I5 Sediment Basin Storage Volume – Soil Loss Calculation

The sediment storage zone volume has been calculated as equal to 100 per cent of the settling zone for Type C Soils or 50 per cent of the settling zone for Type F & D Soils. However, for highly erodible soils the sediment storage zone volume should be determined more precisely. This can be calculated as being equal to the average 2-month soil loss from the disturbed areas of the catchment. This volume (*V*) is determined by the Revised USLE equation (Appendix A) as follows.

$$\frac{0.17\,A\,(R\,K\,LS\,P\,C)}{1.3} \qquad m^3$$

where:

		Description	Value
0.17	=	a factor converting annual estimated soil loss to the 2-month soil loss	0.17
A	=	disturbed area (ha)	2.96 ha
R	=	RUSLE R factor (Appendix A)	2500
K	=	RUSLE K factor (Appendix A)	0.038
LS	=	RUSLE LS factor (Appendix A)	2
P	=	RUSLE P factor (Appendix A)	1.3
C	=	RUSLE C factor (Appendix A)	1
1.3	=	a factor to convert tonnes to cubic metres based on a typical density of saturated sediment of 1.3	1.3

$$V = \frac{0.17\,A\,(R\,K\,LS\,P\,C)}{1.3}\ m^3$$

$$V = \frac{0.17 \times 2.96 \times 2500 \times 0.038 \times 2 \times 1.3 \times 1}{1.3}$$

Therefore the sediment storage zone volume is V = 95.6 m^3.

$366 + 95.6 = 461.6 \simeq 462$

$462 < 549 \quad \therefore$ use $549 m^3$

I Standard Worksheets

I1 Site Data Sheet

Site Name: Coca Cola Amatil, Northmead

Site Number: _____

Site Location: Briens Road

Precinct: Western Area

Description of Site: _____

_____

Catchment Area (ha): _____ Disturbed Area (ha): _____

Topographic Position: _____

Soil Loss Class: _____ (Appendix C)

Soil Hydrologic Group: _____ (Appendix F)

Soil Texture Group: _____ (Section 6.3.1)

Percent of whole subsoil dispersible: _____ (Section 6.3.1)

5 Day 75th percentile Rainfall Event: 20·6 mm (Section 6.3.3)

Peak Flow Runoff Coefficient (C_{10}): _____ (AR&R)

Volumetric Runoff Coefficient (C_v): 0·6 (Appendix F)

Rainfall Erosivity (*R*-factor): 2500 (Appendix A)

Table I1 RUSLE Values

Site/soil/water characteristic	Value	Comments
rainfall erosivity (*R*-factor)	2500	
soil erodibility (*K*-factor)	0·038	
length/gradient (*LS*-factor)	2	Slope length = metres; slope gradient = %
erosion control practice (*P*-factor)	1·3	
ground cover (*C*-factor)	1	

I4 Sediment Basin Volume - *Type F & D* Soils

Basin Volume = Settling Zone Volume + Sediment Storage Zone Volume

The settling zone volume for Type F & D Soils is calculated to provide capacity to contain all runoff expected from up to the 75th percentile rainfall event. The settling zone volume (*V*) can be determined by the following equation:

$$V = 10 \cdot C_V \cdot A \cdot R_{75th\ ile,\ 5\ day}\ (m^3)$$

where:

		Description	Value
10	=	a unit conversion factor	10
C_V	=	the volumetric runoff coefficient, defined as that portion of rainfall that runs off as stormwater over the 5-day period	0·6
R	=	is the 5-day total rainfall depth (mm) which is not exceeded in 75 percent of rainfall events. (See table in Section 6.3.3)	20·6
A	=	area of catchment in hectares (ha)	1·096

$V = 10 \times C_V \times A \times R_{75th\ ile,\ 5\ day}$

$V = 10 \times 0{\cdot}6 \times 1{\cdot}096 \times 20{\cdot}6$

$V = 135{\cdot}5\ m^3$

Therefore the settling zone volume for Type F & D Soils is V = 136 m^3

Total Basin Volume = Settling Zone Volume + Sediment Storage Zone Volume

The Sediment Storage Zone Volume for Type F & D Soils has been stipulated as 50 per cent of the Settling Zone Volume (Section 6.3.3) for soils that are not highly erodible. For highly erodible soils the sediment storage zone volume should be determined more precisely using the RUSLE outlined in Worksheet I5. Therefore;

= V + 50%V

= 136 + 68

= 204 m^3

I5 Sediment Basin Storage Volume – Soil Loss Calculation

The sediment storage zone volume has been calculated as equal to 100 per cent of the settling zone for Type C Soils or 50 per cent of the settling zone for Type F & D Soils. However, for highly erodible soils the sediment storage zone volume should be determined more precisely. This can be calculated as being equal to the average 2-month soil loss from the disturbed areas of the catchment. This volume (V) is determined by the Revised USLE equation (Appendix A) as follows.

$$\frac{0.17\ A\ (R\ K\ LS\ P\ C)}{1.3} \qquad m^3$$

where:

		Description	Value
0.17	=	a factor converting annual estimated soil loss to the 2-month soil loss	0.17
A	=	disturbed area (ha)	1·096 ha
R	=	RUSLE R factor (Appendix A)	2500
K	=	RUSLE K factor (Appendix A)	0·038
LS	=	RUSLE LS factor (Appendix A)	2
P	=	RUSLE P factor (Appendix A)	1·3
C	=	RUSLE C factor (Appendix A)	1
1.3	=	a factor to convert tonnes to cubic metres based on a typical density of saturated sediment of 1.3	1·3

$$V = \frac{0.17\ A\ (R\ K\ LS\ P\ C)}{1.3}\ m^3$$

$$V = \frac{0.17 \times 1{\cdot}096 \times 2500 \times 0{\cdot}038 \times 2 \times 1{\cdot}3 \times 1}{1.3}$$

Therefore the sediment storage zone volume is V = 35·4 m^3.

136 + 35·4 = 171·4 ≃ 171·5

204 > 171·5 ∴ use 204 m^3

Parramatta

Position And Isopleth Values

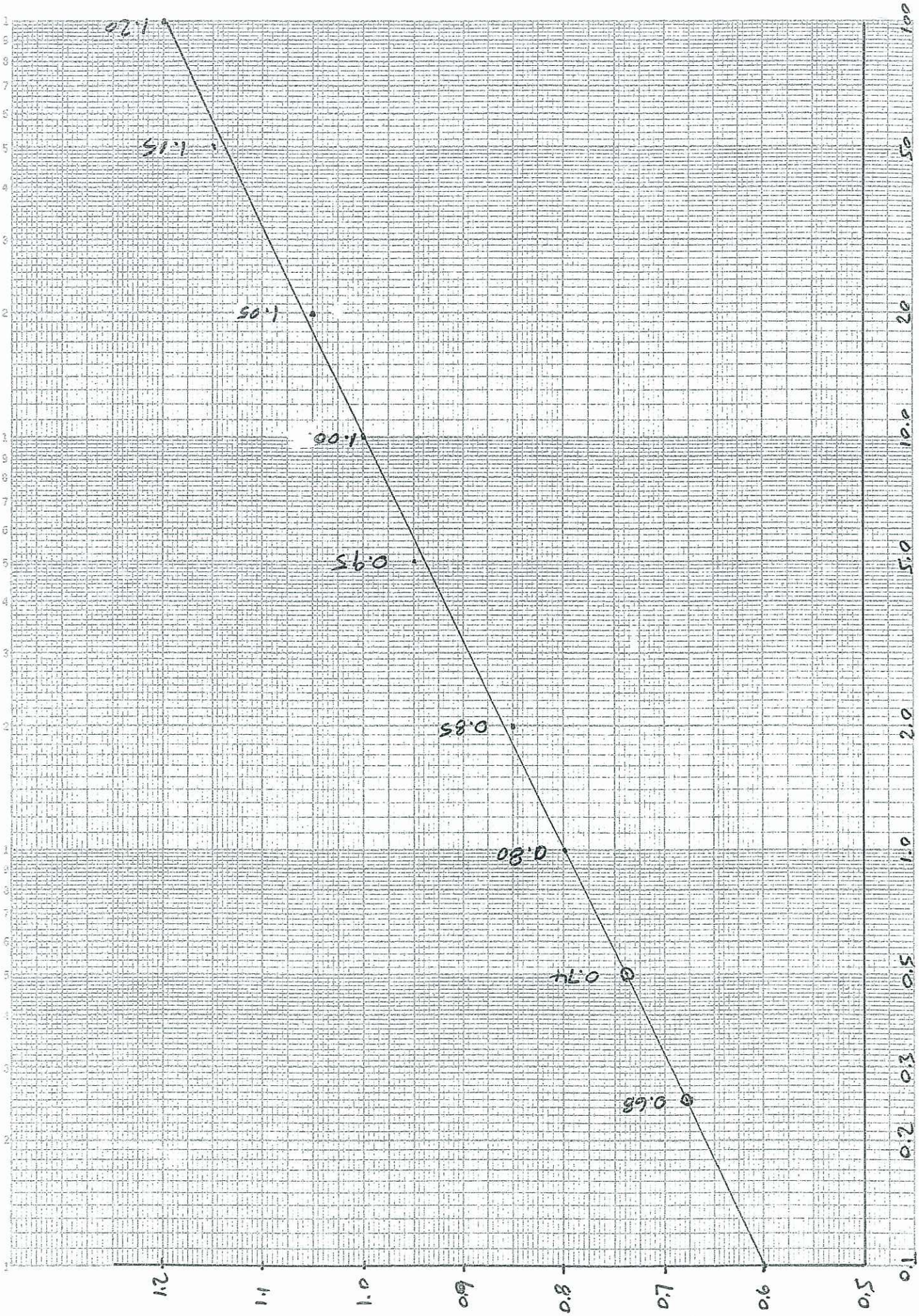
Latitude 33 deg 49.5 min S
Longitude 151 deg 0.0 min E

Map 1.* : 2 year ARI, 1 hour intensity 33.20
Map 2.* : 2 year ARI, 12 hour intensity 7.04
Map 3.* : 2 year ARI, 72 hour intensity 2.29
Map 4.* : 50 year ARI, 1 hour intensity 63.10
Map 5.* : 50 year ARI, 12 hour intensity 14.80
Map 6.* : 50 year ARI, 72 hour intensity 4.89

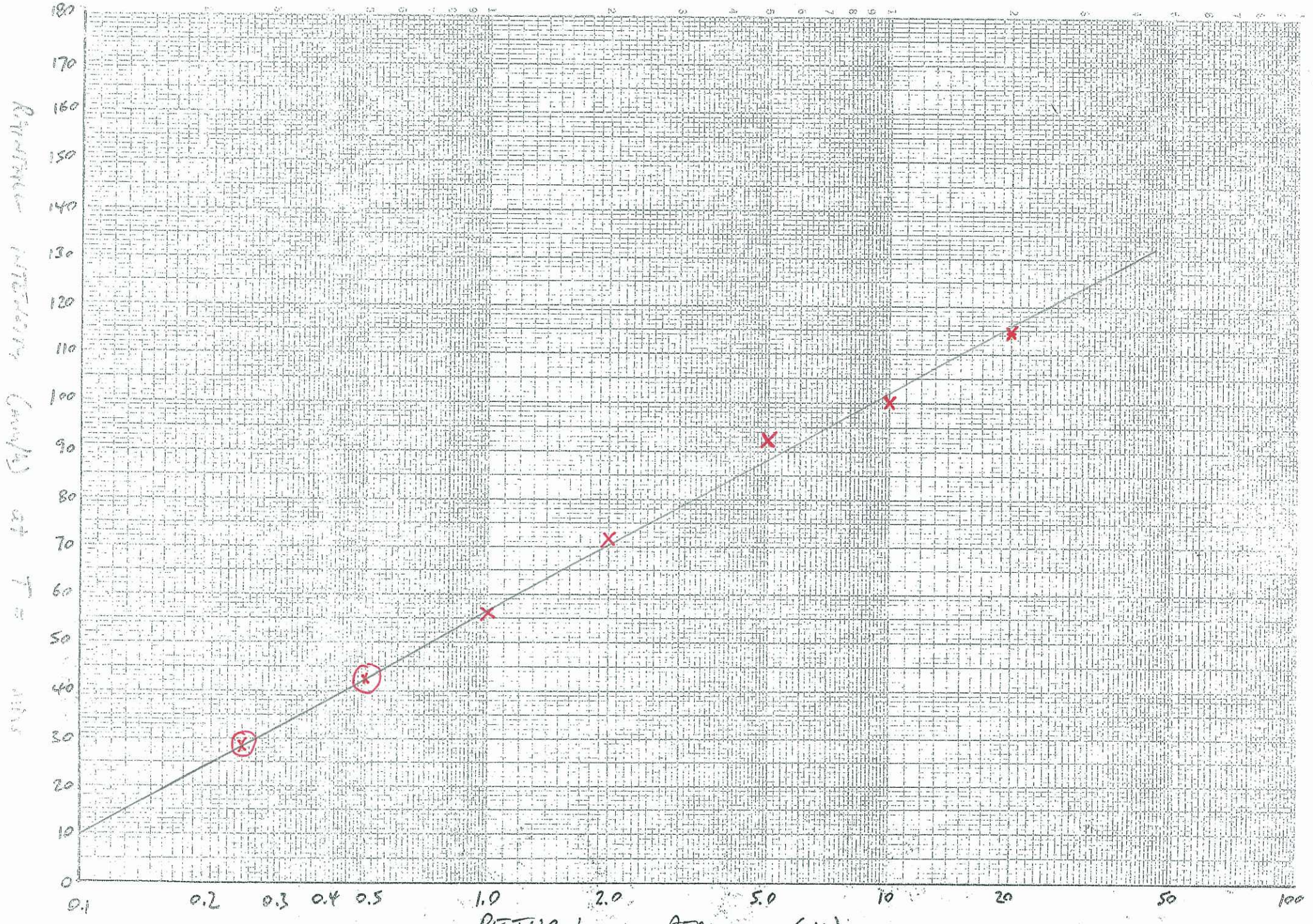
Map 7.* : Poisson distribution Skew Factor 0.00
Geographical Factors (calculated) : F2 4.30 and F50 15.83

Verification Table For Average Recurrence Intervals

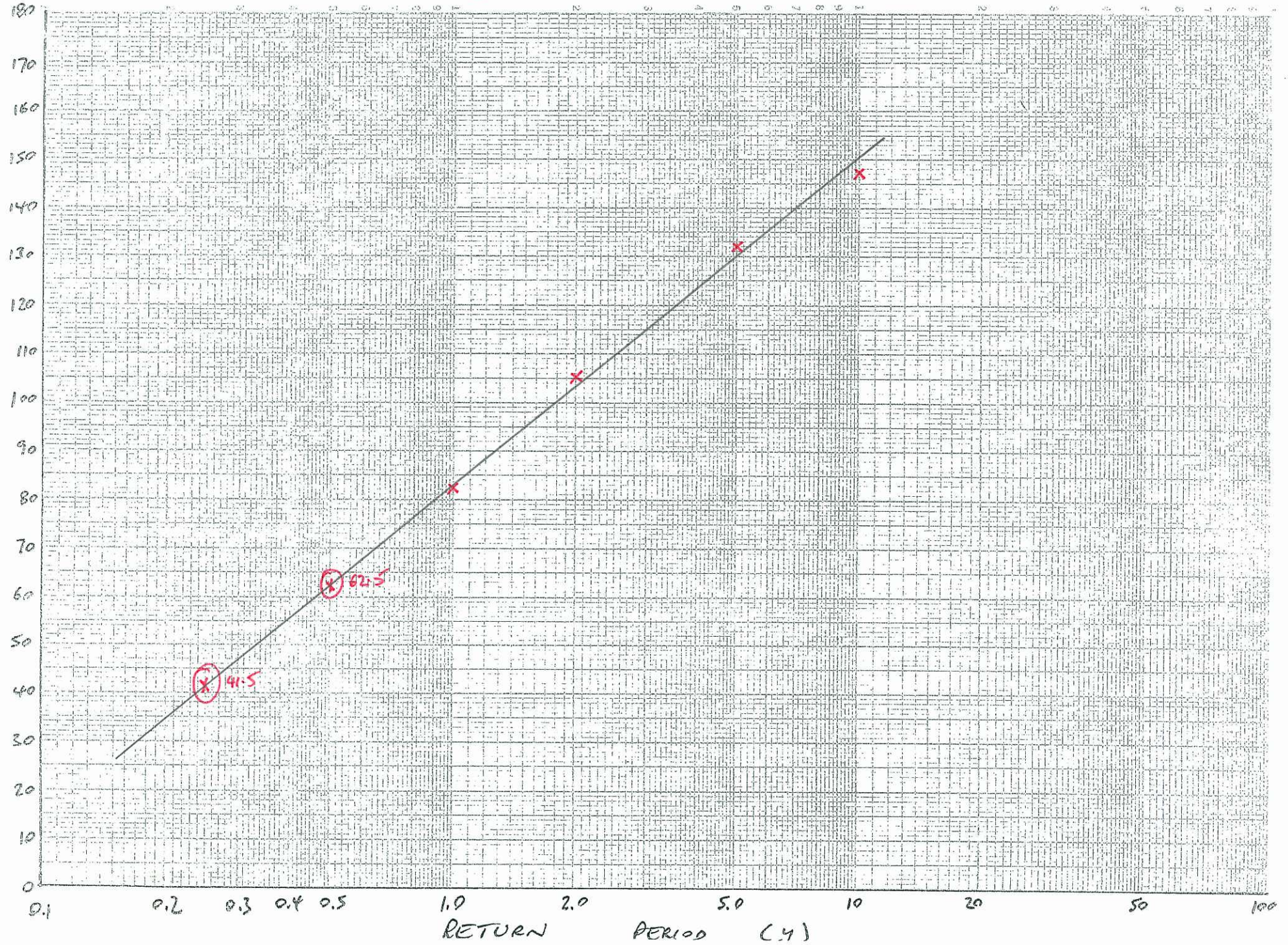
TIME	1 YEAR	2 YRS	5 YRS	10 YRS	20 YRS	50 YRS	100 YRS
5	84	107	136	153	175	203	225
6	79	101	128	143	164	190	211
10	64	82	104	117	134	156	172
12	59	76	97	108	124	144	159
18	49.3	63	80	90	103	120	132
20	46.8	60	76	85	98	114	126
30	38.0	48.7	62	69	79	92	102
60	25.9	33.2	42.2	47.3	54	63	70
120	16.9	21.7	27.9	31.5	36.2	42.4	47.1
180	13.0	16.8	21.8	24.7	28.5	33.4	37.2
360	8.39	10.9	14.2	16.2	18.8	22.2	24.8
720	5.41	7.04	9.33	10.7	12.5	14.8	16.6
1440	3.58	4.67	6.20	7.12	8.30	9.88	11.1
2880	2.32	3.03	4.03	4.63	5.41	6.44	7.23
4320	1.75	2.29	3.05	3.51	4.10	4.89	5.50

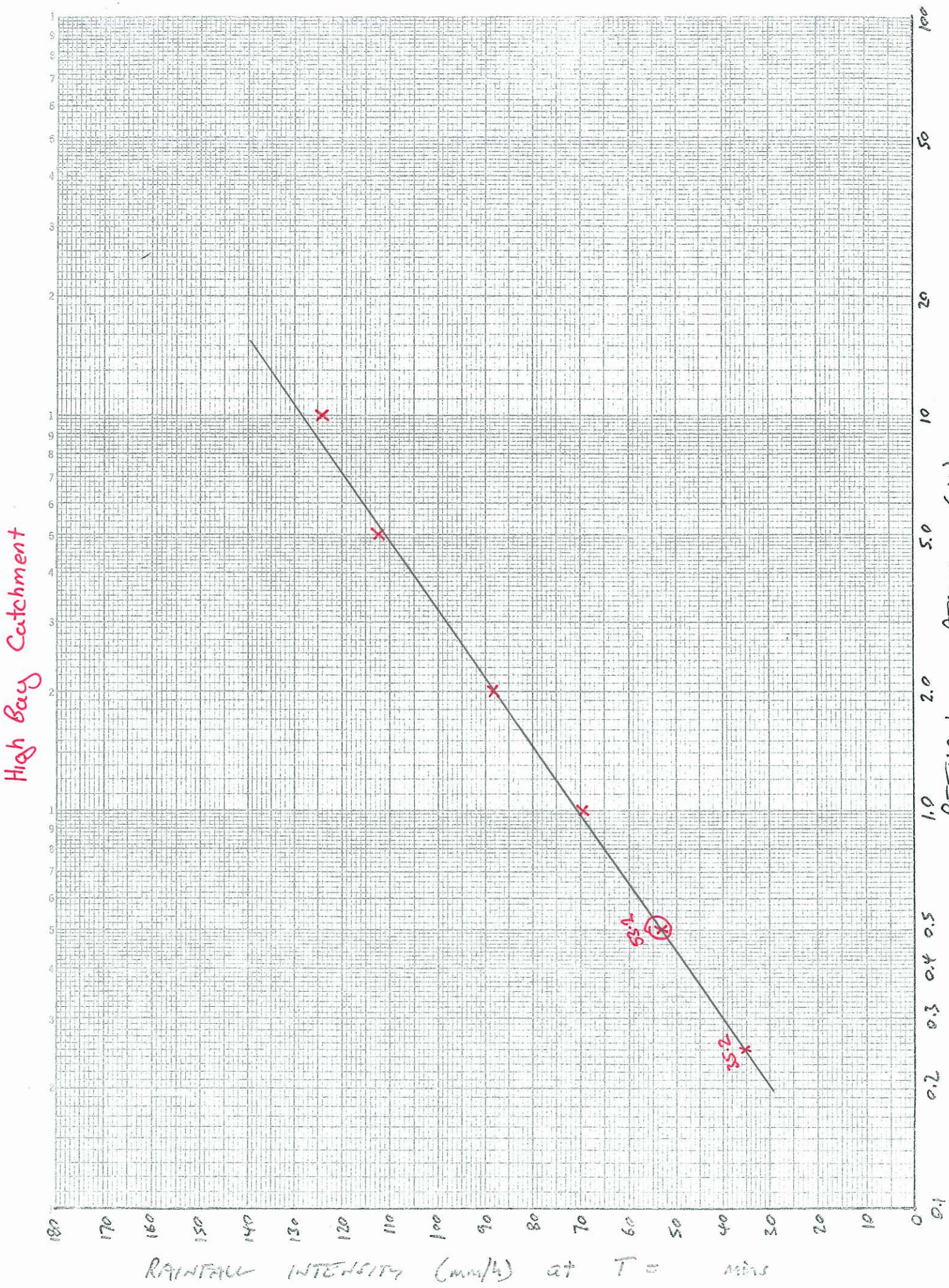


External Catchments



Loading Dock / Carpark Catchment





4.0 Performance Specifications

Ecosol's **RSF 4000** meets, and in most cases, exceeds accepted standards for GPT performance. It has been extensively tested both in the field and under laboratory conditions by a range of independent authorities.

4.1 Capture Efficiencies

Ecosol's **RSF 4000** has an independently-verified[3] capture rate of more than 98% of solids greater than 3mm but, although it is a primary filtration device designed to filter gross pollutants, it also removes a high percentage of fine sediments.

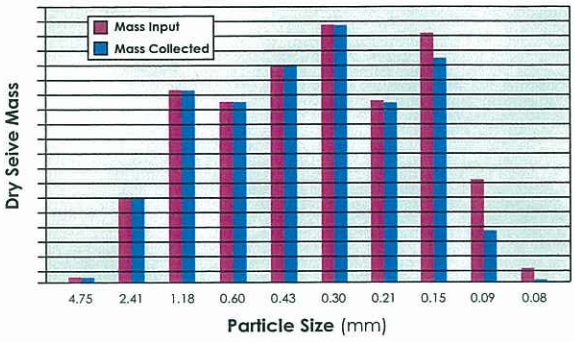
The adjoining table shows the results from laboratory testing for a range of particle sizes and flows. It shows that the unit achieves high capture efficiencies even for particle sizes smaller than the standard 3mm screen. These results have been confirmed by field testing, as shown in the adjoining PSD plot[4] but it is important to note that factors, such as the range of flows monitored, the homogeneity of pollutants, the quantity of previously captured material, and the accuracy in flow and material measurement, can present difficulties in accurately determining capture efficiencies.

Importantly and many unlike other systems, the **RSF 4000** continues to treat the specified TFR, and maintain its capture efficiencies during high-flow events. The composition and quantity of pollutants captured by the **RSF 4000** depends heavily on the catchment size, area, land use, and rainfall patterns. However, it typically captures the following gross pollutants:

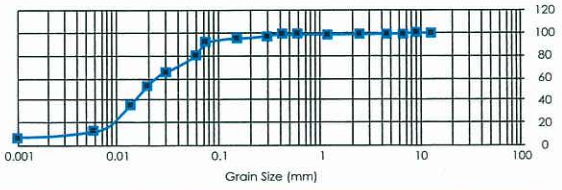
Solid Pollutants (Particle size capture efficiencies)						Free Oil & Grease*
Size(mm)	>4.800	>1.200	>0.211	>0.150	>0.090	
Capture % (at 40% of TFR)	100	98	98	91	75	Up to 97%
Capture % (at TFR)	100	98	98	90	51	

* The capture efficiency for oil & grease is applicable to spill situations. It is recommended that the unit be cleaned as soon as possible following a spill event.

RSF 4100
Collection of Typical Siliceous Sediment



RSF 4000 Particle Size Distribution
AS Standard Sieves



POLLUTANTS	POLLUTANT REMOVAL EFFICIENCY	DESCRIPTION
Litter	VH	Anthropogenic material such as cans, bottles, plastic bags and packing materials (generally > 5mm in diameter)
Vegetation	VH	Organic material, such as leaves and grass clippings
Coarse Sediment	VH	Solid material of varying size (generally > 0.5mm), both mineral and organic
Fine Sediment	H	Fine sand (generally < 0.1mm median diameter), both mineral and organic
Free Oils and Grease	M	Free floating oils that do not emulsify in aqueous solution, such as cooking and motor oil
Nutrients (N & P)	L	Total phosphorous and total nitrogen
Attached Pollutants	L	Generally attached to fine sediments and include nutrients, heavy metals, toxicants, and hydrocarbons
Dissolved Pollutants	L	Nutrients, metals, and salts, etc

N = negligible, L = low, M = medium, H = high, VH = very high

The above pollutant removal efficiency classifications are based on the following generally-accepted bases:

Negligible	Less than 10% pollution removal efficiency
Low	10 - 40% pollution removal efficiency
Medium	40 - 60% pollution removal efficiency
High	60 - 80% pollution removal efficiency
Very High	80 - 100% pollution removal efficiency

Typical gross pollutants captured and retained in the Ecosol **RSF 4000** Solid Pollutant Filter