	

**Adjusted storage volumes :-
(SVR x BSV)**

(ASV _{1yr})	0.8	m ³	Note 14
(ASV _{30yr})	1.65	m ³	
(ASV _{100yr})	2.1	m ³	



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Growth curve factors :-

(GC_{1yr})

Note 15

(GC_{30yr})

(GC_{100yr})

Hydrological region volume storage ratio :-

(HR_{1yr})

Note 16

(HR_{30yr})

(HR_{100yr})

Final estimated attenuation storage volumes:-

(HR x ASV) (AtVol_{1yr})

m³

Note 17

(AtVol_{30yr})

m³

(AtVol_{100yr})

m³

Printed from Masterdrain Hydrology program.



Company Remote Engineering Design Services				Project Penley	
Item Attenuation storage volume for House Type 3B				Job Ref	Sheet no. 3
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Notes:-

References to Appendix 1 refer to 'R&D Technical Report W5-074/A - Preliminary rainfall runoff management for developments (Revision E) Defra/EA

- Note 1 - UK is divided into 10 Hydrological regions reflecting the different flood frequency growth curves (Appendix 1, fig 1.1). This data is included in the database.
- Note 2 - Zones 1 - 8 based on FSR rainfall characteristics. This data is included in the database.
- Note 3 - Excluding public open spaces not modified Or drained by the proposed development.
- Note 4 - Impermeable area served by direct drainage / total area of impermeable surface.
- Note 5 - From previous calculation.
- Note 6 - For catchments where the PIMP value is less than 50%, a more detailed study should be made as the storage estimates may be undersized.
- Note 7 - These values are generated by the program, based on the graphs in Appendix 1, figures 7.1 - 7.8.
- Note 8 - Storage units may serve areas of different densities of development. If necessary, calculations should be based on each development zone, then cumulated.
- Note 9 - The Defra guidance on the impact of climate change on river flows is to apply a factor of 1.2. As there is a non-linear relationship between rainfall and runoff, it is suggested that a factor of 1.1 should be applied to rainfall +depths in this procedure.
- Note 10 - FEH factor is calculated by the program. It is used to derive the critical storm duration for the appropriate hydrological zone. (App. 1, fig. 11)
- Note 11 - The critical storm duration for the location. This should be used to select the FSR/FEH ratio map in Appendix 1, figures 6.1.1 to 6.3.4.
- Note 12 - This is derived from the maps in Appendix 1, 6.1.1 to 6.3.4
- Note 13 - This is a function of the Climate change factor and the FEH rainfall factor. See App 1, Figs 8.1 to 8.8
- Note 14 - Storage volumes adjusted for climate change and FEH rainfall.
- Note 15 - Growth curve factors for each hydrological region obtained from Appendix 1, figure 1.2 (table inset in figure).
- Note 16 - These are a function of the Storage Volume Ratio and the growth curves.
- Note 17 - Required attenuation storage.