Table 1 - Peak Runoff Estimation before and after development

Catchment	Catchment Area, A (m^2)	Land Use		Average Slope, H (m per 100m)	Flow Distance, L (m)	Inlet Time, t_o (min) [1]	Flow Time, t_f (min) [2]	Duration, t_c (min) [3]	50 - year return period				Runoff Coefficient, C [6]	Rainfall Increase due to Climate Change, % [7]	50-year Return Period Peak Runoff, Q_p (m^3/s) [8]	Total Peak Runoff, Qp (m3/s) [8]
		Surface Characteristics	Area (m^2)						Storm Constant, a [4]	Storm Constant, b [4]	Storm Constant, c [4]	Extreme Mean Intensity, i (mm/hr) [5]				
Existing Condition																
Existing	3250	Concrete	975	6.9	102	4.47	0	4.47	451.3	2.46	0.34	235.02	0.95	16.0	0.070	0.122
		Green	2275										0.35		0.052	
After Development																
After	3250	Concrete	2012.1	6.9	102	4.47	0	4.47	451.3	2.46	0.34	235.02	0.95	16.0	0.145	0.175
		Permeable paver	389										0.35		0.010	
		Green	848.9										0.35		0.019	

Note:

[1] Brandsby William's equation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$t_o = \frac{0.14465L}{H^{0.2} A^{0.1}}$$

where t_o = time of concentration of a natural catchment (min.)

A = catchment area (m^2)

H = average slope (m per 100 m), measured along the line of natural flow, from the summit of the catchment to the point under consideration

L = distance (on plan) measured on the line of natural flow between the summit and the point under consideration (m)

[2] t_f is assumed to be 0 for conservative estimation.

[3] $t_c = t_o + t_f$

[4] Storm constants are referenced to Table 3a in DSD Stormwater Drainage Manual (Fifth Edition) based on corresponding return periods.

[5] Intensity-Duration-Frequency calculation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$i = \frac{a}{(t_d + b)^c}$$

where i = extreme mean intensity in mm/hr,

t_d = duration in minutes ($t_d \le 240$), and

a, b, c = storm constants given in Tables 3a, 3b, 3c and 3d.

[6] Runoff coefficient is referenced from Section 7.5.2 in DSD Stormwater Drainage Manual (Fifth Edition). The value of 0.35 is proposed for green area whereas 0.95 for concrete paved area.

[7] Rainfall increase precentage due to climate change is referenced from Table 28 in DSD Stormwater Drainage Manual (Fifth Edition) and Corrigendum No. 1/2022 of the SDM. 16.0% for End of 21st Century is adopted as worst case scenario.

[8] Rational method for peak runoff estimation is referenced from Section 4.3.3 in DSD Stormwater Drainage Manual (Fifth Edition).

$$Q_p = 0.278\, C\, i\, A$$

where Q_p = peak runoff in m^3/s

C = runoff coefficient (dimensionless)

i = rainfall intensity in mm/hr

A = catchment area in km^2