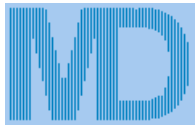




Company Remote Engineering Design Services				Project Big Green Farm - Penley	
Item Attenuation storage volume for House Type 4B				Job Ref RED-EDL-001	Sheet no. 1
MasterDrain	Calc. by JGW	Date 18/11/20	Checked by KB	Date	Approved by Date

Hydrological region	(R)	9		Note 1
Hydrological rainfall zone	(Z)	4		Note 2
Development area - ha	(A)	0.009	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:-				
	($Uvol_{1yr}$)	170.0	m ³ /ha	Note 7
	($Uvol_{30yr}$)	350.0	m ³ /ha	
	($Uvol_{100yr}$)	430.0	m ³ /ha	
Basic storage volumes :-				
($Uvol \times a \times A$)	(BSV_{1yr})	1.5	m ³	Note 8
	(BSV_{30yr})	3.1	m ³	
	(BSV_{100yr})	3.9	m ³	
Climate change factor	(CC)	1.3		Note 9
FEH factor		1.0		Note 10
Critical storm duration		13.0	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})	0.894		Note 13
	(SVR_{30yr})	0.894		
	(SVR_{100yr})	0.894		
Adjusted storage volumes :-				
($SVR \times BSV$)	(ASV_{1yr})	1.4	m ³	Note 14
	(ASV_{30yr})	2.82	m ³	
	(ASV_{100yr})	3.5	m ³	



Company Remote Engineering Design Services				Project Penley	
Item Attenuation storage volume for House Type 4B				Job Ref	Sheet no. 2
MasterDrain	Calc. by JGW	Date 18/11/20	Checked by	Date	Approved by Date

Growth curve factors :-

(GC _{1yr})	0.85	Note 15
(GC _{30yr})	1.33	
(GC _{100yr})	1.59	

Hydrological region volume storage ratio :-

(HR _{1yr})	0.97	Note 16
(HR _{30yr})	1.07	
(HR _{100yr})	1.12	

Final estimated attenuation storage volumes:-

(HR x ASV)	(AtVol _{1yr})	1.3	m³	Note 17
	(AtVol _{30yr})	3.0	m³	
	(AtVol _{100yr})	3.9	m³	

Printed from Masterdrain Hydrology program.



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Item Attenuation storage volume for House Type 4B				Job Ref	Sheet no. 3
MasterDrain	Calc. by JGW	Date 18/11/20	Checked by	Date	Approved by Date

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.