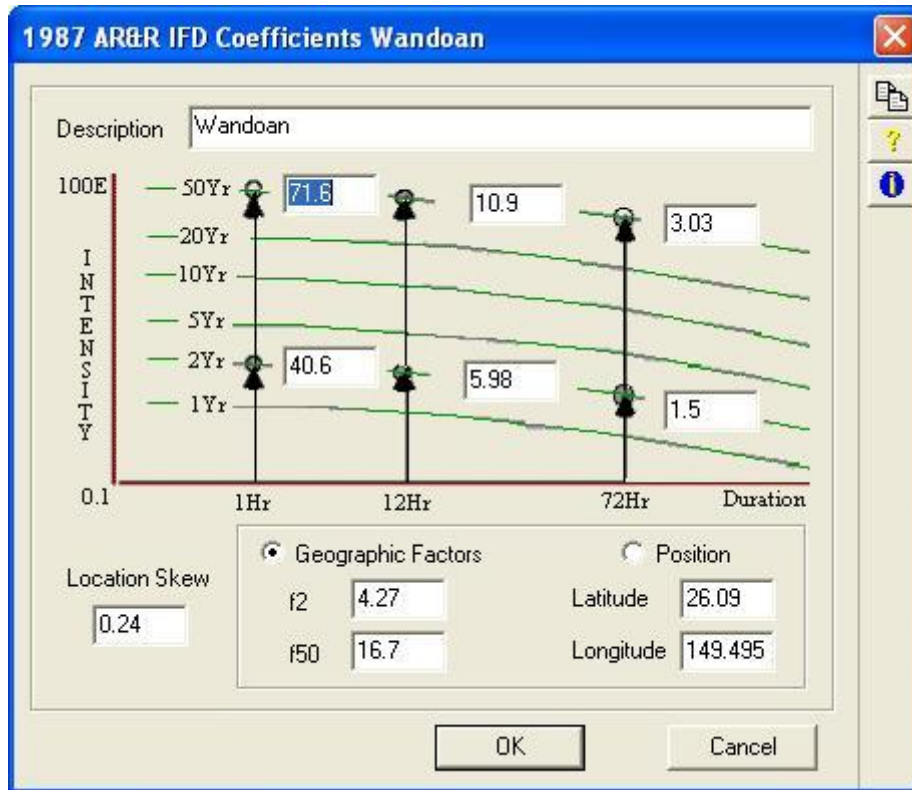


## **Appendix A**

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Intensity frequency duration data





**Figure A1 – IFD Coefficients**

**IFD data from CRC FORGE (Areal reduction factor = 1)**

Duration	ARI (y)								
	5	10	20	50	100	200	500	1000	2000
15 min	104.9	118.2	136.3	160.8	180.6	201	229.2	252.1	275.7
30 min	74.77	84.02	96.72	113.8	127.8	142.3	162.2	178.4	195.2
1 hour	51.27	57.46	65.99	77.47	86.98	96.82	110.4	121.4	132.8
3 hours	22.13	24.81	28.5	33.47	37.58	41.83	47.71	52.47	57.39
6 hours	12.89	14.46	16.62	19.52	21.91	24.39	27.82	30.59	33.46
12 hours	7.532	8.448	9.71	11.41	12.81	14.26	16.26	17.88	19.56
18 hours	5.707	6.434	7.426	8.767	9.843	10.96	12.5	13.74	15.03
24 hours	4.676	5.29	6.124	7.255	8.146	9.068	10.34	11.37	12.44
48 hours	2.851	3.226	3.734	4.424	4.941	5.471	6.196	6.764	7.344
72 hours	2.097	2.373	2.747	3.255	3.636	4.028	4.566	4.972	5.402
96 hours	1.635	1.85	2.141	2.537	2.833	3.14	3.551	3.871	4.195
120 hours	1.341	1.517	1.756	2.081	2.318	2.563	2.899	3.157	3.422



## **Appendix B**

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XP-RAFTS model



**Sub-catchment Parameters**

Sub-Catch	Area (ha)	Vectored Slope (%)	Manning's "n"	Loss Model	Sub-Catch	Area (ha)	Vectored Slope (%)	Manning's "n"	Loss Model
A01	8,857	0.244	0.07	ARBM	D11B	777	0.464	0.07	ARBM
A02	1,163	0.502	0.07	ARBM	D12A	355	0.348	0.07	ARBM
A03	3,612	0.539	0.07	ARBM	D12B	517	0.348	0.07	ARBM
A04	1,337	0.423	0.07	ARBM	D12C	437	0.348	0.07	ARBM
A05	3,651	0.489	0.07	ARBM	D13	946	0.692	0.07	ARBM
A06	2,662	0.468	0.07	ARBM	D14	2,886	0.342	0.07	ARBM
A07	581	0.823	0.07	ARBM	D15	3,273	0.592	0.07	ARBM
A08	6,290	0.298	0.07	ARBM	D16	5,462	0.449	0.07	ARBM
A08A	5,363	0.298	0.07	ARBM	D17	1,957	0.565	0.07	ARBM
A09	4,285	0.490	0.07	ARBM	D18	3,265	0.829	0.07	ARBM
A10	2,920	0.693	0.07	ARBM	D19	2,657	0.979	0.07	ARBM
A11	2,825	0.567	0.07	ARBM	D20	7,937	0.690	0.07	ARBM
A12	9,090	0.407	0.07	ARBM	E01A	1,444	0.528	0.07	ARBM
A13	5,538	0.537	0.07	ARBM	E01B	872	0.528	0.07	ARBM
A14	3,674	0.717	0.07	ARBM	E01C	1,269	0.528	0.07	ARBM
A15A	470	0.677	0.07	ARBM	E02A	627	0.267	0.07	ARBM
A15B	570	0.677	0.07	ARBM	E02B	287	0.267	0.07	ARBM
A15C	2,665	0.677	0.07	ARBM	E02C	266	0.267	0.07	ARBM
A15D	2,265	0.677	0.07	ARBM	E02D	653	0.267	0.07	ARBM
A15E	758	0.677	0.07	ARBM	E02E	146	0.267	0.07	ARBM
A16	3,542	0.633	0.07	ARBM	E02F	1,041	0.267	0.07	ARBM
A17	4,642	0.798	0.07	ARBM	E02G	286	0.267	0.07	ARBM
A18	2,781	0.995	0.07	ARBM	E02H	357	0.267	0.07	ARBM
A19	7,071	0.496	0.07	ARBM	E02I	512	0.267	0.07	ARBM
A20	5,830	0.507	0.07	ARBM	E02J	440	0.267	0.07	ARBM
A21	2,846	0.940	0.07	ARBM	E02K	538	0.267	0.07	ARBM
A22	2,626	0.906	0.07	ARBM	E03	9,411	0.247	0.07	ARBM
B00	3,595	0.285	0.07	ARBM	E04	4,607	0.766	0.07	ARBM
B01	3,003	0.291	0.07	ARBM	E05	5,676	0.120	0.07	ARBM
B02	1,030	0.446	0.07	ARBM	E06	6,692	0.290	0.07	ARBM
B03	3,423	0.203	0.07	ARBM	E07	8,596	0.437	0.07	ARBM
B04	4,898	0.197	0.07	ARBM	E08	5,177	0.707	0.07	ARBM
B05	2,543	0.670	0.07	ARBM	E09	4,658	0.533	0.07	ARBM
C01	4,684	0.381	0.07	ARBM	E10	5,301	0.366	0.07	ARBM
C01a	2,408	0.415	0.07	ARBM	E11	2,590	0.861	0.07	ARBM
C02	2,860	0.577	0.07	ARBM	E12A	341	0.441	0.07	ARBM
C03	6,164	0.432	0.07	ARBM	E12B	668	0.441	0.07	ARBM
C04	1,495	0.476	0.07	ARBM	E12C	298	0.441	0.07	ARBM
C05	2,787	0.818	0.07	ARBM	E13	2,277	0.710	0.07	ARBM
D01A	809	0.291	0.07	ARBM	E14A	769	0.511	0.07	ARBM
D01B	975	0.291	0.07	ARBM	E14B	519	0.511	0.07	ARBM
D01C	509	0.291	0.07	ARBM	E14C	296	0.511	0.07	ARBM
D01D	304	0.291	0.07	ARBM	E15	1,221	0.811	0.07	ARBM
D01E	655	0.291	0.07	ARBM	E16	3,252	0.642	0.07	ARBM
D01F	520	0.291	0.07	ARBM	E17	3,448	0.492	0.07	ARBM
D01G	828	0.291	0.07	ARBM	E18	4,198	0.625	0.07	ARBM
D02A	352	0.495	0.07	ARBM	E19	3,772	0.541	0.07	ARBM
D02B	718	0.495	0.07	ARBM	E20	3,368	0.599	0.07	ARBM
D02C	409	0.495	0.07	ARBM	E21	2,962	0.811	0.07	ARBM
D03A	196	0.700	0.07	ARBM	F01	4,449	0.339	0.07	ARBM
D03B	258	0.700	0.07	ARBM	F02	2,749	0.515	0.07	ARBM
D03C	1,073	0.700	0.07	ARBM	F03	9,978	0.343	0.07	ARBM
D03D	223	0.700	0.07	ARBM	F04	5,636	0.352	0.07	ARBM
D03E	315	0.700	0.07	ARBM	F04A	4,666	0.352	0.07	ARBM
D04A	1,311	0.248	0.07	ARBM	F05	6,274	0.449	0.07	ARBM
D04B	463	0.248	0.07	ARBM	F06	6,375	0.495	0.07	ARBM
D04C	1,249	0.248	0.07	ARBM	F07	3,212	0.589	0.07	ARBM
D04D	269	0.248	0.07	ARBM	F08	2,705	0.701	0.07	ARBM
D05A	107	0.365	0.07	ARBM	F09	2,289	0.675	0.07	ARBM
D05B	2,959	0.365	0.07	ARBM	F10	3,455	0.699	0.07	ARBM
D06	5,575	0.431	0.07	ARBM	F11	2,558	0.847	0.07	ARBM
D07	1,405	0.436	0.07	ARBM	<b>Total</b>	<b>356,844</b>	<b>hectares</b>		
D07a	2,057	0.436	0.07	ARBM					
D08	7,089	0.384	0.07	ARBM					
D08a	5,367	0.384	0.07	ARBM					
D09	4,997	0.455	0.07	ARBM					
D10	4,280	0.754	0.07	ARBM					
D11A	1,895	0.464	0.07	ARBM					

Link	From	To	Length (m)	Slope	Link	From	To	Length (m)	Slope
L001	A21	J01	740	0.003	L108	J27	E03	2940	0.002
L002	J01	A12	9830	0.003	L109	E03	J25	9730	0.001
L003	A12	J05	5940	0.002	L110	E21	J30	2980	0.004
L004	A11	J02	2350	0.001	L111	A09	J06	3820	0.001
L005	J02	J03	560	0.001	L112	J30	E19	4880	0.004
L006	A01	B00	9550	0.001	L113	E19	J29	1730	0.002
L007	B00	J00	860	0.001	L114	E20	J30	3790	0.004
L008	A14	J04	1785	0.003	L115	E04	J31	3670	0.002
L009	J04	A13	8005	0.003	L116	J31	J28	3670	0.002
L010	A13	J05	6015	0.002	L117	E08	E07	11440	0.003
L011	J05	A11	2690	0.002	L118	E07	E06	6400	0.003
L012	A20	J04	1785	0.003	L119	E06	E05	7020	0.002
L013	A19	J02	3100	0.005	L120	E05	J31	3880	0.001
L014	A10	J03	1090	0.001	L121	F04A	F04	2680	0.002
L015	J06	A08A	4220	0.001	L122	J32	D09	2910	0.002
L016	A08A	A08	10480	0.001	L123	D09	D07A	5160	0.002
L017	A08	A07	1500	0.001	L124	J29	E17	2145	0.002
L018	A18	J06	3550	0.001	L125	D18	J33	1930	0.004
L019	A17	J07	7740	0.001	L126	J33	D17	2949	0.004
L020	J07	A07	2280	0.001	L127	D20	J34	2110	0.003
L021	A07	A06	2280	0.002	L130	J34	J32	2180	0.003
L022	A06	A04	5780	0.002	L131	J17	J45	580	0.001
L023	A04	J35	2080	0.001	L132	Gaug	B04	3210	0.001
L024	J35	A02	2780	0.001	L133	J28	J27	1560	0.002
L025	A02	J36	1900	0.001	L134	J03	A09	4110	0.002
L026	J36	A01	4760	0.001	L135	E17	J28	7130	0.002
L027	A05	A04	4360	0.001	L136	A15C	A15	5720	0.003
L028	A03	J35	2940	0.001	L137	A15D	J36	2650	0.003
L029	A16	J07	3750	0.001	L138	D01B	D01	3350	0.001
L030	A22	J01	1680	0.003	L139	D01C	J17	3930	0.001
L031	A15A	A15	850	0.003	L140	D01F	J39	1080	0.001
L032	A15B	A15	2250	0.003	L141	J39	D01G	1815	0.001
L033	B05	J08	3260	0.001	L142	D01G	J17	1904	0.001
L034	J08	B01	3180	0.001	L143	D01E	J39	3590	0.001
L035	B01	J00	3270	0.001	L144	D11B	D02	975	0.002
L036	F08	J09	5740	0.002	L145	D02B	J18	1740	0.001
L037	J09	F02	1910	0.002	L146	J40	J22	1545	0.001
L038	F02	J10	3430	0.001	L147	J41	J40	630	0.001
L039	J10	F01	2220	0.001	L148	D03A	J41	400	0.001
L040	F01	J11	7270	0.001	L149	D03D	J41	2837	0.001
L041	J11	B02	1590	0.001	L150	J42	J41	340	0.001
L042	B02	J08	2200	0.001	L151	D03C	J42	5834	0.001
L043	D17	J32	4410	0.003	L152	D03B	J43	1400	0.001
L044	D19	J33	6250	0.004	L153	J43	J42	1740	0.001
L045	D10	J34	4660	0.003	L154	D05A	J37	1005	0.001
L046	F07	J10	4730	0.001	L155	D12C	D12	2835	0.004
L047	F06	J14	4470	0.003	L156	D12A	J37	1830	0.004
L048	J14	F05	3360	0.003	L157	D12B	D12	1865	0.004
L049	F05	J13	6030	0.002	L158	D04D	J22	1745	0.001
L050	J13	F04A	4720	0.002	L159	D04C	D04	2850	0.001
L051	F04	J12	5110	0.002	L160	E01B	J46	3490	0.001
L052	J12	F03	5400	0.002	L161	E01C	J44	4980	0.001
L053	F03	J09	9540	0.002	L162	J45	Gaug	2320	0.001
L054	F09	J12	2450	0.002	L163	E01A	J45	3620	0.001
L055	F10	J13	3570	0.002	L164	J44	J17	3134	0.001
L056	F11	J14	980	0.003	L165	J23	J47	790	0.001
L057	C03	C02	9690	0.004	L166	E02E	J47	1020	0.001
L058	C02	J15	2710	0.002	L167	E02D	J47	1020	0.001
L059	J15	C01	6330	0.002	L168	J48	J50	720	0.001
L060	C01	C01A	3610	0.002	L169	J50	J49	920	0.001
L061	C01A	J16	3270	0.001	L170	J49	J23	1170	0.001
L062	J16	B03	4060	0.001	L171	E02B	J48	2143	0.001
L063	B03	J11	3060	0.001	L172	E02C	J49	1120	0.001
L064	C05	C04	4110	0.002	L173	E02J	J50	3590	0.001
L065	C04	J15	2940	0.002	L174	E02I	J51	1880	0.001
L066	D01A	D01	2690	0.001	L175	E02F	J51	3790	0.001
L068	B04	J16	4610	0.001	L176	E02G	J53	1540	0.001
L069	D11A	D11	3690	0.002	L177	J53	J52	240	0.001
L070	D02A	D02	1385	0.001	L178	J52	J51	1650	0.001
L071	D01D	D01	1820	0.001	L179	E02H	J52	1385	0.001
L072	D16	J20	4080	0.003	L180	E02K	J54	1570	0.002
L073	J20	D14	3790	0.001	L181	E12A	J54	1330	0.002
L074	D14	D04A	7260	0.002	L182	E12B	E12	1310	0.002
L075	D04A	D04	1315	0.002	L183	E12C	E12	2125	0.004
L076	E18	J29	8190	0.002	L184	D02C	D01	3020	0.002
L077	J18	D01D	1640	0.001	L185	D13	D12C	100	0.004
L078	D08A	D08	8090	0.002	L186	E14B	J55	3730	0.002
L079	D08	D07A	5200	0.002	L187	J55	E14A	1110	0.002
L080	D07A	J21	6248	0.002	L188	E14C	J55	2400	0.002
L081	J21	D05B	4280	0.002					
L082	D05B	J37	4841	0.001					
L083	J37	J43	2960	0.001					
L084	D06	J21	2750	0.002					
L085	D15	J20	3500	0.003					
L086	D07	D05B	4870	0.002					
L087	D03E	J40	2355	0.001					
L088	D04B	D04	2820	0.001					
L089	J22	J18	2570	0.001					
L092	E13	E12C	5840	0.004					
L093	J38	J53	1240	0.001					
L094	J51	J23	3070	0.001					
L095	E15	E14C	3800	0.004					
L096	E14A	J38	2470	0.002					
L097	J54	J38	575	0.002					
L098	E10	J26	6160	0.003					
L099	J26	E09	6160	0.003					
L100	E09	J25	5510	0.001					
L101	J25	J24	1250	0.001					
L102	J24	J48	730	0.001					
L103	J47	J46	1265	0.001					
L104	J46	J44	825	0.001					
L105	E02A	J24	2810	0.001					
L106	E11	J26	3260	0.005					
L107	E16	J27	4310	0.002					



**ARBM\_Non\_GAB\_Intake\_Bed**

Zone	Capacity	Initial
Impervious	0.5	0.0
Interception	0.5	0.0
Depression	1.0	0.0
Upper soil	10.0	0.0
Lower soil	50.0	0.0
Groundwater		0.0

**Infiltration**

Static	Dry sorptivity	5.0
	Hydraulic cond	1.00
Lower soil drainage factor		0.10
Static	Constant rate	0.94
	Variable rate	1.0

**Evapo-Transpiration**

Proportion of rain intercepted		0.7
Max PET	Upper soil	10
	Lower soil	10
Proport ET from Upper soil		0.7
Ratio of PET to Pan evap		0.9

**ARBM\_GAB\_Intake\_Bed**

Zone	Capacity	Initial
Impervious	0.5	0.0
Interception	0.5	0.0
Depression	1.0	0.0
Upper soil	25.0	0.0
Lower soil	100.0	0.0
Groundwater		0.0

**Infiltration**

Static	Dry sorptivity	30.0
	Hydraulic cond	3.00
Lower soil drainage factor		0.10
Static	Constant rate	0.94
	Variable rate	1.0

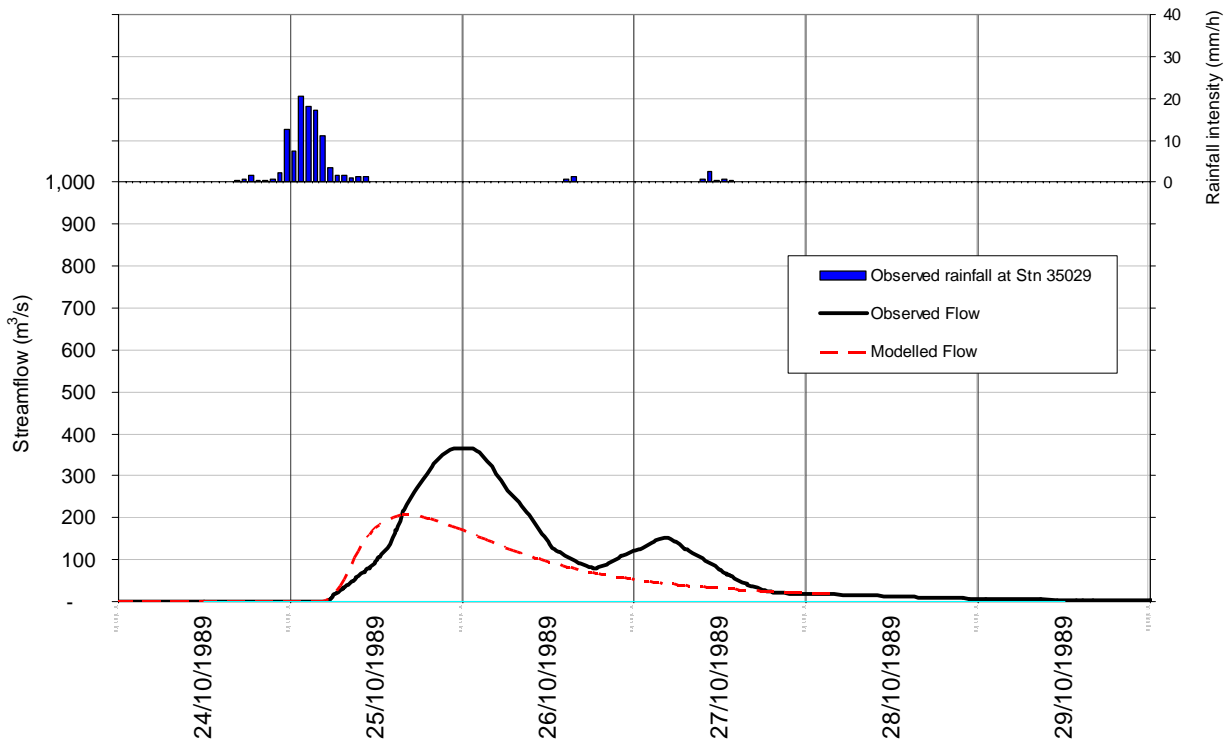
**Evapo-Transpiration**

Proportion of rain intercepted		0.7
Max PET	Upper soil	10
	Lower soil	10
Proport ET from Upper soil		0.7
Ratio of PET to Pan evap		0.9

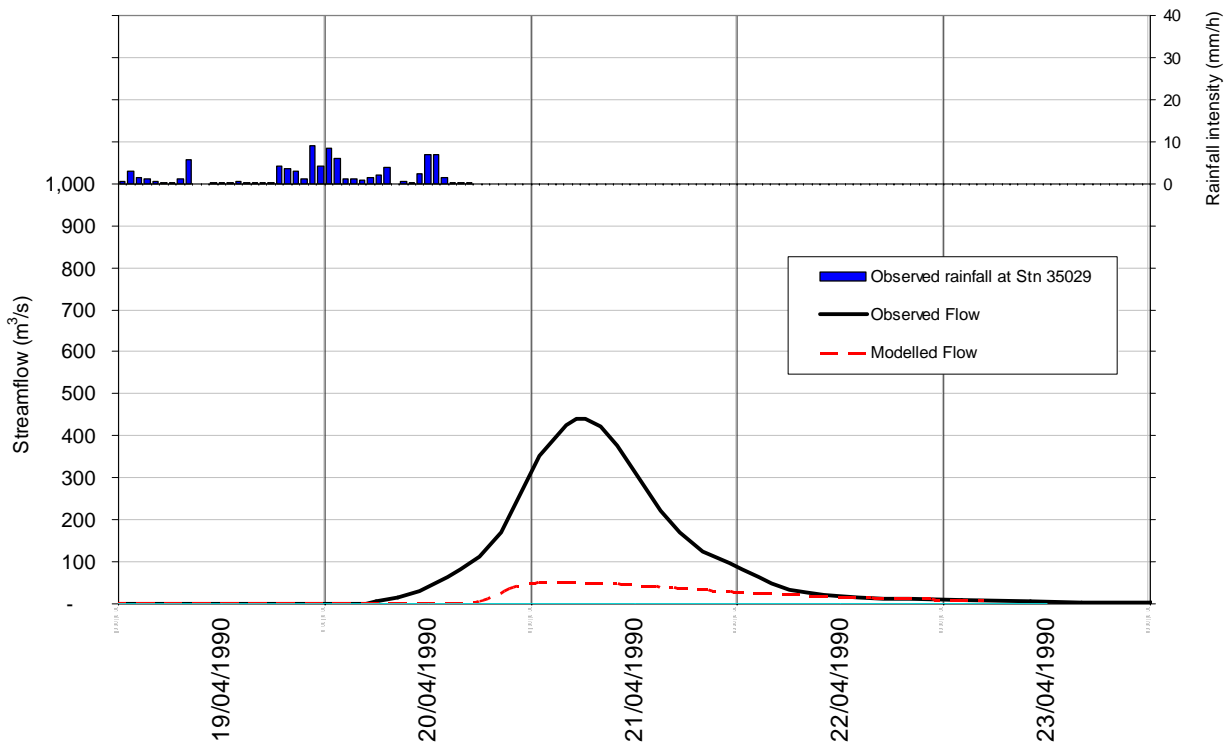
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**ARBM Soil Loss Parameters**

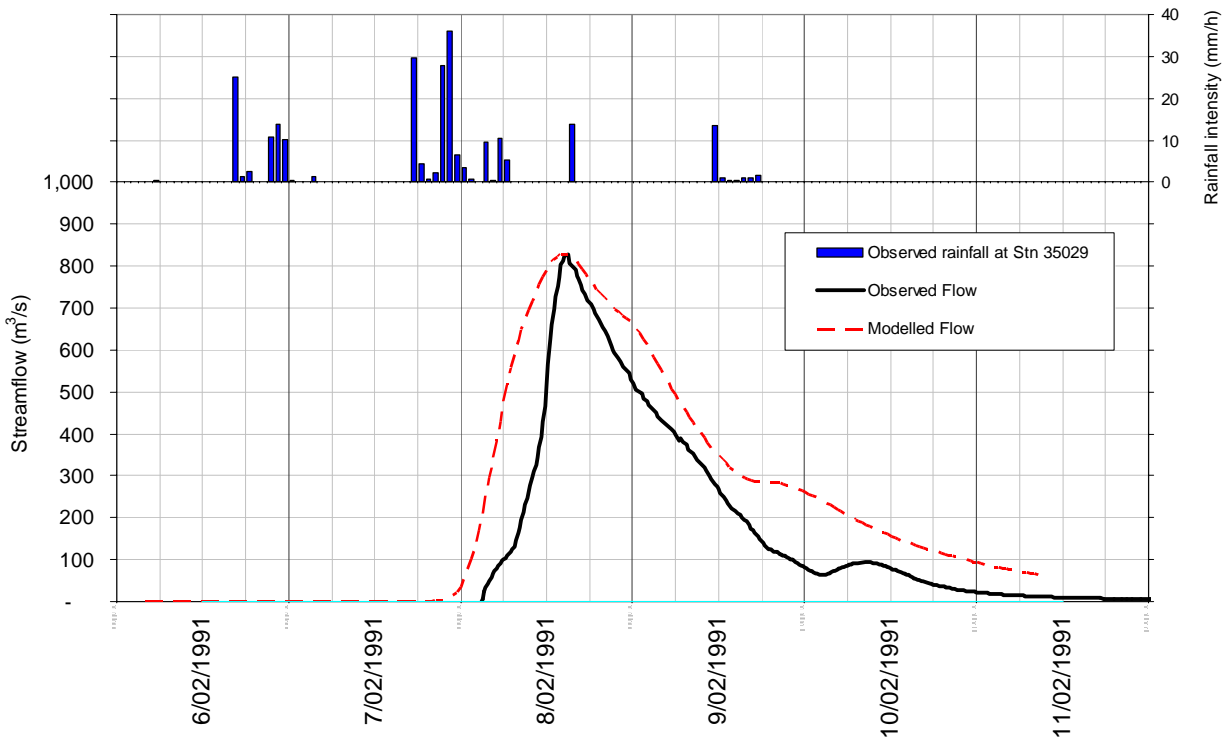
Shaded values indicate parameters that have most significant impact on results



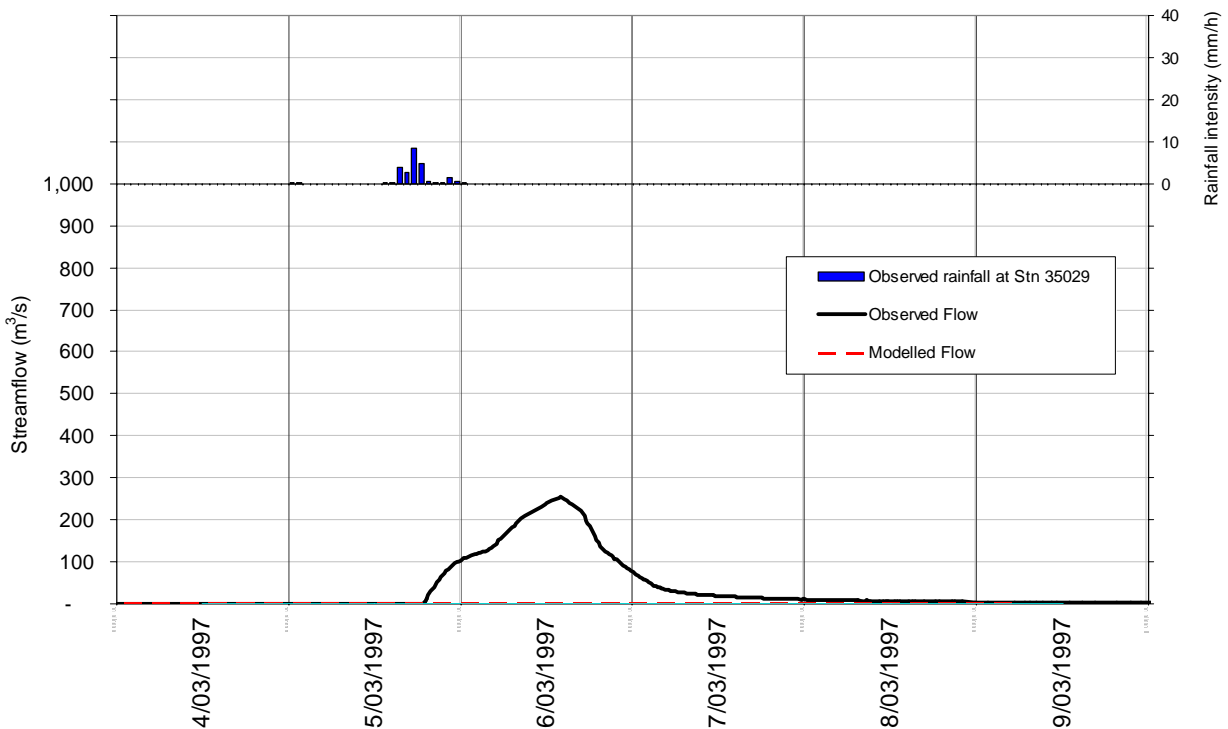
**Figure B1 – Comparison of Hydrographs XP-RAFTS versus Observed Data – October 1989**



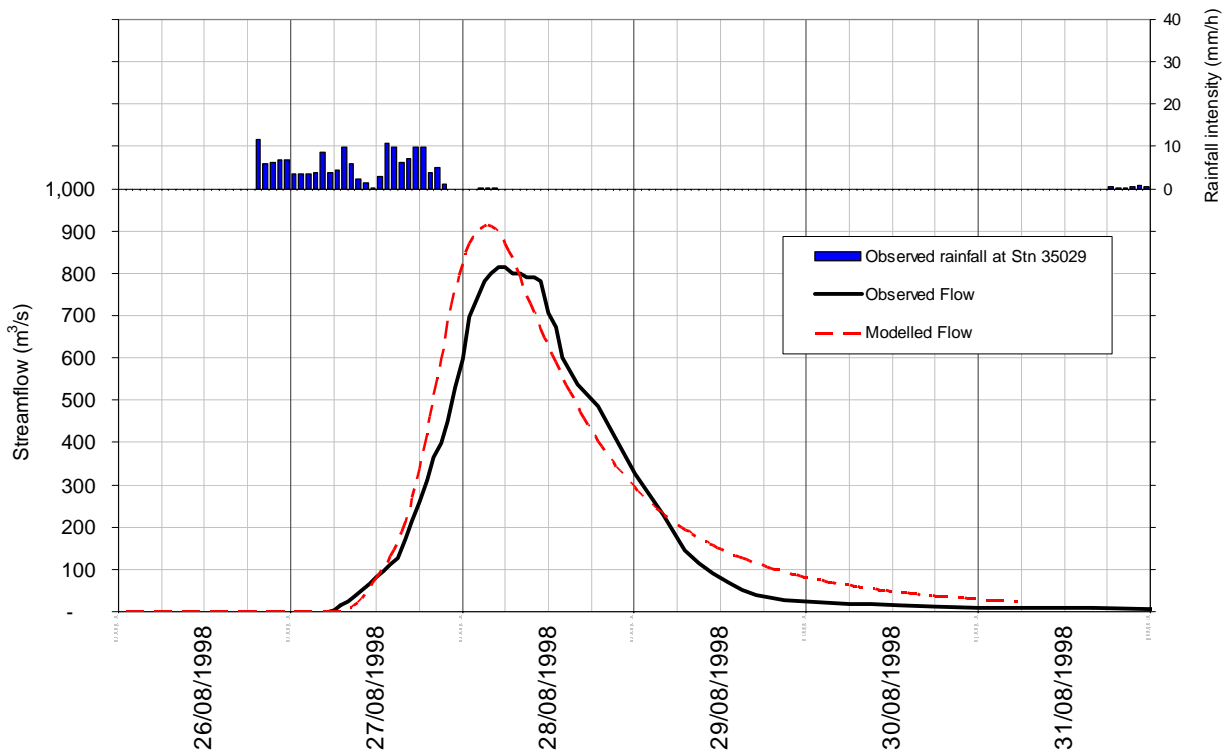
**Figure B2 – Comparison of Hydrographs XP-RAFTS versus Observed Data – April 1990**



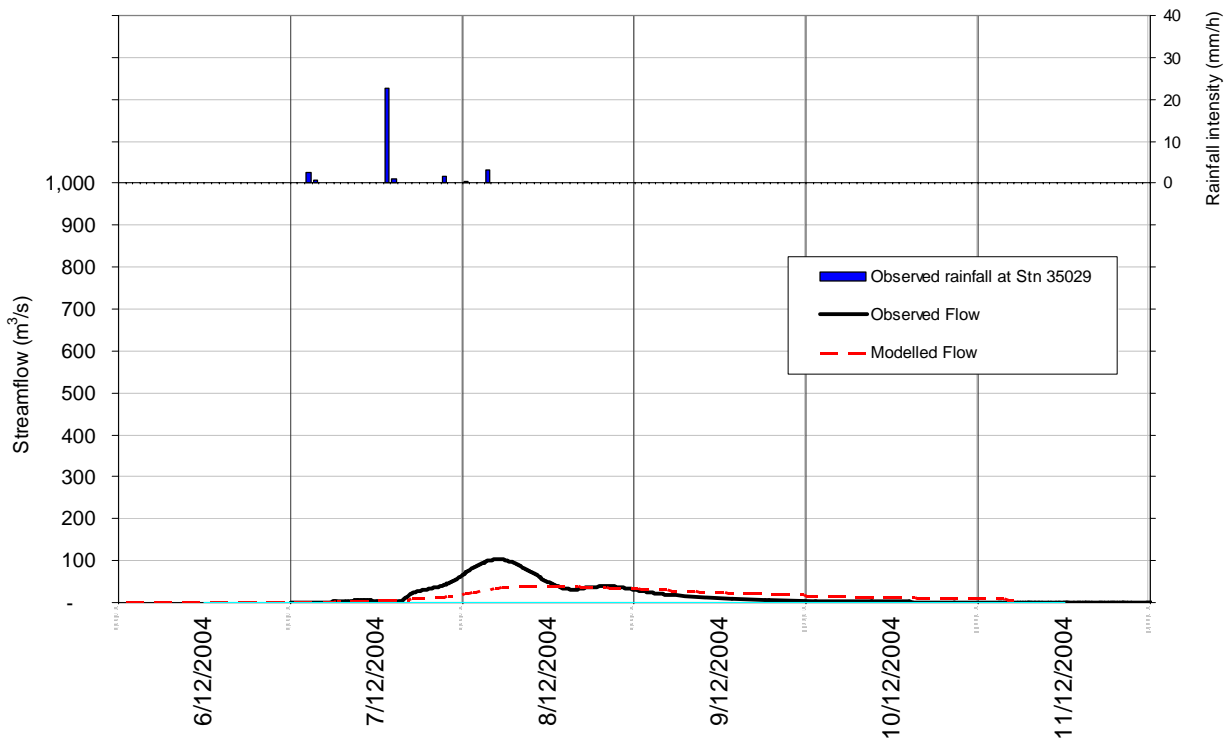
**Figure B3 – Comparison of Hydrographs XP-RAFTS versus Observed Data – February 1991**



**Figure B4 – Comparison of Hydrographs XP-RAFTS versus Observed Data – March 1997**



**Figure B5 – Comparison of Hydrographs XP-RAFTS versus Observed Data – August 1998**



**Figure B6 – Comparison of Hydrographs XP-RAFTS versus Observed Data – December 2004**