

Project: Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot
 Title: Total Pollution Loading of Stormwater During Operational Phase

Total Pollution Loading of Stormwater During Operational Phase

Scenarios	Items	Rainfall Intensity (mm/yr) [A] ^[1]	Runoff Coefficient ^[2]		Pollutant Concentration (mg/L) ^[3]			1-Silt Trap Removal Efficiency [M]	Area (km ²) [G]	Average Daily Runoff (m ³ /day) [H]	Loading (kg/day)		
			paved area [B]	unpaved area [C]	BOD5 [D]	TN [E]	TP [F]				BOD5 [I]	TN [J]	TP [K]
Existing Condition	Paved Area	1386	0.9	0.35	22.5	2.0	0.2	0.8	0.165	$[H1]=[A] \times [B] \times [G] \times \frac{1000}{365} = 564$	$[I1]^{[4]}=[H1] \times [D] \times [M] = 10.15$	$[J1]^{[4]}=[H1] \times [E] \times [M] = 0.902$	$[K1]^{[4]}=[H1] \times [F] \times [M] = 0.090$
	Unpaved Area								0.135	$[H2]=[A] \times [C] \times [G] \times \frac{1000}{365} = 179$	$[I2]=[H2] \times [D] = 4.04$	$[J2]=[H2] \times [E] = 0.359$	$[K2]=[H2] \times [F] = 0.036$
	Subtotal								0.300	$[H0]=[H1]+[H2]=743$	$[I0]=[I1]+[I2]=14.19$	$[J0]=[J1]+[J2]=1.261$	$[K0]=[K1]+[K2]=0.126$
With Development Scenario	Paved Area	1386	0.9	0.35	22.5	2.0	0.2	0.8	0.290	$[H3]=[A] \times [B] \times [G] \times \frac{1000}{365} = 991$	$[I3]^{[4]}=[H3] \times [D] \times [M] = 17.84$	$[J3]^{[4]}=[H3] \times [E] \times [M] = 1.586$	$[K3]^{[4]}=[H3] \times [F] \times [M] = 0.159$
	Unpaved Area								0.010	$[H4]=[A] \times [C] \times [G] \times \frac{1000}{365} = 13$	$[I4]=[H4] \times [D] = 0.30$	$[J4]=[H4] \times [E] = 0.027$	$[K4]=[H4] \times [F] = 0.003$
	Subtotal								0.300	$[H5]=[H3]+[H4]=1004$	$[I5]=[I3]+[I4]=18.14$	$[J5]=[J3]+[J4]=1.612$	$[K5]=[K3]+[K4]=0.161$
Area of catchment	Total								3.000^[5]				
Change of Loading	kg/day										$[I]=[I5]-[I0]=3.95$	$[J]=[J5]-[J0]=0.35$	$[K]=[K5]-[K0]=0.04$

Remarks:

[1] According to "Stormwater Drainage Manual, annual rainfall in Hong Kong is around 2200mm. However, according to the report on "Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool", only rainfall events of sufficient intensity and volume would give rise to runoff. It indicated that runoff percentage for the wet season is about 82% while dry season is only 44%. Therefore, only rainfall of $2200 \times (82\% + 44\%) / 2 = 1386\text{mm}$ can be generated into runoff and is adopted in this Study.

[2] According to "Stormwater Drainage Manual, runoff coefficient depends on the impermeability, slope and retention characteristics of the ground surface. In this study, 0.9 of runoff coefficient is used for developed area and 0.35 is adopted for undeveloped area.

[3] EPD, Update on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool- Pollution Loading Inventory Report

[4] Silt traps will be implemented and 20% of removal efficiency of silt traps is assumed in this Study. Enhanced design or closer spacing between silt traps may increase the efficiency.

[5] Given that the area of the catchment is approximately 3 km², the increase in paved area and the associated surface runoff would be equal to $(0.29-0.165)/3$, approximately 4%