Appendix 10

RUSLE Calculation Sheets

(Total No. of pages including blank pages = 4)

Note: A colour version of this Appendix is available on the digital version of this document

This page has intentionally been left blank

SWMP Commentary, Detailed Calculations

Note: These "Detailed Calculation" spreadsheets relate only to high erosion hazard lands as identified in figure 4.6 or where the designer chooses to use the RUSLE to size sediment basins. The "Standard Calculation" spreadsheets should be used on low erosion hazard lands as identified by figure 4.6 and where the designer chooses not to run the RUSLE in calculations.

1. Site Data Sheet

Site Name: Wallerawang Quarry

Site Location: Great Western Highway

Precinct: Wallerawang

Description of Site: Quartzite Quarry

Site area	Sub-catchments						Remarks
	SB-1	SB-4	SB-6				
Total catchment area (ha)	7.1	1.3	0.5				
Disturbed catchment area (ha)	7.1	1.3	0.5				

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D					From Appendix C
% sand (fraction 0.02 to 2.00 mm)							Soil texture should be assessed through mechanical dispersion only. Dispersing agents (e.g. Calgon) should not be used
% silt (fraction 0.002 to 0.02 mm)							
% clay (fraction finer than 0.002 mm)							
Dispersion percentage							E.g. enter 10 for dispersion of 10%
% of whole soil dispersible							See Section 6.3.3(e). Auto-calculated
Soil Texture Group	D	D					Automatic calculation from above

Rainfall data

Design rainfall depth (days)	5	5	5				See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	95	95	95				See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	56.4	56.4	56.4				See Section 6.3.4 (h)
Rainfall R-factor (if known)	1500	1500	1500				See Appendix B
IFD: 2-year, 6-hour storm (if known)	7.79	7.79	7.79				See IFD chart for the site

RUSLE Factors

Rainfall erosivity (*R*-factor)	1500	1500	1500				Auto-filled from above
Soil erodibility (*K*-factor)	0.05	0.05	0.05				
Slope length (m)	50	30	30				
Slope gradient (%)	1	1	1				RUSLE LS factor calculated for a high rill/interrill ratio.
Length/gradient (*LS*-factor)	0.17	0.15	0.15				
Erosion control practice (*P*-factor)	1.3	1.3	1.3				
Ground cover (*C*-factor)	1	1	1				

Calculations

Soil loss (t/ha/yr)	17	15	15				
Soil Loss Class	1	1	1				See Section 4.4.2(b)
Soil loss (m^3/ha/yr)	13	11	11				
Sediment basin storage volume, m^3	15	2	1				See Sections 6.3.4(i) and 6.3.5 (e)

SWMP Commentary, Detailed Calculations

4. Volume of Sediment Basins, *Type D* and *Type F* Soils

Basin volume = settling zone volume + sediment storage zone volume

Settling Zone Volume

The settling zone volume for *Type F* and *Type D* soils is calculated to provide capacity to contain all runoff expected from up to the y-percentile rainfall event. The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle and can be determined by the following equation:

$$V = 10 \times C_v \times A \times R_{x\text{-day, y-\%ile}} \ (m^3)$$

where:

10 = a unit conversion factor

C_v = the volumetric runoff coefficient defined as that portion of rainfall that runs off as stormwater over the x-day period

$R_{x\text{-day, y-\%ile}}$ = is the x-day total rainfall depth (mm) that is not exceeded in y percent of rainfall events. (See Sections 6.3.4(d), (e), (f), (g) and (h)).

A = total catchment area (ha)

Sediment Storage Zone Volume

In the detailed calculation on Soil Loss Classes 1 to 4 lands, the sediment storage zone can be taken as 50 percent of the settling zone capacity. Alternately designers can design the zone to store the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(ii)). However, on Soil Loss Classes 5, 6 and 7 lands, the zone must contain the 2-month soil loss as calculated by the RUSLE (Section 6.3.4(i)(iii).

Place an "X" in the box below to show the sediment storage zone design parameters used here:

	50% of settling zone capacity,
X	2 months soil loss calculated by RUSLE

Total Basin Volume

Site	C_v	$R_{x\text{-day, y-\%ile}}$	Total catchment area (ha)	Settling zone volume (m^3)	Sediment storage volume (m^3)	Total basin volume (m^3)
SB-1	0.50	56.4	7.1	2002.2	15	2017.2
SB-4	0.50	56.4	1.3	366.6	2	368.6
SB-6	0.50	56.4	0.5	141	1	142

Note that designers should achieve a minimum 3:1 length:width ratio in Type D or F basins