Appendix 4

Replacement Pages of Drainage Impact Assessment

6) Existing Watercourses and Drainage Route (Cont'd)

6.5 Evaluation of Runoff Collection

6.5.1 Per DSD SDM Table 10, a 50-year return period and rainfall intensity of 218 mm/hr are adopted for design.

6.5.2 Runoff calculations are summarized below (see **Appendix III** for details).

Catchment Ref:	Location	Area (m2)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope	682.80	Steep Slope (Heavy Soil)	0.35	226	16.0%	17.4	Access Road (East)
B	Northern Slope	116.44	Steep Slope (Heavy Soil)	0.35			3.0	
C	Site (North Portion) Slope	176.77	Steep Slope (Heavy Soil)	0.35			4.5	
D	Site (North Portion) Driveway	524.28	Concrete	0.85			32.5	
E	Site (East Portion) Slope	36.44	Steep Slope (Heavy Soil)	0.35			0.9	Slope (East), and downstream RBL 667 & Ext.
F	Site (South Portion) Building	1287.85	Concrete	0.85			79.7	Ex. 600mm U-channel (Southwest)
		18.53	Steep Slope (Heavy Soil)	0.35			0.5	

**Rainfall intensity of 226mm/hr according to Table 2a, corrigendum no.1/2024, SDM*

#Rainfall increase factor of 16% according to Table 28, corrigendum no.1/2022, SDM

6.6 Identified Drainage Issues

6.6.1 The existing drainage system presents the following concerns:

i. Discharge is dispersed across three routes (access road, government slope, and southwest U-channel), complicating maintenance.
ii. No drainage infrastructure for Catchment E, leading to uncontrolled runoff onto adjacent properties.

7) Proposed Drainage System (Cont'd)

7.5 Post-Redevelopment Runoff Assessment

7.5.1 The future drainage flow path is illustrated in Appendix IV.

7.5.2 Total discharge into the 600mm U-channel will increase from 80.2 L/s to 121 L/s.

7.5.3 The revised drainage pattern is illustrated below and attached in **Appendix V**.

Catchment Ref:	Location	Area (m2)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope (Government)	682.80	Steep Slope (Heavy Soil)	0.35	226	16.0%	17.4	Access Road (East)
B	Northern Slope (Government)	116.44	Steep Slope (Heavy Soil)	0.35			3.0	Ex. 600mm U-channel on Slope (Southwest)
G	Site (After Re-development)	2,043.87						
	Greenery	284.62	Flat, Soil	0.2			4.1	
		130.29	Steep Slope (Heavy Soil)	0.35			3.3	
	Concrete	1,628.96	Concrete	0.85			100.8	

Drainage Discharge Point	Existing (L/s)	After Re-development (L/s)
Access Road (East)	39.9	0
Government Slope (East) & downstream RBL 667	0.9	0
Ex. 600mm U-channel on slope (Southern West)	80.2	111.3

7.6 Capacity Assessment of 600mm U-Channel

7.6.1 Using Manning's Equation, the channel's capacity is evaluated as follows:

Runoff collected by 600mm U-Channel:

	Area (m^2)	Surface Condition	Catchment Coefficient	Flowrate (L/s)
Upstream Slope	116.44	Steep Slope	0.35	3.0
Site	2,043.87			108.3
			Total	111.3

Flow velocity, $V = \frac{1}{U} \times R^{2/3} \times S^{1/2}$

Where U = Roughness coefficient of pipe
(for concrete lined channel in fair condition, U = 0.016)
R = Hydraulic Radius
S = Gradient of fall

Gradient Fall:
S = Upstream I.L – Downstream I.L. / Length
= (80.21 – 79.25) / 7.37m (as surveyed)
= 0.13

Assuming 1/2 bore flow of 600mm channel,
R = 0.25 D
V = $\frac{1}{0.016} \times (0.25 \times 0.6)^{2/3} (0.13)^{1/2}$
= 6.36 m/s

Handling capacity
Q = AV
= $(3.14 \times 0.3^2 / 2) \times (6.36)$
= 0.8989 m^3/s
= 898.9 l/s
> 111.3 l/s (12.4%, acceptable)

Appendix III – Evaluation of Runoff from Catchments (Existing)

Proposed Residential Re-development at 66 Deep Water Bay Road, Hong Kong
Evaluation of Runoff from Catchments (Existing)

Catchment Ref:	Location	Area (m2)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope	682.80	Steep Slope (Heavy Soil)	0.35	226	16.0%	17.4	Access Road (East)
B	Northern Slope	116.44	Steep Slope (Heavy Soil)	0.35			3.0	
C	Site (North Portion) Slope	176.77	Steep Slope (Heavy Soil)	0.35			4.5	
D	Site (North Portion) Driveway	524.28	Concrete	0.85			32.5	
E	Site (East Portion) Slope	36.44	Steep Slope (Heavy Soil)	0.35			0.9	Slope (East), and downstream RBL 667 & Ext.
F	Site (South Portion) Building	1287.85	Concrete	0.85			79.7	Ex. 600mm U-channel (Southwest)
		18.53	Steep Slope (Heavy Soil)	0.35			0.5	

Appendix V – P Evaluation of Runoff from Catchments (Future)

Proposed Residential Re-development at 66 Deep Water Bay Road, Hong Kong
Evaluation of Runoff from Catchments (Post-redevelopment)

Catchment Ref:	Location	Area (m2)	Surface Condition	Catchment Coefficient	Rainfall Intensity (mm/hr)	Rainfall Inc. Factor (End of 21 Cen)	Flowrate (L/s)	Discharge Point
A	Northern Slope (Government)	682.80	Steep Slope (Heavy Soil)	0.35	226	16.0%	17.4	Access Road (East)
B	Northern Slope (Government)	116.44	Steep Slope (Heavy Soil)	0.35			3.0	Ex. 600mm U-channel on Slope (Southwest)
G	Site (After Re-development)	2,043.87						
	Greenery	284.62	Flat, Soil	0.2			4.1	
		130.29	Steep Slope (Heavy Soil)	0.35			3.3	
	Concrete	1,628.96	Concrete	0.85			100.8	