

ESTIMATED CALCULATION - ANNUAL LOAD POLLUTANT

Area of study/catchment:	Acre	Ha
	160.18	64.82

VOLUMETRIC RATIONAL FORMULA-EMC (USMM pg 15-4)

$$R/Vr = D C_v$$

R/Vr = Average annual runoff depth (mm)
 D = Average annual rainfall depth (mm), and
 C_v = weighted average annual runoff coefficient

Table 15.1: Typical Volumetric Runoff Coefficient Values-USMM

Landuse	Native Vegetation Coefficient
Forest	0.1-0.3
Pasture	0.2-0.6
Urban	0.5-0.7

EVENT MEAN CONCENTRATION METHOD-EMC (USMM pg 15-6)

$$L = 10^{-4} \times C \times Vr \times A \quad (15.8)\text{-USMM}$$

L = Annual load of pollutant (kg)
 C = EMC of pollutant (mg/l)
 Vr = Annual runoff depth (mm)
 A = Catchment area (ha)

Table 15.2: Typical Event Mean Concentration (EMC) Values in mg/L-USMM
 (Note: Landuse categories)

Pollutant	Native Vegetation categories				
	Native Vegetation/Forest	Rural Grazing	Industry	Urban	Construction
Sediment	85	500	50-2000	50-200	4,000

	Pre-Construction	Construction	Post-Construction
Weighted average annual runoff coefficient, C _v	0.30	0.50	0.70
Average annual rainfall depth, D (mm)	2,812.80	2,812.80	2,812.80
Average annual runoff depth, R (mm)	843.84	1,406.40	1,968.96
Catchment area, A (ha)	64.82	64.82	64.82
EMC of pollutant Value, C (mg/L)	85.00	4,000.00	100.00
Annual load of pollutant, L (kg/ha)	1,199.39	145,868.92	5,195.32

Different between pre-construction and Construction 144,906.73
 Percentage increased (%) 98.725

FORMULA

$$SDR (\%) = 77.684 \times A^{-0.065} \times (RL)^{0.213}$$

A = Area (Acre)
 (RL) = Ratio of drainage gradient

Catchments	Area (acre)	RL Value	SDR ratio (%)		
			Pre-Construction	Construction	Post-Construction
1	160.18	0.25	41.57	20.79	31.18
Total	160.18	Total	41.57	20.79	31.18

FORMULA

Sediment that flow into river = Sediment Loading (L) x SDR (%)

Catchments	Sediment that flow into river (tonnes/year)		
	Pre-Construction	Construction	Post-Construction
1	0.77	30.32	1.59
Total	0.77	30.32	1.59

*Source: Urban Stormwater Management Manual For Malaysia, Department of Irrigation and Drainage Malaysia, Volume 6, Runoff Estimation (Chapter 16: Pollutant Estimation, Transport and Retention, Part 16.3: Design Criteria, Clause 16.5.2: Alternative Expression for Pollutant Load)
 Volume 6, Runoff Estimation (Chapter 16: Pollutant Estimation, Transport and Retention, Part 16.3: Design Criteria, Clause 16.4.2: Volumetric Rational Formula)

check from Rainfall chapter 4