

BAB V

KESIMPULAN DAN SARAN

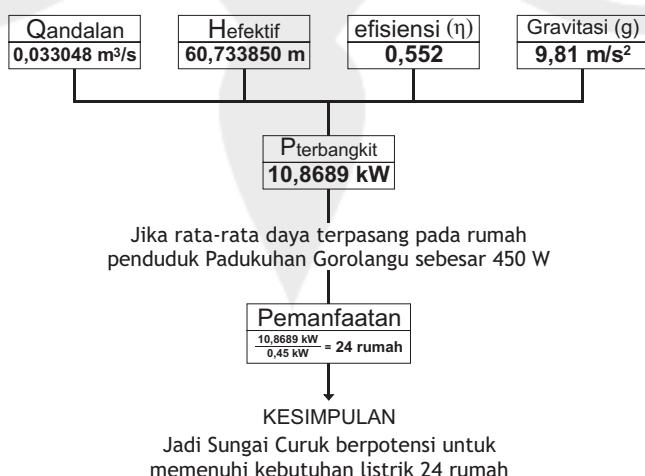
5.1 Kesimpulan

Potensi Sungai Curuk sebagai Pembangkit Listrik Tenaga Mikro Hidro (PLTMH) diketahui melalui besarnya daya listrik yang mungkin terbangkitkan. Daya listrik terbangkitkan itu nantinya akan digunakan untuk memenuhi kebutuhan listrik Padukuhan Gorolangu.

Daya listrik terbangkitkan dapat dihitung dengan perkalian debit andalan, *head* efektif, efisiensi sistem, dan gaya gravitasi ($9,81 \text{ m/s}^2$). Debit pada Sungai Curuk dicari melalui Metode Mock yang memperhitungkan hujan, evapotranspirasi, serta aliran bawah tanah (*base flow*). Debit andalan yang digunakan untuk pembangkit listrik dianalisis sebesar 80%, sehingga diperoleh $Q_{80} = 0,033048 \text{ m}^3/\text{s}$.

Selain debit, parameter lain yang dihitung adalah *head* efektif yang didapat dari representasi komponen PLTMH pada pemodelan tiga dimensi peta topografi. Setelah selisih elevasi *forebay* (475 m) dengan *power house* (412,5 m) dikurangi kehilangan energi (1,76605 m), maka didapat *head* efektif sebesar 60,73385 m.

Nilai efisiensi sistem yang terdiri dari efisiensi konstruksi sipil, *penstock*, generator, trafo, turbin, dan sistem kontrol didapatkan 0,552. Jika semua parameter tersebut dikalikan, diperoleh daya listrik terbangkit sebesar 10,8689 kW. Nilai ini dapat memenuhi kebutuhan listrik 24 rumah warga yang memiliki rata-rata daya terpasang 450 W. (Gambar 5.1)



Gambar 5.1 Kesimpulan Penelitian

5.2. Saran

Pemenuhan kebutuhan listrik di Padukuhan Gorolangu melalui PLTMH dapat dimanfaatkan lebih banyak kepala keluarga dengan melakukan rekayasa hidrolik. Dalam mendapatkan debit yang kontinu dapat dilakukan peninggian bendung dan tampungan air. Selain itu, penempatan *forebay*, *penstock*, dan *power house* dapat dilakukan pada lokasi lain, sehingga mendapatkan tinggi jatuh efektif yang lebih besar. Perhitungan rekayasa hidrolik ini dapat diteruskan pada penelitian selanjutnya.

DAFTAR PUSTAKA

- Allen, R.G., Luis, S.P., Dirk, R., and Martin, S. 1990. *FAO Irrigation and Drainage Paper No. 56.*
- Adinigrum, C. 2010. Analisis Ketersediaan Air Menggunakan Model Mock : Studi Kasus DAS Bedog, DAS Code, dan DAS Winongo Daerah Istimewa Yogyakarta. *Tugas Akhir. Jurusan Teknik Sipil Fakultas Teknik Universitas Gadjah Mada, Yogyakarta.*
- Anonim. 2004. *Guide on How to Develop a Small Hydropower Plant.* European Small Hydropower Association (ESHA).
- Anonim. 2005. *Manual Pembangunan Pembangkit Listrik Tenaga Mikrohidro (PLTMH).* Institut Bisnis dan Ekonomi Kerakyatan. Jakarta.
- Database Badan Perencanaan Pembangunan Daerah (Bappeda) Kab. Kulon Progo tahun 2010
- Data Stastistik Direktorat Jendaral Energi Baru Terbarukan dan Konservasi Energi Tahun 2009
- Direktorat Pengairan dan Irigasi Kementerian Negara Perencanaan Pembangunan Nasional. 2006. *Laporan Akhir Buku 2 Identifikasi Masalah Pengelolaan Sumber Daya Air di Pulau Jawa.* Badan Perencanaan Pembangunan Nasional
- Jorde, K. Hartmann, E. Unger, H. 2010. *Baik & Buruk dari Mini/Mikro Hidro Volume 1.* Integrated Microhydro Development and Application Program (IMIDAP). Jakarta
- Kadir, R. 210. Perencanaan Pembangkit Listrik Tenaga Mikro Hidro (PLTMH) di Sungai Maripa Kecamatan Pnembani. *Tugas Akhir Fakultas Teknik, Universitas Tadulako, Palu.*
- Kurniawan, A. dkk. 2009. *Pedoman Studi Kelayakan Hidrologi.* Integrated Microhydro Development and Application Program (IMIDAP)
- Kurniawan, A. dkk. 2009. *Pedoman Studi Kelayakan Sipil.* Integrated Microhydro Development and Application Program (IMIDAP)
- Kurniawan, A. dkk. 2009. *Pedoman Studi Kelayakan Mekanikal Elektrikal.* Integrated Microhydro Development and Application Program (IMIDAP)
- Kurniawan, A. dkk. 2009. *Pedoman Studi Potensi (Pra Kelayakan Potensi).* Integrated Microhydro Development and Application Program (IMIDAP)
- Kusdiana, D dkk. 2008. *Pedoman Teknis Standardisasi Peralatan dan Komponen Pembangkit Listrik Tenaga Mikrohidro (PLTMH).* Integrated Microhydro Development and Application Program (IMIDAP)
- Mock, F.J. 1973. *Land Capability Appraisal Indonesia Water Availability Appraisal.* Indonesia UNDP/FAO. Bogor.
- Tim Contained Energy Indonesia. 2008. *Panduan Energi yang Terbarukan.* Program Nasional Pemberdayaan Masyarakat.
- Triatmodjo, B. 2010. *Hidrologi II.* Beta Offset. Yogyakarta.
- Triatmodjo, B. 2008. *Hidrologi Terapan.* Beta Offset. Yogyakarta.

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Pedoman Teknis Puslitbang SDA No. PD T-22-2004

Soemarto. 1986. *Hidrologi Teknik*. Usaha Nasional. Surabaya.

Sucahyo, I. 2005. Aplikasi Alogaritma Genetika Untuk Optimasi Parameter Model Hujan Aliran Mock. *Tugas Akhir. Jurusan Teknik Sipil Fakultas Teknik Universitas Gadjah Mada, Yogyakarta*.

Sujono, J. dkk.. 1998. Optimasi Parameter Model Hujan-Aliran Mock dengan Solver. *Media Teknik No.2 Tahun XX Edisi Mei 1998 No. 1998 No. ISSN 0216-3012*.



LAMPIRAN



A. Perhitungan Evapotranspirasi Potensial Metode Penman Monheit

Lampiran A.1. Perhitungan Evapotranspirasi Potensial tahun 2001

Uraian	Satuan	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKTBR	NOV	DES	
ETo (Evapotranspirasi Potensial)	mm/bulan	121,28	121,28	157,04	184,17	126,39	122,90	127,08	146,07	133,97	126,77	124,10	114,15	115,36
Eto = $(0,408 \Delta (Rn-G) + \gamma(900/T+273) U (es-ea)) / (\Delta + \gamma(1+0,34U))$	mm/hari	3,91	5,61	5,94	4,21	3,96	4,24	4,71	4,32	4,23	4,00	3,80	3,72	
U (Kecepatan Angin)														
U = $Uz [4,87/\ln(67,8 z+5,42)]$	m/s	0,25	0,30	0,30	0,34	0,26	0,26	0,31	0,34	0,41	0,31	0,27	0,30	
Uz (Kecepatan Angin)	m/s	0,49	0,58	0,58	0,66	0,51	0,50	0,60	0,65	0,80	0,59	0,53	0,57	
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	
Δ (Slope of saturation vapour pressure curve)														
Δ = $4098 (0,6108 \exp(17,27 T / (T+237,3))) / (T+237,3)^2$	Kpa/°C	0,18	0,18	0,18	0,19	0,19	0,18	0,18	0,17	0,19	0,19	0,19	0,18	
T (Temperatur udara)	°C	23,82	24,57	24,14	24,88	24,77	24,26	24,17	23,39	25,01	24,98	24,98	23,72	
G (Energi yang diperlukan untuk memanaskan tanah)														
G = $0,14 (Tn - Tn-1)$	°C	-0,09	0,11	-0,06	0,10	-0,02	-0,07	-0,01	-0,11	0,23	0,00	0,00	-0,18	
Tn (Temperatur udara bulan itu)	°C	23,82	24,57	24,14	24,88	24,77	24,26	24,17	23,39	25,01	24,98	24,98	23,72	
Tn-1 (Temperatur udara bulan sebelumnya)	°C	24,45	23,82	24,57	24,14	24,88	24,77	24,26	24,17	23,39	25,01	24,98	24,98	
γ (Tetapan Psikrometri)														
γ = $0,665 \cdot 10^{-3} P$	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	
P (Tekanan Atmosfer)														
P = $101,3 (293-0,0065.z/293)^{0,26}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	
es (mean saturation vapour pressure)														
es = $e^0 (Tmax)+e^0 (Tmin)/2$	Kpa	79,60	75,13	81,70	85,71	81,67	78,96	69,53	64,62	73,57	79,12	79,84	71,70	
ea (actual vapour pressure)														
ea = $e^0 (Tmin).RHmax/100 + e^0 (Tmax).RHmin/100$	Kpa	76,76	64,71	70,37	82,68	79,12	74,88	63,70	60,63	70,58	76,69	77,78	69,81	
e^0 (saturation vapour pressure at the air temperature)														
$e^0 = 0,6108 \exp(17,27 T / (T+237,3))$	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07	
T (Temperatur udara)														
Tmax (Temperatur udara max)	°C	26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48	
Tmin (Temperatur udara min)	°C	24,60	25,50	25,50	25,50	25,40	25,40	25,35	24,45	26,00	25,50	26,55	25,55	
RHmax (Kelembaban relative max)	%	98,00	100,00	100,00	98,00	99,00	98,00	99,00	98,00	99,00	99,00	99,00	99,00	
RHmin (Kelembaban relative min)	%	95,00	74,00	74,00	95,00	95,00	92,00	85,00	90,00	94,00	95,00	96,00	96,00	
Rn (net radiation)														
Rn = Rns-Rnl	MJ/m ² /hari	11,39	10,96	11,12	11,79	11,70	11,60	11,28	11,18	11,52	11,67	11,43	11,14	
Rns (Net solar or shortwave radiation)														
Rns = $(1-\alpha)Rs$	MJ/m ² /hari	7,67	7,66	7,65	7,72	7,74	7,75	7,79	7,81	7,76	7,75	7,65	7,67	
α (Koefisien albedo)														
Rs (solar or shortwave radiation)														
Rs = $(as + bs \cdot n/N)Ra$		9,97	9,95	9,93	10,02	10,05	10,07	10,12	10,14	10,08	10,06	9,93	9,96	
as (konstanta regresi)		0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	
bs (rekomenadasi)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	
n (lama penyiataran matahari)		9,62	9,19	8,46	11,54	12,66	13,32	15,02	15,79	13,67	12,95	8,44	9,55	
N (daylight hour)														
N = $(24/n) ws$	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	
R (extraterrestrial radiation)														
Ra = $24(60)/\pi \cdot Gsc.dr (ws \sin(\phi) \sin(\delta) + \cos(\delta)\sin(ws))$	MJ/m ² /hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	
Gsc (solar constant)	MJ/m ² /menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	
φ (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	
δ (solar declination)														
δ = $0,409 \sin(2\pi/365 J - 1,39)$	rad	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	
J (jumlah hari dalam satu tahun)		365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	
dr (inverse relative distance Earth-Sun)														
dr = $1+0,033 \cos(\pi/365 \cdot J)$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	
ws = $\arccos(-\tan(\phi) \tan(\delta))$	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	
Rn1 (net outgoing longwave radiation)														
Rn1 = $\sigma (Tmax^4 + Tmin^4 \cdot K'/2) (0,34 - 0,14 (ea)^{0.5}) (1,35 Rn/Rso - 0,35)$	MJ/m ² /hari	-3,72	-3,30	-3,47	-4,07	-3,96	-3,84	-3,49	-3,37	-3,76	-3,92	-3,78	-3,47	
σ (Tetapan Stefan-Boltzmann)	MJ/k ⁴ m ⁻² /hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	
Tmax (Temperatur udara max)	°K	297,76	298,66	298,66	298,66	298,56	298,56	298,51	297,61	299,16	298,66	299,71	298,71	
Tmin (Temperatur udara min)	°K	295,66	295,46	295,46	297,31	295,71	296,01	295,91	295,56	297,76	296,91	296,81	294,31	
Rso (clear-sky radiation)														
Rso = $(0,75+2 \cdot 10^{-5}) Ra$	MJ/m ² /hari	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	

Lampiran A.2. Perhitungan Evapotranspirasi Potensial tahun 2002

Uraian	Satuan	JAN 31	FEB 28	MARET 31	APRIL 30	MEI 31	JUNI 30	JULI 31	AGUST 31	SEPT 30	OKTBR 31	NOV 30	DES 31
ETo (Evapotranspirasi Potensial)	mm/bulan	207,31	179,49	156,87	121,66	116,89	112,02	129,50	111,51	106,78	112,71	110,26	110,33
Eto = $(0,408 \Delta (Rn-G) + \gamma(900/T+237,3) U (es-ea)) / \delta + \gamma(1+0,34U)$	mm/hari	6,69	6,41	5,06	4,06	3,77	3,73	4,18	3,60	3,56	3,64	3,68	3,56
U (Kecepatan Angin)													
$U = U_z [4,87/\ln(67,8 z - 5,42)]$	m/s	0,29	0,29	0,31	0,27	0,20	0,22	0,28	0,36	0,48	0,43	0,39	0,27
U_z (Kecepatan Angin)	m/s	0,56	0,56	0,59	0,52	0,39	0,42	0,53	0,70	0,93	0,84	0,75	0,53
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
A (Slope of saturation vapour pressure curve)													
$\Delta = 4098 (0,6108 \exp(17,27 T/T+237,3)) / (T+237,3)^2$	Kpa/°C	0,18	0,18	0,18	0,19	0,19	0,18	0,17	0,16	0,17	0,18	0,19	0,18
T (Temperatur udara)	°C	24,12	24,12	24,21	24,68	24,88	24,35	22,81	21,33	22,78	23,89	24,62	24,53
G (Energi yang diperlukan untuk memanaskan tanah)													
$G = 0,14 (T_n - T_{n-1})$	°C	0,06	0,00	0,01	0,07	0,03	-0,07	-0,21	-0,21	0,20	0,16	0,10	-0,01
T_n (Temperatur udara bulan itu)	°C	24,12	24,12	24,21	24,68	24,88	24,35	22,81	21,33	22,78	23,89	24,62	24,53
T_{n-1} (Temperatur udara bulan sebelumnya)	°C	23,72	24,12	24,12	24,23	24,68	24,88	24,35	22,81	21,33	22,78	23,89	24,62
γ (Tetapan Psikrometri)													
$\gamma = 0,665 \cdot 10^{-3} P$	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
P (Tekanan Atmosfer)													
$P = 101,3 (293-0,0065.z/293)^{7,6}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
es (mean saturation vapour pressure)													
$es = e^0 (T_{max})e^0 (T_{min})/2$	Kpa	82,22	76,47	84,61	84,50	83,45	78,14	64,90	58,00	63,39	74,87	78,33	73,93
ea (actual vapour pressure)													
$ea = e^0 (T_{min}) \cdot RH_{max}/100 + e^0 (T_{max}) \cdot RH_{min}/100$	Kpa	67,14	62,45	77,30	81,38	81,66	76,86	60,88	56,38	62,03	73,69	77,14	72,79
e^0 (saturation vapour pressure at the air temperature)													
$e^0 = 0,6108 \exp(17,27 T/T+237,3)$	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07
T (Temperatur udara)	°C	26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48
Tmax (Temperatur udara max)	°C	27,20	27,20	26,70	26,40	26,40	26,00	25,95	25,05	25,05	26,75	26,00	26,20
Tmin (Temperatur udara min)	°C	21,45	21,45	22,80	22,55	22,60	21,75	18,95	17,00	18,55	19,85	23,25	21,95
RHmax (Kelembaban relative max)	%	99,00	99,00	100,00	99,00	100,00	100,00	99,00	99,00	99,00	99,00	99,00	99,00
RHmin (Kelembaban relative min)	%	68,00	68,00	84,00	94,00	96,00	97,00	90,00	96,00	97,00	98,00	98,00	98,00
Rn (net radiation)													
Rn = Rns-Rnl	MJ/m ² /hari	11,07	10,90	11,36	11,66	11,79	11,89	11,17	10,95	10,99	11,45	11,52	11,30
Rns (Net solar or shortwave radiation)													
Rns = $(1-\alpha)Rs$	MJ/m ² /hari	7,67	7,67	7,64	7,69	7,73	7,83	7,82	7,82	7,74	7,73	7,69	7,68
α (Koefisien albedo)		0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Rs (solar or shortwave radiation)													
$Rs = (as + bs \cdot n/N)Ra$		9,96	9,96	9,92	9,99	10,04	10,17	10,15	10,16	10,06	10,04	9,99	9,97
as (konstanta regresi)		0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
bs (rekondensi)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
n (lama peninjaman matahari)		9,25	9,25	7,99	10,53	12,34	16,80	16,27	16,54	12,89	12,23	10,54	9,87
N (daylight hour)													
N = $(24/n_t) ws$	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Ra (extraterrestrial radiation)													
$Ra = 24(60)/\pi \cdot Gsc \cdot dr (ws \sin(\phi) \sin(\delta) + \cos(\delta) \sin(ws))$	MJ/m ² /hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78
Gsc (solar constant)	MJ/m ² /menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08
ϕ (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68
δ (solar declination)													
$\delta = 0,409 \sin(2\pi/365 J - 1,39)$	rad	-0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
J (jumlah hari dalam satu tahun)		365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00
dr (inverse relative distance Earth-Sun)													
$dr = 1 + 0,033 \cos((\pi/365 \cdot J))$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03
$ws = \text{arc cos } (-\tan(\phi) \tan(\delta))$	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Rn1 (net outgoing longwave radiation)													
$Rn1 = \sigma (T_{max} - T_{min} \cdot K^2/2) (0,34 - 0,14 (ea)^{0,5}) (1,35 Rs/Rs_o - 0,35)$	MJ/m ² /hari	-3,41	-3,24	-3,73	-3,96	-4,06	-4,06	-3,36	-3,12	-3,25	-3,72	-3,83	-3,62
σ (Tetapan Stefan-Boltzmann)	MJ/k ⁴ m ⁻³ /hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tmax (Temperatur udara max)	°K	300,36	300,36	299,86	299,56	299,56	299,16	299,11	298,21	298,21	299,91	299,16	299,36
Tmin (Temperatur udara min)	°K	294,61	294,61	295,96	295,71	295,76	294,91	292,11	290,16	291,71	293,01	296,41	295,11
Rso (clear-sky radiation)													
$Rso = (0,75 + 2 \cdot 10^{-5} z) Ra$	MJ/m ² /hari	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00

Lampiran A.3. Perhitungan Evapotranspirasi Potensial tahun 2003

Uraian	Satuan	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKTBR	NOV	DES
ETo (Evapotranspirasi Potensial)	mm/bulan	166,20	117,59	115,90	135,84	131,36	111,09	114,49	131,69	125,66	134,93	129,51	138,47
Eto = $(0,408 \Delta (Rn-G) + \gamma(900/T+273) U (es-ea)) / (\Delta + \gamma(1+0,34U))$	mm/hari	5,36	4,20	3,74	4,53	4,24	3,70	3,69	4,25	4,19	4,35	4,32	4,47
U (Kecepatan Angin)	m/s	0,29	0,27	0,28	0,27	0,26	0,28	0,33	0,44	0,35	0,31	0,31	0,29
Uz (Kecepatan Angin)	m/s	0,56	0,52	0,54	0,53	0,50	0,54	0,65	0,85	0,67	0,59	0,59	0,57
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
Δ (Slope of saturation vapour pressure curve)	Kpa/°C	0,18	0,18	0,19	0,19	0,18	0,16	0,16	0,17	0,19	0,19	0,19	0,19
Δ = $4098 (0,6108 \exp (17,27 T/T+237,3)) / (T+237,3)$	°C	24,18	24,55	24,64	25,13	24,53	22,37	22,02	23,41	25,00	24,63	24,71	24,71
T (Temperatur udara)	°C												
G (Energi yang diperlukan untuk memanaskan tanah)	°C	-2,97	0,05	0,01	0,07	-0,08	-0,30	-0,05	0,19	0,22	-0,05	0,01	0,00
G = $0,14 (Tn - Tn-1)$	°C	24,18	24,55	24,64	25,13	24,53	22,37	22,02	23,41	25,00	24,63	24,71	24,71
Tn (Temperatur udara bulan itu)	°C												
Tn-1 (Temperatur udara bulan sebelumnya)	°C	45,36	24,18	24,55	24,64	25,13	24,53	22,37	22,02	23,41	25,00	24,63	24,71
γ (Tetapan Psikrometri)	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
γ = $0,665 \cdot 10^{-3} p$	P (Tekanan Atmosfer)												
P = $101,3 (293-0,0065.z/293)^{0,26}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
es (mean saturation vapour pressure)	Kpa	77,74	77,02	83,84	85,71	79,54	70,20	66,13	61,17	72,11	81,61	80,80	79,00
es = $e^0 (Tmax) + e^0 (Tmin) / 2$													
ea (actual vapour pressure)	Kpa	72,44	72,57	82,56	80,68	75,61	68,72	64,35	57,76	68,36	77,23	76,46	73,93
ea = $e^0 (Tmin) \cdot RHmax / 100 + e^0 (Tmax) \cdot RHmin / 100$													
e^0 (saturation vapour pressure at the air temperature)	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07
$e^0 = 0,6108 \exp (17,27 T/T+237,3)$	T (Temperatur udara)	26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48
Tmax (Temperatur udara max)	°C	26,75	26,00	25,95	26,85	26,30	23,75	25,85	25,35	26,05	27,75	27,75	27,85
Tmin (Temperatur udara min)	°C	19,25	23,00	23,10	22,80	20,40	19,15	19,90	19,00	23,55	23,05	23,05	23,60
RHmax (Kelembaban relative max)	%	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00
RHmin (Kelembaban relative min)	%	89,00	90,00	98,00	90,00	92,00	97,00	96,00	91,00	91,00	91,00	91,00	89,00
Rn (net radiation)													
Rn = Rns-Rnl	MJ/m ² /hari	11,27	11,18	11,80	11,87	11,65	11,52	11,30	10,93	11,13	11,28	11,25	11,30
Rns (Net solar or shortwave radiation)													
Rns = $(1-\alpha)Rs$	MJ/m ² /hari	7,69	7,63	7,73	7,76	7,78	7,85	7,81	7,78	7,66	7,60	7,60	7,64
α (Koefisien albedo)		0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Rs (solar or shortwave radiation)													
Rs = $\alpha s + b s \cdot N/N$		9,99	9,91	10,03	10,08	10,10	10,20	10,14	10,10	9,95	9,87	9,87	9,92
as (konstanta regresi)		0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
bs (rekomenadasi)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
n (lama penyinaran matahari)		10,30	7,76	12,03	13,67	14,37	17,80	15,77	14,36	9,09	6,22	6,22	8,02
N (daylight hour)													
N = $(24/t) ws$	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Ra (extraterrestrial radiation)													
Ra = $24(60)/\pi \cdot Gsc.dr (ws \sin(\phi) \sin(\delta) + \cos(\delta)\sin(ws))$	MJ/m ² /hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78
Gsc (solar constant)	MJ/m ² /menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08
φ (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68
δ (solar declination)													
δ = $0,409 \sin(2\pi/365 J - 1,39)$	rad	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
J (jumlah hari dalam satu tahun)		365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00
dr (inverse relative distance Earth-Sun)													
dr = $1+0,033 \cos(\pi/365 \cdot J)$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03
ws = $\arccos(-\tan(\phi) \tan(\delta))$	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Rn1 (net outgoing longwave radiation)													
Rn1 = $\sigma (Tmax^4 + Tmin^4) / 2$ $(0,34 - 0,14 (e^0)^{0,5}) (1,35 Rs/Rso - 0,35)$	MJ/m ² /hari	-3,58	-3,54	-4,07	-4,10	-3,88	-3,67	-3,49	-3,15	-3,47	-3,68	-3,65	-3,66
σ (Tetapan Stefan-Boltzmann)	MJ/k ⁴ m ⁻² /hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tmax (Temperatur udara max)	°K	299,91	299,16	299,11	300,01	299,46	296,91	299,01	298,51	299,21	300,91	300,91	301,01
Tmin (Temperatur udara min)	°K	292,41	296,16	296,26	295,96	293,56	292,31	293,06	292,16	296,71	296,21	296,21	296,76
Rso (clear-sky radiation)	MJ/m ² /hari	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22
Rso = $(0,75 + 2 \cdot 10^{-5} z) Ra$	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
z (Ketinggian di atas muka laut)													

Lampiran A.4. Perhitungan Evapotranspirasi Potensial tahun 2004

Uraian	Satuan	JAN 31	FEB 29	MARET 31	APRIL 30	MEI 31	JUNI 30	JULI 31	AGUST 31	SEPT 30	OKTBR 31	NOV 30	DES 31
ETo (Evapotranspirasi Potensial)	mm/bulan	419,55	386,25	405,39	383,94	412,77	296,13	266,24	257,92	309,68	297,67	407,04	404,91
$Eto = (0,408 \Delta (Rn-G) + \gamma(900/T+273) U (es-ea)) / (\Delta + \gamma(1+0,34U))$	mm/hari	13,53	13,32	13,08	12,80	13,32	9,87	8,59	8,32	10,32	9,60	13,57	13,06
U (Kecepatan Angin)	m/s	0,30	0,28	0,26	0,24	0,30	0,26	0,29	0,36	0,44	0,36	0,25	0,26
$U = Uz (4,87/\ln (67,8 z - 5,42))$	m/s	0,57	0,54	0,49	0,46	0,58	0,50	0,56	0,69	0,85	0,69	0,49	0,50
Uz (Kecepatan Angin)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
z (Ketinggian di atas muka laut)													
Δ (Slope of saturation vapour pressure curve)	Kpa/°C	0,19	0,19	0,18	0,18	0,19	0,19	0,17	0,17	0,15	0,17	0,17	0,18
$\Delta = 4098 (0,6108 \exp (17,27 T/T+237,3)) / (T+237,3)$	°C	24,71	24,67	24,62	23,97	25,00	24,87	23,41	22,85	20,16	22,54	23,43	24,42
T (Temperatur udara)													
G (Energi yang diperlukan untuk memanaskan tanah)	°C	-0,18	-0,29	-0,10	-0,36	-0,33	-0,12	-0,29	0,00	-0,73	-0,35	-0,67	-0,24
$G = 0,14 (Tn - Tn-1)$	°C	24,71	24,67	24,62	23,97	25,00	24,87	23,41	22,85	20,16	22,54	23,43	24,42
Tn (Temperatur udara bulan itu)													
$Tn-1$ (Temperatur udara bulan sebelumnya)	°C	26,00	26,75	25,35	26,55	27,35	25,75	25,50	22,85	25,35	25,05	28,20	26,15
γ (Tetapan Psikrometri)													
$\gamma = 0,665 \cdot 10^{-3} p$	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
P (Tekanan Atmosfer)													
$P = 101,3 (293-0,0065.z/293)^{5,26}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
es (mean saturation vapour pressure)													
$es = e^0 (Tmax) + e^0 (Tmin) / 2$	Kpa	205,84	189,96	208,27	211,21	205,82	197,60	171,37	160,21	171,34	191,18	193,96	186,17
ea (actual vapour pressure)													
$ea = e^0 (Tmin) \cdot RHmax / 100 + e^0 (Tmax) \cdot RHmin / 100$	Kpa	170,82	152,25	170,05	173,08	172,49	176,55	157,96	149,62	158,57	178,00	154,83	146,97
e^0 (saturation vapour pressure at the air temperature)	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07
$e^0 = 0,6108 \exp (17,27 T/T+237,3)$	°C	26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48
T (Temperatur udara)													
Tmax (Temperatur udara max)	°C	22,80	21,85	22,85	23,35	21,85	21,75	19,55	17,15	18,85	20,00	22,95	22,25
Tmin (Temperatur udara min)	°C	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00
RHmax (Kelembaban relative max)	%	92,00	91,00	91,00	90,00	91,00	98,00	98,00	98,00	98,00	98,00	87,00	89,00
RHmin (Kelembaban relative min)	%	43,85	30,99	41,14	47,80	51,20	49,97	62,68	66,81	63,92	68,87	48,87	34,21
Rn (net radiation)													
$Rn = Rns - Rnl$	MJ/m ² /hari	18,63	17,41	18,51	18,89	18,92	19,04	18,63	18,31	18,67	19,70	18,17	17,32
Rns (Net solar or shortwave radiation)													
$Rns = (1-\alpha)Rs$	MJ/m ² /hari	7,69	7,63	7,68	7,71	7,73	7,73	7,79	7,81	7,80	7,82	7,72	7,64
α (Koefisien albedo)		0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Rs (solar or shortwave radiation)													
$Rs = (as + bs \cdot n/N)R$		9,99	9,90	9,97	10,02	10,04	10,03	10,12	10,15	10,13	10,16	10,03	9,93
as (konstanta regresi)		0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
bs (rekomenadasi)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
n (lama penyinaran matahari)		10,52	7,44	9,87	11,47	12,29	11,99	15,04	16,03	15,34	16,53	11,73	8,21
N (daylight hour)													
N = (24/t) ws	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Ra (extraterrestrial radiation)													
$Ra = 24(60)/\pi \cdot Gsc \cdot dr (ws \sin(\phi) \sin(\delta) + \cos(\delta) \sin(ws))$	MJ/m ² /hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78
Gsc (solar constant)	MJ/m ² /menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08
ϕ (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68
δ (solar declination)													
$\delta = 0,409 \sin(2\pi/365 J - 1,39)$	rad	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
J (jumlah hari dalam satu tahun)		366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00
dr (inverse relative distance Earth-Sun)													
$dr = 1 + 0,033 \cos((\pi/365) \cdot J)$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03
ws = $\arccos(-\tan(\phi) \tan(\delta))$	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Rn1 (net outgoing longwave radiation)													
$Rn1 = \sigma (Tmax^4 + Tmin^4) / 2 (0,34 - 0,14 (e^0)^{0,5}) (1,35 Rns / Rso - 0,35)$	MJ/m ² /hari	-10,94	-9,79	-10,83	-11,18	-11,19	-11,31	-10,84	-10,50	-10,87	-11,88	-10,45	-9,68
σ (Tetapan Stefan-Boltzmann)	MJ/k ⁴ m ⁻² /hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tmax (Temperatur udara max)	°K	295,96	295,01	296,01	296,51	295,01	294,91	292,71	290,31	292,01	293,16	296,11	295,41
Tmin (Temperatur udara min)	°K	372,16	372,16	372,16	372,16	372,16	372,16	372,16	372,16	372,16	372,16	372,16	372,16
Rso (clear-sky radiation)	MJ/m ² /hari	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23
$Rso = (0,75 + 2 \cdot 10^{-5} z) Ra$	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
z (Ketinggian di atas muka laut)													

Lampiran A.5. Perhitungan Evapotranspirasi Potensial tahun 2005

Uraian	Satuan	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKTBR	NOV	DES
		31	28	31	30	31	30	31	31	30	31	30	31
ET₀ (Evapotranspirasi Potensial)	mm/bulan	132,20	118,25	126,59	130,34	141,33	109,70	107,07	101,75	101,47	108,86	137,34	129,20
$ET_0 = (0,408 \Delta (Rn-G) + \gamma(900/T+273) U (es-ea)) / \Delta + \gamma(1+0,34U)$	mm/hari	4,26	4,22	4,08	4,34	4,56	3,66	3,45	3,28	3,38	3,51	4,58	4,17
U (Kecepatan Angin)													
$U = U_z (4,87 / (\ln(67,8 z - 5,42)))$	m/s	0,30	0,28	0,26	0,24	0,30	0,26	0,29	0,36	0,44	0,36	0,25	0,26
U_z (Kecepatan Angin)	m/s	0,57	0,54	0,49	0,46	0,58	0,50	0,56	0,69	0,85	0,69	0,49	0,50
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
Δ (Slope of saturation vapour pressure curve)													
$\Delta = 4098 (0,6108 \exp(17,27 T/T+237,3)) / (T+237,3)$	Kpa/°C	0,19	0,18	0,18	0,19	0,19	0,17	0,17	0,15	0,17	0,17	0,18	0,18
T (Temperatur udara)	°C	24,67	24,62	23,97	25,00	24,87	23,41	22,85	20,16	22,54	23,43	24,42	24,42
G (Energi yang diperlukan untuk memanaskan tanah)													
$G = 0,14 (Tn - Tn-1)$	°C	0,03	-0,01	-0,09	0,14	-0,02	-0,21	-0,08	-0,38	0,33	0,12	0,14	0,00
Tn (Temperatur udara bulan itu)	°C	24,67	24,62	23,97	25,00	24,87	23,41	22,85	20,16	22,54	23,43	24,42	24,42
Tn-1 (Temperatur udara bulan sebelumnya)	°C	24,42	24,67	24,62	23,97	25,00	24,87	23,41	22,85	20,16	22,54	23,43	24,42
γ (Titik lebur Psikrometri)													
$\gamma = 0,665 \cdot 10^{-3} P$	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
P (Tekanan Atmosfer)													
$P = 101,3 (293-0,0065.z/293)^{0,46}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
es (mean saturation vapour pressure)													
$es = e^0 (Tmax) + e^0 (Tmin) / 2$	Kpa	82,47	76,39	82,38	86,14	83,79	77,73	65,92	55,17	64,26	72,38	81,35	74,31
ea (actual vapour pressure)													
$ea = e^0 (Tmin) RHmax / 100 + e^0 (Tmax) RHmin / 100$	Kpa	78,57	72,26	78,09	81,16	79,23	76,53	64,88	54,30	63,25	71,25	75,16	69,56
e^0 (saturation vapour pressure at the air temperature)													
$e^0 = 0,6108 \exp(17,27 T/T+237,3)$	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07
T (Temperatur udara)													
26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48		
Tmax (Temperatur udara max)	°C	26,00	26,75	25,35	26,55	27,35	25,75	25,85	22,85	25,35	25,05	28,20	26,15
Tmin (Temperatur udara min)	°C	22,80	21,85	22,85	23,35	21,85	21,75	19,75	17,15	18,85	20,00	22,95	22,25
RHmax (Kelembaban relative max)	%	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00
RHmin (Kelembaban relative min)	%	92,00	91,00	91,00	90,00	91,00	98,00	98,00	98,00	98,00	98,00	87,00	89,00
Rn (net radiation)													
$Rn = Rns - Rnl$	MJ/m ² hari	11,53	11,35	10,92	11,77	11,91	11,58	11,16	10,69	11,10	11,26	11,54	10,94
Rns (Net solar or shortwave radiation)													
$Rns = (1-\alpha)Rs$	MJ/m ² hari	7,68	7,70	7,50	7,73	7,80	7,73	7,75	7,77	7,76	7,71	7,71	7,59
α (Koefisien albedo)		0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Rs (solar or shortwave radiation)													
$Rs = (as + bs \cdot n/N)Ra$		9,98	10,00	9,74	10,03	10,13	10,05	10,06	10,10	10,08	10,01	10,01	9,86
as (konstanta regresi)		0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
bs (rekomenasai)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
n (lama penyiapan matahari)		10,12	10,73	1,45	12,01	15,28	12,43	13,12	14,26	13,65	11,23	11,09	5,88
N (daylight hour)													
$N = (24/\pi) ws$	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Ra (extraterrestrial radiation)													
$Ra = 24(60)/\pi \cdot Gsc.dr (ws \sin(\phi) \sin(\delta) + \cos(\delta)\sin(ws))$	MJ/m ² hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78
Gsc (solar constant)	MJ/m ² menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08
ϕ (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68
δ (solar declination)													
$\delta = 0,409 \sin(2\pi/365 J - 1,39)$	rad	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
J (jumlah hari dalam satu tahun)		365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00
dr (inverse relative distance Earth-Sun)													
$dr = 1+0,033 \cos(\pi/365 \cdot J)$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03
ws = $\text{arc cos}(-\tan(\phi) \tan(\delta))$	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Rn1 (net outgoing longwave radiation)													
$Rn1 = \sigma (Tmax, K' + Tmin, K''/2) (0,34 - 0,14 (ea)^{0,5}) (1,35 Rs/Rso - 0,35)$	MJ/m ² hari	-3,85	-3,65	-3,43	-4,05	-4,11	-3,85	-3,41	-2,92	-3,33	-3,55	-3,83	-3,35
σ (Tetapan Stefan-Boltzmann)	MJ/k ⁴ m ² hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tmax (Temperatur udara max)	°K	299,16	299,91	298,51	299,71	300,51	298,91	299,01	296,01	298,51	298,21	301,36	299,31
Tmin (Temperatur udara min)	°K	295,96	295,01	296,01	296,51	295,01	294,91	292,91	290,31	292,01	293,16	296,11	295,41
Rso (clear-sky radiation)													
$Rso = (0,75+2 \cdot 10^{-3} z) Ra$	MJ/m ² hari	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00

Lampiran A.6. Perhitungan Evapotranspirasi Potensial tahun 2006

Uraian	Satuan	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKTBR	NOV	DES
ETo (Evapotranspirasi Potensial)	mm/bulan	140,92	100,73	111,96	106,42	111,00	108,73	107,34	105,83	106,33	116,45	121,15	159,93
$Eto = 0,408 \Delta (Rn-G) + \gamma(900/T+273) U (es-ea)/\Delta + \gamma(1+0,34U)$	mm/hari	4,55	3,60	3,61	3,55	3,58	3,62	3,46	3,41	3,54	3,76	4,04	5,16
U (Kecepatan Angin)													
$U = Uz [4,87 / (\ln(67,8 z + 5,42))]$	m/s	0,19	0,10	0,12	0,07	0,03	0,05	0,10	0,13	0,23	0,13	0,20	0,27
Uz (Kecepatan Angin)	m/s	0,36	0,20	0,23	0,13	0,05	0,10	0,20	0,25	0,44	0,25	0,38	0,52
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
Δ (Slope of saturation vapour pressure curve)	Kpa/°C	0,18	0,18	0,18	0,18	0,18	0,16	0,15	0,15	0,16	0,17	0,20	0,18
$\Delta = 4,098 \cdot (0,6108 \exp(17,27 T/(T+237,3))) / (T+237,3)^2$	°C	24,39	24,48	24,60	24,34	24,08	21,69	21,22	20,45	21,46	22,89	26,04	24,42
T (Temperatur udara)	°C												
G (Energi yang diperlukan untuk memanaskan tanah)	°C	-2,61	0,01	0,02	-0,04	-0,04	-0,33	-0,07	-0,11	0,14	0,20	0,44	-0,23
$G = 0,14 (T_n - T_{n-1})$	°C	24,39	24,48	24,60	24,34	24,08	21,69	21,22	20,45	21,46	22,89	26,04	24,42
T_n (Temperatur udara bulan itu)	°C												
T_{n-1} (Temperatur udara bulan sebelumnya)	°C	43,03	24,39	24,48	24,60	24,34	24,08	21,69	21,22	20,45	21,46	22,89	26,04
γ (Tetapan Psikrometri)	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
$\gamma = 0,665 \cdot 10^{-6} P$	P (Tekanan Atmosfer)												
$P = 101,3 (293 - 0,0065 z / 293)^{0,26}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
es (mean saturation vapour pressure)	Kpa	81,71	74,58	83,92	82,43	82,26	74,95	61,58	55,31	62,01	74,06	78,73	76,54
$es = (T_{max} + e) / (T_{min} + e)$	Kpa												
ea (actual vapour pressure)	Kpa	78,66	71,23	81,73	80,69	76,99	69,72	57,71	52,20	59,64	69,95	74,46	67,94
$ea = e^0 (T_{min} / RH_{max} / 100 + e^0 (T_{max} / RH_{min} / 100))$	Kpa												
e^0 (saturation vapour pressure at the air temperature)	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07
$e^0 = 0,6108 \exp(17,27 T / (T+237,3))$	Kpa	26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48
T (Temperatur udara)	°C	26,40	26,70	26,35	26,40	26,15	27,35	24,35	23,15	24,00	26,25	27,35	26,85
Tmax (Temperatur udara max)	°C	21,95	20,75	22,75	21,35	22,15	18,45	18,25	16,95	18,65	19,85	22,15	23,00
Tmin (Temperatur udara min)	°C	99,00	100,00	99,00	99,00	99,00	100,00	99,00	99,00	99,00	99,00	99,00	99,00
RHmax (Kelembaban relative max)	%	94,00	92,00	96,00	97,00	89,00	89,00	89,00	91,00	94,00	91,00	91,00	80,00
RHmin (Kelembaban relative min)	%												
Rn (net radiation)	MJ/m ² /hari	11,28	11,19	11,45	11,56	11,61	11,43	10,90	10,78	11,08	11,61	11,77	11,20
$Rn = Rns - Rnl$	MJ/m ² /hari												
Rns (Net solar or shortwave radiation)	MJ/m ² /hari	7,61	7,66	7,62	7,68	7,73	7,78	7,78	7,85	7,82	7,84	7,81	7,69
$Rns = (1-\alpha)Rs$	MJ/m ² /hari	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
α (Koefisien albedo)													
Rs (solar or shortwave radiation)	MJ/m ² /hari	9,88	9,95	9,90	9,98	10,04	10,10	10,11	10,19	10,16	10,18	10,14	9,99
$Rs = (as - bs \cdot n) / Ra$	MJ/m ² /hari	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
as (konstanta refleksi)													
bs (rekomenasai)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
n (faktor penyinaran matahari)		6,52	9,19	7,33	9,94	12,29	14,48	14,58	17,52	16,39	17,10	15,69	10,33
N (daylight hour)													
$N = (24/\pi) ws$	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Ra (extraterrestrial radiation)													
$Ra = 24(60)/\pi \cdot Gsc \cdot dr (ws \sin(\phi) \sin(\delta) + \cos(\delta) \sin(ws))$	MJ/m ² /hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78
Gsc (solar constant)	MJ/m ² /menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08
dr (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68
δ (solar declination)	rad	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
$\delta = 0,409 \sin(2\pi/365 J - 1,39)$													
J (jumlah hari dalam satu tahun)		365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00
dr (inverse relative distance Eart-Sun)													
$dr = 1+0,033 \cos((\pi/365) J)$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03
$ws = \arccos(\tan(\phi) \tan(\delta))$	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Rn1 (net outgoing longwave radiation)													
$Rn1 = o (T_{max} K^4 T_{min} K^2 / 2) (0,34-0,14 (ea)^{0,5}) (1,35 Rso / Rso - 0,35)$	MJ/m ² /hari	-3,68	-3,52	-3,83	-3,88	-3,88	-3,65	-3,12	-2,94	-3,26	-3,77	-3,97	-3,51
o (Tetapan Stefan-Boltzmann)	MJ/k ⁴ m ² /hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tmax (Temperatur udara max)	°K	299,56	299,80	299,51	299,56	299,31	300,51	297,51	296,31	297,16	299,41	300,51	300,01
Tmin (Temperatur udara min)	°K	295,11	293,91	295,91	294,51	295,31	291,61	291,41	290,11	291,81	293,01	295,31	296,16
Rso (clear-sky radiation)	MJ/m ² /hari	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00

Lampiran A.7. Perhitungan Evapotranspirasi Potensial tahun 2007

Uraian	Satuan	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKTBR	NOV	DES
ETo (Evapotranspirasi Potensial)	mm/bulan	107,64	93,99	105,92	108,00	115,01	105,19	102,54	101,10	99,90	103,15	103,64	103,38
$Eto = (0,408 \Delta (Rn-G) + (900/T+273) U (es-ea)) / (\Delta + \gamma(1+0,34U))$	mm/hari	3,47	3,36	3,42	3,60	3,71	3,51	3,31	3,26	3,33	3,33	3,45	3,33
U (Kecepatan Angin)													
$U = Uz (4,87/\ln (67,8 z - 5,42))$	m/s	0,007	0,002	0,002	0,001	0,001	0,001	0,001	0,002	0,003	0,003	0,002	0,001
Uz (Kecepatan Angin)	m/s	0,014	0,003	0,005	0,002	0,001	0,001	0,003	0,004	0,005	0,006	0,005	0,001
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
Δ (Slope of saturation vapour pressure curve)													
$\Delta = 4098 (0,6108 \exp (17,27 T/T+237,3)) / (T+237,3)^2$	Kpa/°C	0,17	0,18	0,18	0,20	0,19	0,18	0,17	0,17	0,19	0,19	0,18	0,18
T (Temperatur udara)	°C	23,54	24,46	24,60	26,35	25,61	24,05	23,10	23,53	25,06	24,92	24,36	24,54
G (Energi yang diperlukan untuk memanaskan tanah)													
$G = 0,14 (Tn - Tn-1)$	°C	-0,12	0,13	0,02	0,24	-0,10	-0,22	-0,13	0,06	0,21	-0,02	-0,08	0,03
Tn (Temperatur udara bulan itu)	°C	23,54	24,46	24,60	26,35	25,61	24,05	23,10	23,53	25,06	24,92	24,36	24,54
Tn-1 (Temperatur udara bulan sebelumnya)	°C	24,42	23,54	24,46	26,35	25,61	24,05	23,10	23,53	25,06	24,92	24,36	
γ (Tetapan Psikrometrik)													
$\gamma = 0,665 \cdot 10^{-3} p$	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
P (Tekanan Atmosfer)													
$P = 101,3 (293,0 \cdot 0,0065 \cdot z / 293)^{0,26}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
es (mean saturation vapour pressure)													
$es = e^0 (T_{max}) \cdot e^0 (T_{min}) / 2$	Kpa	78,24	77,96	83,92	90,63	89,84	80,18	65,77	63,59	69,57	67,39	76,19	75,85
ea (actual vapour pressure)													
$ea = e^0 (T_{min}) \cdot RH_{max} / 100 + e^0 (T_{max}) RH_{min} / 100$	Kpa	72,92	73,45	78,58	84,82	83,76	74,68	60,27	58,12	62,95	62,69	72,40	70,13
e^0 (saturation vapour pressure at the air temperature)													
$e^0 = 0,6108 \exp (17,27 T/T+237,3)$	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07
T (Temperatur udara)	°C	26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48
Tmax (Temperatur udara max)	°C	26,85	26,40	26,35	28,40	29,75	28,75	25,75	26,95	27,15	27,85	27,15	26,40
Tmin (Temperatur udara min)	°C	19,45	23,20	22,75	24,10	23,00	20,25	19,75	19,15	20,70	14,10	20,75	23,00
RHmax (Kelembaban relative max)	%	99,00	99,00	99,00	99,00	100,00	99,00	99,00	99,00	99,00	99,00	99,00	98,38
RHmin (Kelembaban relative min)	%	89,00	90,00	89,00	89,00	88,00	89,00	86,00	86,00	84,00	90,00	92,00	87,31
Rn (net radiation)													
Rn = Rns-Rnl	MJ/m ² /hari	11,49	11,29	11,35	11,93	12,06	11,52	11,08	11,04	11,18	10,96	11,43	11,12
Rns (Net solar or shortwave radiation)													
Rns = (1 - α)Rs	MJ/m ² /hari	7,76	7,66	7,62	7,71	7,76	7,72	7,79	7,80	7,77	7,74	7,73	7,64
α (Koefisien albedo)		0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Rs (solar or shortwave radiation)													
Rs = (as + bs, n/N)Ra		10,08	9,95	9,90	10,02	10,08	10,03	10,12	10,13	10,08	10,05	10,04	9,92
as (konstanta regresi)		0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
bs (rekomenadasi)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
n (lama penyinaran matahari)		13,51	8,89	7,30	11,47	13,65	11,91	14,93	15,42	13,84	12,48	12,13	7,97
N (daylight hour)													
$N = (24/h) \cdot ws$	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Ra (extraterrestrial radiation)													
$Ra = 24(60)/\pi \cdot Gsc \cdot dr (ws \sin(\phi) \sin(\delta) + \cos(\delta) \sin(ws))$	MJ/m ² /hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78
Gsc (solar constant)	MJ/m ² /menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08
φ (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68
δ (solar declination)													
$\delta = 0,409 \sin(2\pi/365 J - 1,39)$	rad	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
J (jumlah hari dalam satu tahun)		365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00	365,00
dr (inverse relative distance Earth-Sun)													
$dr = 1 + 0,033 \cos(\pi/365 \cdot J)$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03
ws = arc cos (-tan(φ) tan(δ))	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Rn1 (net outgoing longwave radiation)													
$Rn1 = \alpha (T_{max}, K' + T_{min}, K'/2) (0,34 - 0,14 (ea)^{0,5}) (1,35 R_s / R_o - 0,35)$	MJ/m ² /hari	-3,74	-3,64	-3,73	-4,22	-4,30	-3,80	-3,30	-3,24	-3,41	-3,23	-3,70	-3,48
α (Tetapan Stefan-Boltzmann)	MJ/k ⁴ /m ² /hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tmax (Temperatur udara max)	°K	300,01	299,56	299,51	301,56	302,91	301,91	298,91	300,11	300,31	301,01	300,31	299,56
Tmin (Temperatur udara min)	°K	292,61	296,36	295,91	297,26	296,16	293,41	292,91	292,31	293,86	287,26	293,91	296,16
Rso (clear-sky radiation)													
$Rso = (0,75 + 2 \cdot 10^{-2} z) Ra$	MJ/m ² /hari	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22	29,22
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00

Lampiran A.8. Perhitungan Evapotranspirasi Potensial tahun 2008

Uraian	Satuan	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKTBR	NOV	DES
ETo (Evapotranspirasi Potensial)	mm/bulan	109,11	96,83	107,63	106,45	108,21	96,87	92,99	98,34	101,19	107,18	101,46	96,85
Eto = $(0,408 \Delta (Rn-G) + \gamma(900/T+273) U (es-ea)) / (\Delta + \gamma(1+0,34U))$	mm/hari	3,52	3,34	3,47	3,55	3,49	3,23	3,00	3,17	3,37	3,46	3,38	3,12
U (Kecepatan Angin)													
$U = U_z / \ln((67,8 z - 5,42))$	m/s	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002	0,002
U_z (Kecepatan Angin)	m/s	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004	0,004
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
Δ (Slope of saturation vapour pressure curve)													
$\Delta = 4098 (0,6108 \exp(17,27 T / (T+23,3)) / (T+23,3))^2$	Kpa/°C	0,19	0,19	0,19	0,19	0,16	0,15	0,15	0,18	0,18	0,19	0,19	0,19
T (Temperatur udara)	°C	24,77	24,90	24,85	24,78	22,41	21,18	21,11	23,75	24,06	25,35	24,79	24,92
G (Energi yang diperlukan untuk memanaskan tanah)													
$G = 0,14 (Tn - Tn-1)$	°C	0,03	0,02	-0,01	-0,01	-0,33	-0,17	-0,01	0,37	0,04	0,18	-0,08	0,02
Tn (Temperatur udara bulan itu)	°C	24,77	24,90	24,85	24,78	22,41	21,18	21,11	23,75	24,06	25,35	24,79	24,92
$Tn-1$ (Temperatur udara bulan sebelumnya)	°C	24,54	24,77	24,90	24,85	24,78	22,41	21,18	21,11	23,75	24,06	25,35	24,79
γ (Tetapan Psikrometrik)													
$\gamma = 0,665 \cdot 10^{-3} p$	Kpa/°C	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,07
P (Tekanan Atmosfer)													
$P = 101,3 (293,0065 \cdot z / 293)^{5,26}$	Kpa	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19	99,19
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00
es (mean saturation vapour pressure)													
$es = e^0 (Tmax) + e^0 (Tmin) / 2$	Kpa	84,50	78,98	85,46	84,85	76,56	65,37	51,39	63,31	69,57	80,25	76,50	64,41
ea (actual vapour pressure)													
$ea = e^0 (Tmin) \cdot RHmax / 100 + e^0 (Tmax) \cdot RHmin / 100$	Kpa	78,87	72,92	80,07	80,24	72,45	62,02	47,73	59,88	65,46	74,39	71,16	53,38
e^0 (saturation vapour pressure at the air temperature)													
$e^0 = 0,6108 \exp(17,27 T / (T+23,3))$	Kpa	3,38	3,14	3,42	3,45	3,41	3,27	2,89	2,76	2,91	3,21	3,18	3,07
T (Temperatur udara)	°C	26,09	24,87	26,28	26,45	26,22	25,55	23,47	22,70	23,57	25,24	25,07	24,48
Tmax (Temperatur udara max)	°C	27,00	27,05	26,95	26,75	26,15	26,00	24,85	25,30	24,65	27,55	27,15	27,15
Tmin (Temperatur udara min)	°C	23,00	23,20	23,05	22,40	18,80	13,95	10,70	20,60	23,20	22,40	20,95	14,80
RHmax (Kelembaban relative max)	%	98,44	98,78	98,67	98,44	98,78	98,56	98,56	99,00	98,33	95,89	98,44	87,49
RHmin (Kelembaban relative min)	%	89,00	86,78	89,44	91,33	91,67	92,89	90,44	91,00	90,11	88,83	80,37	
Rn (net radiation)													
$Rn = Rns - Rnl$	MJ/m ² /hari	11,68	11,05	11,48	11,74	11,63	11,11	10,48	11,03	11,33	11,54	11,12	10,31
Rns (Net solar or shortwave radiation)													
$Rns = (1-\alpha)Rs$	MJ/m ² /hari	7,72	7,58	7,64	7,73	7,82	7,82	7,83	7,77	7,78	7,73	7,64	7,62
α (Koefisien albedo)		0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Rs (solar or shortwave radiation)													
$Rs = (as - bs \cdot n/N)Ra$		10,03	9,84	9,92	10,04	10,16	10,15	10,17	10,09	10,11	10,03	9,92	9,90
as (konstanta regresi)		0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
bs (rekomenadasi)		0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50
n (lama peninjaman matahari)		11,79	5,15	8,10	12,27	16,45	16,21	16,83	14,12	14,71	11,97	7,86	7,12
N (daylight hour)													
$N = (24/t) \cdot ws$	Jam	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93	687,93
ws (sunset hour angle)	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Ra (extraterrestrial radiation)													
$Ra = 24(60)/\pi \cdot Gsc \cdot dr (ws \sin(\phi) \sin(\delta) + \cos(\delta) \sin(ws))$	MJ/m ² /hari	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78	38,78
Gsc (solar constant)	MJ/m ² /menit	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08	0,08
ϕ (latitude)	rad	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68	7,68
δ (solar declination)													
$\delta = 0,409 \sin(2\pi/365 J - 1,39)$	rad	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03	0,03
J (jumlah hari dalam satu tahun)		366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00	366,00
dr (inverse relative distance Eart-Sun)													
$dr = 1 + 0,053 \cos((\pi/365) \cdot J)$		1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03	1,03
$ws = \arccos(-\tan(\phi) \tan(\delta))$	rad	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00	90,00
Rn1 (net outgoing longwave radiation)													
$Rn1 = o (Tmax \cdot K^4 + Tmin \cdot K^4) / (0,34 + 0,14 \cdot (ea)^{0,5}) \cdot (1,35 \cdot Rs / Rso - 0,35)$	MJ/m ² /hari	-3,96	-3,47	-3,83	-4,01	-3,81	-3,29	-2,65	-3,26	-3,54	-3,81	-3,48	-2,69
α (Tetapan Stefan-Boltzmann)	MJ/k ⁴ m ² /hari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Tmax (Temperatur udara max)	°K	300,16	300,21	300,11	299,91	299,31	299,16	298,01	298,46	297,81	300,71	300,31	300,31
Tmin (Temperatur udara min)	°K	296,16	296,36	296,23	295,56	291,96	287,11	283,86	293,76	296,36	295,56	294,11	287,96
Rso (clear-sky radiation)													
$Rso = (0,75 + 2 \cdot 10^{-3} z) Ra$	MJ/m ² /hari	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23	29,23
z (Ketinggian di atas muka laut)	m	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00	180,00

B. Perhitungan Debit DAS PDA Kalibawang Metode Mock

Lampiran B.1. Perhitungan Debit DAS PDA Kalibawang tahun 2001

Uraian	JAN	FEB	MARET	/APRIL	MAY	JUNI	JULI	AGUST	SEPT	OCTBR	NOV	DES
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	31
$Qn = Tro \cdot A$	m^3/s	48,50805	70,52349	94,78973	82,38175	32,37	30,78529	29,99912	23,17838	22,77738	17,00228	17,78564
Luas DAS (A)	km^2	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507
Total Limpasan (Tro)												
$Tro = DRO + BST + SRO$	mm/bin	74,77607	98,19263	146,1201	122,89655	49,89895	45,92675	46,2442	33,72959	33,90453	180,362	190,7352
DRO (Direct runoff)												
$DRO = WS - i$	mm/bin	46,47815	58,61423	87,52165	63,70425	0	0	0	0	0	0	0
WS (Water Surplus)												
$WS = (E-Ea)SS$	$(P-Ea)$	165,465	208,6702	311,5824	177,3152	0	0	0	0	0	326,44	395,9444
P (Hujan)	mm/bin	335,0765	365,7063	495,7566	303,7034	38,508933	86,598812	156,131	3,390981	21,0581	374,4703	395,9444
Ea (Evapotranspirasi aktual)												
$Ea = Tro - \Delta E$	mm/bin	121,2811	157,0391	184,1742	126,3582	122,9014	127,08338	146,0664	133,9673	126,7657	124,0989	114,1464
ΔE (Evapotranspirasi Terbatas)												
$\Delta E = Tro / (m/(18-n))$		-3,0717	1,797928	-1,5222	4,178393	13,2054	10,50347	16,30134	17,7584	16,7635	-2,05135	0,94342
Exposed Surface (m)	%	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653
Jumlah Hari Hujan (n)	hari	21,0000	17,0000	19,0000	14,0000	5,0000	8,0000	4,0000	2,0000	2,0000	17,0000	10,0000
Eto (Evapotranspirasi potensial)	mm/bin	121,2811	157,0391	184,1742	126,3582	122,9014	127,08338	146,0664	133,9673	126,7657	124,0989	114,1464
SS (Soil Storage) = SMi-SMf-1	mm/bin	0	0	0	-24,9925	-23,9878	10,06463	10,06463	0	0	48,33031	0
SMi (Soil Moisture bulan ini)												
SMi-1 (Soil Moisture bulan lalu)	mm	10	48,33031	48,33031	48,33031	48,33031	73,93782	0	10,06463	0	0	48,33031
SMC (Soil Moisture Capacity)	mm	10	48,33031	48,33031	48,33031	48,33031	23,93782	0	10,06463	0	0	48,33031
ISM (Initial Soil Moisture)	mm	118,9869	150,056	224,0607	113,611	0	0	0	0	0	208,9673	284,7259
I (Infiltrasi) = WS - (WC atau DIC)												
WC (Koefisien Infiltrasi musim hujan)		0,719106	0,719106	0,719106	0,640729	0,640729	0,640729	0,640729	0,640729	0,640729	0,19106	0,719106
DIC (Koefisien Infiltrasi musim kemarau)												
BSF (Airtan dasar)												
$BSF = I - IV$		12,04409	21,29293	33,81065	44,00704	44,97351	41,57735	38,43765	35,952504	32,85162	36,376089	54,01217
I (Infiltrasi)	mm/bin	118,9869	150,056	224,0607	113,611	0	0	0	0	0	208,9673	284,7259
ΔV (perubahan volume tanah)												
$\Delta V = GWS - IGWS$												
GWS (Ground Water Storage)	mm	106,94228	128,7631	190,2501	69,60293	-44,9735	41,5773	-38,4376	-35,535	-32,8516	170,7064	230,7138
$GWS = 0,5 \cdot (1+k) \cdot h \cdot (GWS)$	mm	206,94228	335,7058	525,9559	59,0009	470,59383	450,0713	435,0363	402,1847	572,891	803,6048	758,3253
k (koefisien resesi airtan tanah)	m^3/s	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485
IGWS (Initial Ground Water Storage)	mm	100	206,94228	335,7058	525,9559	59,5598	550,5863	509,009	470,5713	435,363	402,1847	572,891
SRO (Storm Run Off)	mm/bin	16,25382	18,28546	24,78783	15,18317	4,925446	4,349406	7,80651	0,194549	1,052905	24,92846	25,50454
Percentage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Debit runukur	m^3/s	48,99355	57,44286	129,7871	116,92	33,64194	37,63667	30,5129	17,51935	17,79333	79,40323	80,37014
Debit Terhingga	m^3/s	48,50805	70,52349	94,78973	82,38175	32,37	30,78629	29,99912	23,17818	22,72738	117,0028	127,8564
Debit Tenukur rata-rata	m^3/s	55,92487										
$Dt = \sum (Qtenukur - Qterhingga)^2$		48,04327	2,304274	545,6268	3720,405	496,5293	334,4585	645,7682	1474,984	1454,014	551,233	597,5711
$D^2 = \sum (Qtenukur - Qterhingga)^2$		0,235706	171,1039	1224,816	1192,391	1,517838	46,92761	0,263976	24,34482	1413,73	2254,943	739,9216

Lampiran B.2. Perhitungan Debit DAS PDA Kalibawang tahun 2002

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AUGUST	SEPT	OKEBR	NOV	DES
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Qn = Tro . A	m ³ /s	117,0679	119,3915	83,4496	104,8739	55,4819	49,96712	44,31908	40,88905	39,0797	34,94486	35,24365	84,44847
Luas DAS (A)	km ²	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507
Total Limpasan (Tro)	Tro = DRO + BSF + SRO	mm/bln	180,4623	166,2336	128,6391	156,4501	83,52639	74,54056	68,31868	63,01736	58,2988	53,86815	52,72538
DRO (Direct runoff)													
DRO = WS - i		91,89367	69,30996	32,78599	59,68807	0	0	0	0	0	0	0	0
WS (Water Surplus)													59,594
WS = (P-Ea)-SS	(P-Ea)												
P (Hujan)	mm/bln	448,4281	403,7867	300,8943	293,0814	115,4195	16,15701	3,07759	0	0,803464	0,17813	58,66595	375,8484
Ea (Evapotranspirasi aktual)													
Ea = Eto - ΔE													
ΔE (Evapotranspirasi Terbatas)	mm/bln	121,2811	157,0391	184,1742	126,3882	122,9014	127,0838	146,0664	133,9673	126,7637	124,0989	114,1464	115,3599
ΔE = Eto (m/20)(18-n)													
Exposed Surface (m)	%	-6,85364	1,433515	1,296547	3,016666	12,55903	14,81316	18,19589	16,53966	15,88547	16,76725	10,02445	1,83252
Jumlah Hail Hujan (n)	hari	22,0000	17,0000	15,0000	5,0000	2,0000	1,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Eto (Evapotranspirasi potensial)	mm/bln	207,3092	179,4397	156,6772	121,6643	116,8388	112,0206	129,5035	111,5122	105,7857	112,7059	110,2618	10,3342
SS (Soil Storage) = (SMi-SMf-1)	mm/bln	0	0	0	0	-7,48138	0	0	0	0	0	0	0
SMi (Soil Moisture awal bulan ini)	mm	48,33031	48,33031	48,33031	48,33031	40,84843	0	0	0	0	0	0	0
SMf-1 (Soil Moisture bulan laju)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
ISM (Initial Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
(Infiltrasi) = WS - (WIC atau DIC)	mm	235,5234	177,4377	83,33413	106,8051	0	0	0	0	0	0	0	152,5643
WIC (Koefisien infiltrasi musim hujan)		0,719106	0,719106	0,719106	0,640729	0,640729	0,640729	0,640729	0,640729	0,640729	0,640729	0,719106	0,719106
DIC (Koefisien infiltrasi musim kemarau)													
BSF (Alihan dasar)													
BSF = i - ΔV		66,14773	76,73426	80,8084	81,90799	79,75541	73,73271	68,1648	63,01736	58,29883	53,86815	49,79208	51,79247
i (Infiltrasi)	mm/bln	235,2534	177,4377	83,33413	106,8051	0	0	0	0	0	0	0	152,5643
ΔV (perubahan volume tanah)													
ΔV = GWS - IGWS	mm	169,1061	100,7034	3,125726	24,69716	-79,7554	-73,7327	-68,1648	-65,0174	-56,2586	-53,8592	-49,7921	100,7118
GWS (Ground Water Storage)													
GWS = 0,5 (1+β) · k · (GWS)	mm	92,4314	102,8,135	103,1,261	105,6,158	97,6,4023	90,2,6696	83,4,5048	77,1,4875	71,3,2288	65,9,3696	60,9,5775	71,0,3493
k (koefisien resesi aliran tanah)		0,924465	0,944485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	
IGWS (Initial Ground Water storage)	mm	758,3233	927,4314	1028,135	1031,261	1056,158	976,4023	902,6696	834,5048	771,1,4875	713,2288	659,3696	609,5775
SRO (Strom Run Off)	mm/bln	22,42141	20,18934	15,04472	14,65407	5,770977	0,807851	0,153879	0	0,040173	0,008907	2,933297	18,79242
Percentase faktor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	
Debit Terukur	m ³ /s	21,41613	117,725	108,529	119,07	62,39032	44,21333	34,09677	32,15161	25,73333	24,59355	47,56667	91,30645
Debit Terukur rata-rata	m ³ /s	117,0679	119,3915	83,4496	104,8739	55,4819	49,96712	44,31908	40,88905	39,0797	34,94486	35,24365	84,44847
D ² = ∑ (Qterukur - Qterukur ²)		1545,791	3248,124	2284,491	3403,242	2,747767	272,8889	709,4717	816,8776	124,995	1306,037	173,344	934,7553
D ² = ∑ (Qterukur - Qterukur ²) ²		9149,256	2,777374	626,978	201,5281	47,72626	33,10603	104,4955	76,18555	178,1256	107,1496	149,4022	47,03186

Lampiran B.3. Perhitungan Debit DAS PDA Kalibawang tahun 2003

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DES
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Qn = Tro . A	m ³ /s	91,57444	145,55354	107,44447	58,0805	53,37484	47,52668	42,14504	38,96247	37,4015	37,43779	74,33897	108,5504
Luas DAS (A)	km ²	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507
Total Limpasan (Tro)	Tro = DRO + BSF + SRO	mm/bin	141,1637	202,6347	165,6279	86,68513	82,27831	70,89993	64,96737	60,06138	55,79527	57,71106	110,8983
DRO (Direct runoff)													
DRO = WS - i													
WS (Water Surplus)													
WS = (P-Ea) - SS													
(P-Ea)													
P (Hujan)	mm/bin	227,5069	372,3096	223,7947	0	0	0	0	0	0	0	0	154,9838
Ea (Evapotranspirasi aktual)	mm/bin	348,788	529,3487	407,9689	89,3352	125,2805	12,51673	0	0	0	0	0	306,0876
Ea = Eto - ΔE													
ΔE (Evapotranspirasi Terbatas)													
ΔE = Eto (m/20)(18-n)													
Exposed Surface (m)	%	6,868187	-2,91569	1,915762	11,22732	14,1,1412	15,60882	17,05239	19,53129	16,61773	8,921591	3,21219	1,144487
Jumlah Hail Hujan (n)	hari	0	0	0	0	0	0	0	0	0	0	0	0
Eto (Evapotranspirasi potensial)	mm/bin	166,993	117,5919	115,8361	135,8417	131,3514	111,0939	114,4881	131,3884	125,6596	134,9303	129,5107	138,4/39
SS (Soil Storage) = SM(SM-1)n	mm/bin	0	0	0	0	0	0	0	0	0	0	0	0
SM (Soil Moisture bulan ini)													
SM-1 (Soil Moisture bulan lalu)	mm	48,33031	48,33031	48,33031	11,17767	13,55671	0	0	0	0	0	0	0
SMC (Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	11,17767	13,55671	0	0	0	0	0	3,465316
(Infiltrasi) = WS - (WIC atau DIC)													111,4498 / 20,1094
WIC (Koeffisien infiltrasi musim hujan)													
DIC (Koeffisien infiltrasi musim kemarau)													
BSF (Alihan dasar)													
BSF = i - ΔV													
i (Infiltrasi)	mm/bin	59,81396	71,58768	82,3669	82,22336	76,01429	70,27409	64,96737	60,06138	55,57586	51,33284	51,66451	60,28187
ΔV (perubahan volume tanah)	mm	163,6016	267,73	160,9321	0	0	0	0	0	0	0	0	111,4498 / 220,1094
ΔV = GWS - IGWS													
GWS (Ground Water Storage)													
GWS = 0,5 (1+β) · k · (GWS)	mm	814,319	1010,274	1088,339	1006,516	930,6018	860,3277	795,3603	752,4403	729,7731	679,7731	688,2255	848,053
k (Koeffisien resesi aliran tanah)													
IGWS (Initial Ground Water storage)	mm	710,3493	814,1319	1010,274	1088,339	1006,616	930,6018	860,3277	795,3603	752,4403	729,7731	679,7731	688,2255
SRO (Strom Run Off)													
SRO (Strom Run Off)	mm/bin	17,4394	26,46743	20,39844	4,461776	6,264023	0,625836	0	0	0,269411	6,378211	15,69976	21,07237
Precentage factor (PF)													
Debit Terikur	m ³ /s	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Debit Terikur rata-rata	m ³ /s	111,029	195,2857	156,729	41,76	27,68065	23,46667	24,8	77,29359	16,95333	25,05161	57,27667	93,26452
D ² = ∑ (Qterikur - Qterikur rata-rata) ²		1611,739	15476,14	7369,615	8481,1239	18664,406	2248,268	2123,603	41,01022	2908,352	2100,476	185,1205	500,95216
D ² = ∑ (Qterikur - Qterikur rata-rata) ²		378,481	2475,092	2428,949	267,2587	660,1912	578,8842	300,5505	1459,275	418,1227	155,4175	291,1223	233,6579

Lampiran B.4. Perhitungan Debit DAS PDA Kalibawang tahun 2004

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DES
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Qn = Tro . A	m ³ /s	114,9585	95,73946	81,25438	53,8887	49,37214	44,69149	40,56333	36,37526	34,77158	31,32028	42,16277	94,1546
Luas DAS (A)	km ²	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507
Total Limpasan (Tro)	mm/bln	177,2106	133,3018	125,4093	80,39074	76,10807	66,67041	62,52913	56,07313	51,87157	48,28079	62,89798	145,1411
DRO (Direct runoff)													
DRO = WS - i													
WS (Water Surplus)													
WS = (P-Ea) - S5													
(P-Ea)													
P (Hujan)	mm/bln	299,141	141,3632	110,6835	0	0	0	0	0	0	0	0	0
Ea (Evapotranspirasi aktual)	mm/bln	298,4221	298,4023	294,8577	76,3724	106,3655	74,52561	40,53979	2,795899	9,5521395	192,0243	336,1961	
Ea = Eto - ΔE													
ΔE (Evapotranspirasi Terbatas)													
ΔE = Eto (m/20)(18-n)													
Exposed Surface (m)	%	3,46757	0	-13,4023	34,05089	34,15156	36,71244	33,00746	36,23894	43,51135	29,52276	10,0926	-3,34555
Jumlah Hail Hujan (n)	hari	19,0000	18,0000	22,0000	7,0000	8,0000	3,0000	3,0000	1,0000	1,0000	6,0000	15,0000	0,1653
Eto (Evapotranspirasi potensial)	mm/bln	219,5493	386,2479	405,3943	363,9598	412,7666	296,1278	266,2428	257,9192	309,9783	297,6685	407,0416	404,9063
SS (Soil Storage) = (SMi-SMf-1)	mm/bln	0	0	-48,3303	0	0	0	0	0	0	0	48,33031	0
SMi (Soil Moisture awal bulan ini)	mm	48,33031	48,33031	48,33031	0	0	0	0	0	0	0	48,33031	48,33031
SMf-1 (Soil Moisture bulan laju)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
ISM (Initial Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
i (Infiltrasi) = WS - (WIC atau DC)	mm	215,1141	101,6551	79,59318	0	0	0	0	0	0	0	21,24785	194,7399
WIC (Koeffisien infiltrasi musim hujan)		0,719106	0,719106	0,719106									
DIC (Koeffisien infiltrasi musim kemarau)													
BSF (Alihan dasar)													
BSF = i - ΔV													
i (Infiltrasi)	mm/bln	72,16258	78,67361	79,57605	76,57312	70,7898	65,44413	60,50214	51,95334	51,70955	47,80472	44,99703	49,75497
ΔV (perubahan volume tanah)		215,1141	101,6551	79,59318	0	0	0	0	0	0	0	21,24785	194,7399
ΔV = GWS - IGWS													
GWS (Ground Water Storage)	mm	141,9515	22,98151	0,017131	-76,5721	-70,7898	-65,4441	-60,5021	55,9333	51,7096	-47,8047	23,7492	145,05
GWS = 0,5 (1+ <i>k</i>) · k · (GWS)	mm	99,00495	1013,9816	1014,003	931,431	866,6412	801,1971	740,659	584,7616	633,0521	585,4982	706,5031	
<i>k</i> (Koeffisien resesi aliran tanah)		84,92445	0,944485	0,944485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	
IGWS (Initial Ground Water Storage)	mm	848,053	991,0045	1013,986	1014,003	937,431	866,6412	801,1971	740,659	684,7616	633,0521	585,4982	
SRO (Strom Run Off)	mm/bln	21,02111	14,92011	14,74289	3,81862	5,318274	1,226281	2,026989	0,139795	0,162418	0,47607	9,601214	19,3098
Precentage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	
Debit Terukur	m ³ /s	113,229	110,8862	159,129	102,2833	58,92758	39,02	35,98387	18,70968	15,91333	15,44516	71,3733	135,6677
Debit Terukur rata-rata	m ³ /s	114,9585	95,73946	81,25438	53,8887	49,37214	44,69149	40,56333	36,37526	34,77158	31,32028	42,16277	94,1546
D ² = ∑ (Qterukur - Qterhitung) ²		1614,6	1431,81	7410,126	854,7666	199,4976	1157,833	1373,671	2952,538	3264,249	3317,965	2,800966	3921,365
		2,909867	229,124	6048,897	2342,041	91,2109	32,16577	20,97145	312,0727	355,6334	252,0193	853,2612	1723,341

Lampiran B.5. Perhitungan Debit DAS PDA Kalibawang tahun 2005

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AUGUST	SEPT	OKEBR	NOV	DES	
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31	
Qn = Tro . A	m ³ /s	82,88992	103,8194	60,39288	80,05631	44,92665	42,15738	36,7425	32,99074	32,14329	31,39766	31,38752	90,92826	
Luas DAS (A)	km ²	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	
Total Limpasan (Tro)	Tro = DRO + BSF + SRO (P-Ea)	mm/bln	127,7764	144,5519	93,09675	119,4274	69,25227	64,38185	56,64079	50,85584	47,95111	48,40008	46,82366	140,1676
DRO (Direct runoff)														
DRO = WS - i	mm/bln	53,63056	60,72256	13,94184	40,93665	0	0	0	0	0	0	0	0	
WS (Water Surplus)														
WS = (P-Ea)-SS	mm/bln	190,928	216,176	49,63378	113,9436	0	0	0	0	0	0	0	0	
P (Hujan)	mm/bln	312,2091	373,2151	233,808	240,3318	100,8872	100,396	35,23907	2,413855	20,94419	100,7632	134,7733	411,1004	
Ea (Evapotranspirasi aktual)														
Ea = Eto - ΔE	mm/bln	121,2811	157,0391	184,1742	126,3882	122,9014	127,0838	146,0664	133,9673	126,7657	124,0989	114,1464	115,3599	
ΔE = Eto (m/20)(18-n)	%	1,092,659	0,977,365	2,092,605	4,390,074	17,521,29	10,739	12,389,36	14,296,53	11,741,18	7,197,829	7,945,751	-5,333,38	
Exposed Surface (m)	%	17,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	0,1653	
Jumlah Hail Hujan (n)	hari	17,0000	17,0000	16,0000	14,0000	3,0000	6,0000	4,0000	1,00000	10,0000	11,0000	12,0000	13,0000	
Eto (Evapotranspirasi potensial)	mm/bln	131,2032	118,2534	126,5944	130,3441	141,3492	109,6985	107,0725	101,7511	101,4707	108,8601	131,7391	129,2046	
SS (Soil Storage) = SM(SMI-1)	mm/bln	0	0	0	0	-22,0142	-26,3161	0	0	0	0	0	20,57692	
SM(Soil Moisture bulan ini)														
SM-I (Soil Moisture bulan lalu)	mm	48,33031	48,33031	48,33031	48,33031	26,31613	0	0	0	0	0	0	0	
SMC (Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	
(Infiltrasi) = WS . (WIC atau DIC)														
WIC (Koeffisien infiltrasi musim hujan)														
DIC (Koeffisien infiltrasi musim kemarau)														
Bsf (Aliiran dasar)														
Bsf = i - ΔV	mm/bln	58,5354	65,16556	67,46452	66,77414	64,21091	59,36205	54,87934	50,77554	46,9039	43,36196	40,0875	44,23656	
i (Infiltrasi)														
ΔV (perubahan volume tanah)												0	192,7112	
ΔV = GWS - IGWS	mm	78,76213	90,28488	-31,7726	6,552809	-64,2109	-59,362	-54,8793	-50,77551	-46,9039	-43,36196	-40,0875	148,3746	
GWS (Ground Water Storage)														
GWS = 0,5 . (1+ $\frac{1}{k}$) . k (GWS)	mm	78,76213	87,57776	843,7776	850,3104	786,0995	726,7374	671,8581	62,11229	57,4219	530,8571	490,7696	639,1442	
k (Koeffisien resesi aliran tanah)														
IGWS (Initial Ground Water storage)	mm	706,5031	785,2653	843,7776	850,3104	786,0995	726,7374	671,8581	62,11229	57,4219	530,8571	490,7696		
SRO (Strom Run Off)														
mm/bln	15,61046	18,66075	11,6904	12,01659	5,044362	5,019802	1,761454	0,120693	1,047209	5,038112	6,736165	20,55502		
Precentage factor (PF)														
Debit Terukur	m ³ /s	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	
Debit Terukur rata-rata	m ³ /s	111,029	195,2857	156,729	41,76	27,68065	23,46667	24,64516	18,04839	16,95333	25,05161	57,27667	93,26452	
Debit Terukur rata-rata ²	m ³ /s	65,93256	82,88992	103,8194	60,39288	80,05631	44,92665	43,15738	36,7425	32,99074	32,14329	31,39766	90,92826	
D ² = Σ (Qterukur - Qterukur ²)		203,3,691	167,32,24	824,3,999	584,3,129	146,3,209	180,3,352	170,4,65	229,2,894	239,8,965	167,1,252	74,92456	747,0356	
		291,8096	8366,082	9280,554	146,6,507	297,4248	387,7243	146,5,699	223,2759	230,7,737	40,2273	670,2477	5,458305	

Lampiran B.6. Perhitungan Debit DAS PDA Kalibawang tahun 2006

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DES	
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31	
Qn = Tro . A	m ³ /s	125,6257	100,5278	71,49282	106,0169	83,17294	48,83175	42,68482	40,2694	38,63124	34,60793	35,90351	104,0495	
Luas DAS (A)	km ²	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	
Total Limpasan (Tro)	Tro = DRO + BSF + SRO	mm/bln	193,6544	139,9688	110,2075	158,1552	128,2126	72,84682	67,34001	62,07604	57,62994	53,34877	53,56058	
DRO (Direct runoff)														
DRO = WS - i		109,3037	52,69138	24,43692	68,55714	40,84674	0	0	0	0	0	0	0	
WS (Water Surplus)		389,1279	187,5845	86,9969	190,8228	143,6933	0	0	0	0	0	0	0	
WS = (P-Ea) - SS	(P-Ea)	mm/bln	510,4091	344,6236	271,1711	317,2111	236,5947	5,285153	4,770029	0,333439	5,601597	6,59226	90,90398	
P (Hujan)														
Ea (Evapotranspirasi aktual)														
Ea = Eto - ΔE														
ΔE (Evapotranspirasi Terbatas)														
ΔE = Eto (m/20)(18-n)														
Exposed Surface (m)	%	3,49421	0	1,850519	0,879256	6,421849	15,27675	15,08172	14,81017	14,06082	15,39907	12,01547	-1,32181	
Jumlah Hail Hujan (n)	hari	21,0000	18,0000	16,0000	17,0000	11,0000	1,0000	1,0000	1,0000	2,0000	2,0000	6,0000	19,0000	
Eto (Evapotranspirasi potensial)		mm/bln	140,9239	100,727	111,9551	106,4158	110,9599	108,7275	107,3394	105,3337	106,3282	116,4479	121,1481	159,9382
SS (Soil Storage) = (SMi-SMf-1)n		mm/bln	0	0	0	0	-48,3303	0	0	0	0	0	0	
SMi (Soil Moisture awal bulan ini)														
SMf-1 (Soil Moisture bulan lalu)														
SMG (Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	
(Infiltrasi) = WS - (WIC atau DIC)														
WIC (Koefisien infiltrasi musim hujan)														
DIC (Koefisien infiltrasi musim kemarau)														
BSF (Aliiran dasar)														
BSF = i - ΔV														
i (Infiltrasi)														
ΔV (perubahan volume tanah)														
ΔV = GWS - IGWS														
GWS (Ground Water Storage)														
GWS = 0,5 (1+ k) · k · (GWS)	mm	860,1382	924,9851	915,5333	963,8612	961,1716	888,589	821,4875	759,4532	702,1033	649,0842	600,0688	761,3401	
k (Koefisien resesi aliran tanah)														
IGWS (Initial Ground Water storage)	mm	639,1442	860,1382	924,9851	915,3333	963,8612	961,1716	888,589	821,4875	759,4532	702,1033	649,0842	600,0688	
SRO (Strom Run Off)														
Percentase faktor (PF)														
Debit Terukur	m ³ /s	160,2161	139,525	86,34516	134,06	57,73871	25,68	17,19355	15,37742	13,14667	11,70968	17,37333	79,30645	
Debit Terukur rata-rata	m ³ /s	125,6257	100,5278	71,49282	106,0169	83,17294	48,83175	43,6842	40,2694	38,63134	34,60793	35,90351	104,0495	
D ² = Σ (Qterukur - Qterhitung) ²		9433,903	5834,769	538,5101	5029,74	29,16682	1403,202	2111,016	2281,201	2499,268	2645,01	2094,527	261,3755	
		1196,497	1520,781	220,592	786,4151	646,8999	536,0034	701,7549	619,5109	649,4688	524,3299	343,3676	612,2182	
D ² = Σ (Qterukur - Qterhitung) ²														

Lampiran B.7. Perhitungan Debit DAS PDA Kalibawang tahun 2007

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DES	
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31	
Qn = Tro . A	m ³ /s	44,38635	87,15368	68,833582	98,66545	42,95603	41,36228	34,49524	31,26286	29,85936	28,43146	36,24654	142,9374	
Luas DAS (A)	km ²	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	
Total Limpasan (Tro)	Tro = DRO + BSF + SRO	mm/bln	68,42238	121,359	106,1117	146,4439	662,1752	61,70393	53,17505	48,10228	44,154395	43,82762	54,22208	220,3407
DRO (Direct runoff)														
DRO = WS - i														
WS (Water Surplus)														
WS = (P-Ea)-SS														
(P-Ea)														
P (Hujan)	mm/bln	133,5069	295,0679	278,4298	319,9961	104,9026	106,7117	21,2176	0,31988	0,113779	53,05293	181,0079	527,2026	
Ea (Evapotranspirasi aktual)														
Ea = Eto - ΔE														
ΔE (Evapotranspirasi Terbatas)														
ΔE = Eto (m/20).18-n)														
Exposed Surface (m)	%	0	-0,892665	11,40697	10,43277	14,40633	15,05997	14,83202	12,78832	4,233096	-3,41763			
Jumlah Hail Hujan (n)	hari	9,0000	20,0000	18,0000	19,0000	6,0000	6,0000	1,0000	0,0000	0,0000	13,0000	0,1653	0,1653	
Eto (Evapotranspirasi potensial)	mm/bln	107,6383	93,38682	105,916	108,0045	115,0128	105,1903	102,536	101,0955	99,88928	108,1524	103,6442	103,3766	
SS (Soil Storage) = (SMi-SMf-1)	mm/bln	0	0	0	-17,9988	-20,3668	-9,964657	0	0	0	0	48,33031	0	
SMi (Soil Moisture awal bulan ini)	mm	48,33031	48,33031	48,33031	48,33031	30,33147	9,964659	0	0	0	0	0	0	
SMf-1 (Soil Moisture bulan lalu)	mm	48,33031	48,33031	48,33031	48,33031	30,33147	9,964659	0	0	0	0	0	0	
SMG (Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	
(Infiltrasi) = WS - (WIC atau DIC)														
WIC (Koefisien infiltrasi musim hujan)														
DIC (Koefisien infiltrasi musim kemarau)														
BSF (Aliiran dasar)														
BSF = i - ΔV														
i (Infiltrasi)	mm/bln	57,76393	57,01277	58,22588	60,88664	60,97739	52,11146	48,17638	44,53826	41,17497	38,51397	46,01737		
ΔV (perubahan volume tanah)														
ΔV = GWS - IGWS														
GWS (Ground Water Storage)	mm	50,50712	31,42631	2,065409	63,16376	-60,9724	-56,3681	-52,1115	-48,1763	-44,5383	-41,1775	-26,6405	217,8822	
GWS = 0,5 (1+β) · k · (GWS)	mm	710,7689	742,1952	744,2606	807,4244	746,452	690,0839	637,9724	589,7962	545,2579	504,0829	477,4424	695,3046	
k (koefisien resesi aliran tanah)	m ³ /s	0,92445	0,944485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	
IGWS (Initial Ground Water storage)	mm	761,3401	710,7689	742,1952	744,2606	807,4244	746,452	690,0839	637,9724	589,7962	545,2579	504,0829	477,4424	
SRO (Strom Run Off)	mm/bln	6,625346	14,75339	13,32149	15,8998	5,245129	5,335849	1,063588	0,015994	0,005689	2,632646	9,050394	26,36013	
Precentage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05		
Debit Terukur	m ³ /s	58,3642	124,8284	104,9668	144,6149	57,42042	45,24758	29,10255	16,28502	12,15308	13,17761	42,0152	121,7778	
Debit Terukur rata-rata	m ³ /s	44,38635	87,15368	68,833582	98,16645	42,95603	41,36228	34,49524	31,26286	29,85936	28,43146	36,24654	142,9374	
D ² = ∑ (Qterukur - Qterhitung) ²		33,62108	3680,345	1664,382	6472,584	45,45666	357,777	122,9205	229,226	2704,988	2599,466	490,6249	3319,511	
D ² = ∑ (Qterukur - Qterhitung) ²		195,3804	1418,934	1305,445	2157,462	209,2185	15,09554	29,0811	224,3357	315,5123	232,6797	32,98576	447,7303	

Lampiran B.8. Perhitungan Debit DAS PDA Kalibawang tahun 2008

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DES	
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31	
Qn = Tro . A	m ³ /s	64,29356	62,94588	67,75524	81,5389	49,93538	37,32208	33,04222	30,6308	29,27546	46,93367	91,90233	60,57574	
Luas DAS (A)	km ²	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	1737,507	
Total Limpasan (Tro)	Tro = DRO + BSF + SRO	mm/bin	99,10972	87,6419	104,4475	121,6391	76,97631	55,67769	50,93628	47,21796	43,67291	72,34913	137,0992	93,77664
DRO (Direct runoff)														
DRO = WS - i														
WS (Water Surplus)														
WS = (P-Ea) - SS														
(P-Ea)	P (Hujan)													
Ea (Evapotranspirasi aktual)														
Ea = Eto - ΔE														
ΔE (Evapotranspirasi Terbatas)														
ΔE = Eto (m/20)(18-n)														
Exposed Surface (m)	%													
Jumlah Hail Hujan (n)	hari	16,0000	17,0000	18,0000	15,0000	9,0000	2,0000	0,0000	0,0000	0,0000	12,0000	18,0000	15,0000	
Eto (Evapotranspirasi potensial)	mm/bin	109,1067	96,83091	101,1067	107,6286	106,4538	108,2106	96,87216	92,98838	98,33651	101,1905	107,1849	101,4632	96,95248
SS (Soil Storage) = (SMi-SMf-1)n	mm/bin	0	0	0	0	0	-48,3303	0	0	0	0	0	0	
SMi (Soil Moisture awal bulan ini)														
SMf-1 (Soil Moisture bulan lalu)														
SMG (Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	0	0	0	0	0	0	
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	
(Infiltrasi) = WS - (WIC atau DIC)														
WIC (Koefisien infiltrasi musim hujan)														
DIC (Koefisien infiltrasi musim kemarau)														
BSF (Aliiran dasar)														
BSF = i - ΔV														
i (Infiltrasi)	mm/bin	55,57995	56,37816	57,16592	59,28534	58,39004	55,09691	50,93628	47,08984	43,53387	41,55695	46,68032	52,95033	
ΔV (perubahan volume tanah)											0	0	34,70907	18,0869
ΔV = GWS - IGWS	mm	25,84129	54,49899	25,573484	28,33345	-40,0417	-55,0969	-50,0353	-47,08988	-43,53387	-6,648787	137,4166	22,37118	
GWS (Ground Water Storage)														
GWS = 0,5 (1+ <i>b</i>) · k · (GWS)	mm	722,11459	715,6469	741,2218	769,6602	729,6185	674,5216	623,5853	576,2955	532,9616	526,1137	663,5303	685,9045	
k (Koefisien resesi aliran tanah)														
IGWS (Initial Ground Water storage)	mm	695,3046	721,1459	715,6469	741,2218	769,6602	729,6185	674,5216	623,5853	576,2955	532,9616	526,1137	663,5303	
SRO (Strom Run Off)														
Precentage factor (PF)	mm/bin	11,72534	11,3862	14,96174	13,16503	7,611238	0,579882	0	0,128112	0,139036	11,33002	18,50772	11,00337	
Debit Terukur	m ³ /s	63,38853	164,7904	146,3141	105,6744	48,41866	24,03182	15,04144	14,58424	12,86407	38,42404	116,6116	67,38371	
Debit Terukur rata-rata	m ³ /s	64,29356	62,94585	67,75624	81,5389	49,93538	37,32208	33,04222	30,6308	29,27546	46,93367	91,90233	60,57574	
D ² = ∑ (Qterukur - Qterhitung) ²		68,11517	22,34108	9346,107	6115,07	1410,695	387,9525	1943,342	2816,62	881,564	2351,905	0,768176		
D ² = ∑ (Qterukur - Qterhitung) ²		68,19066	10372,32	6171,335	562,5215	2,300432	176,631	324,0533	257,993	265,3338	72,41397	610,5486	44,99315	

C. Perhitungan Debit DAS Curuk Metode Mock

Lampiran C.1. Perhitungan Debit DAS Curuk tahun 2001

Uraian	Satuan	JAN	FEB	MARET	/APRIL	MELI	JUNI	JULI	AGUST	SEPT	OKEBRI	NOV	DES
Debit yang tersedia (Qn)													
Qn = Tro . A	m ³ /s	0,018185	0,030105	0,019542	0,047927	0,017535	0,012299	0,010837	0,009042	0,009228	0,058894	0,074734	0,032735
Luas DAS (A)	km ²	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996
Total Limpasan (Tr)													
Tro = DRO + BSF + SRO													
DRO (Direct runoff)													
DRO = WS - i													
WS (Water Surplus)													
WS = (P-Ea) . Ss													
(P-Ea)	mm/bin	92,81888	96,96092	39,92358	156,6118	14,59858	0	0	0	0	207,5708	307,8556	54,64012
P (Hujan)	mm/bin	214,10	254,00	224,10	283,00	137,50	51,00	42,00	0,00	22,00	380,00	422,00	170,00
Ea (Evapotranspirasi aktual)													
Ea = Eto - ΔE													
ΔE (Evapotranspirasi Terbatas)													
ΔE = Eto (m/20) (18-n)	%	0	0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)	%	0	0	0	0	0	0	0	0	0	0	0	0
Jumlah Hari Hujan (n)	hari	20,0000	15,0000	8,0000	14,0000	5,0000	4,0000	2,0000	0,0000	2,0000	16,0000	19,0000	12,0000
Eto (Evapotranspirasi potensial)													
SS (Soil Storage) = SMI(SMn-1)	mm/bin	121,2811	157,0391	184,1742	126,33882	122,9014	127,0838	146,0664	133,9673	126,7657	124,0989	114,1464	115,3599
SM1 (Soil Moisture bulan ini)	mm	38,35031	0	0	0	0	0	0	0	0	48,33031	0	0
SM1-1 (Soil Moisture bulan lalu)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
SMC (Soil Moisture Capacity)	mm	10	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
ISM (Initial Soil Moisture)	mm	10	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
i (Infiltrasi) = WS - (Mic atau DIC)													
WIC (Koeffisien infiltrasi musim hujan)		39,18305	69,72517	28,1088	100,3457	9,35372	0	0	0	0	132,9966	221,3794	39,29203
DIC (Koeffisien infiltrasi musim kemarau)		0,719106	0,719106	0,719106	0,640729	0,640729	0,640729	0,640729	0,640729	0,640729	0,719106	0,719106	
BSF (Airan dasar)													
BSF = i - ΔV		9,030915	12,46103	15,23673	18,95896	21,66924	20,38607	18,84662	17,42342	16,1077	19,91293	31,7895	39,23119
1 (Infiltrasi)	mm/bin	39,18305	69,72517	28,1088	100,3457	9,35372	0	0	0	0	132,9966	221,3794	39,29203
ΔV (perubahan volume tanah)													
ΔV = GWS - IGWS													
GWS (Ground Water Storage)													
GWS = 0,5 . (1+k) + k(GWS)	mm	30,15214	57,26414	13,47416	81,38675	-12,3155	-20,3861	-18,8466	-17,4234	-16,1077	113,0837	189,5899	0,6160848
k (Koeffisien resesi airan tanah)	mm	130,1521	187,4163	200,8804	282,2772	269,9617	249,5756	230,7729	213,3056	197,1979	310,2815	499,8714	49,9322
IGWS (Initial Ground Water Storage)	mm	100	130,1521	187,4163	200,8904	282,2772	269,9617	249,5756	230,7729	213,3056	197,1979	310,2815	499,8714
SRO (Strom Run Off) = P . PF													
Precentage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
debit Terhitung	m ³ /s	0,018185	0,030105	0,019542	0,047927	0,017535	0,012299	0,010837	0,009042	0,009228	0,058894	0,074734	0,032735

Lampiran C.2. Perhitungan Debit DAS Curuk tahun 2002

	Uraian	JAN	FEB	MARET	/APRIL	MELI	JUNI	JULI	AUGUST	SEPT	OKEBR	NOV	DEK
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31
$Qn = Tr_o \cdot A$	m^3/s	0.064865	0.091226	0.041753	0.058369	0.031252	0.028095	0.025136	0.023238	0.022199	0.019661	0.02085	0.065868
Luas DAS (A)	km^2	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996
Total Limpasan (Tr)													
$Tr_o = DRO + BSF + SRO$													
DRO (Direct runoff)													
$DRO = WS - i$													
WS (Water Surplus)	mm/bin	124.392	158.7773	80.45736	108.8469	60.22196	52.3924	48.436	44.77837	41.39695	38.27087	38.88086	134.6335
$WS = (P-Ea) \cdot SS$													
$(P-Ea)$	mm/bin	226.7189	290.9609	35.8258	107.6118	51.9014	-127.084	-146.066	-133.967	-126.766	-124.099	-44.1464	310.1401
P (Hujan)	mm/bin	348.00	448.00	220.00	234.00	71.00	0.00	0.00	0.00	0.00	0.00	70.00	425.50
Ea (Evapotranspirasi aktual)	mm/bin	63.68399	81.72921	10.06326	38.66183	0	0	0	0	0	0	0	73.54083
$Ea = Eto - \Delta E$													
ΔE (Evapotranspirasi Terbatas)													
$\Delta E = Eto (m/20)(18-n)$	%	0	0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)	%	0	0	0	0	0	0	0	0	0	0	0	0
Jumlah Hari Hujan (n)	hari	20.0000	16.0000	18.0000	14.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	21.0000
Eto (Evapotranspirasi potensial)													
SS (Soil Storage) = SMi_0/SMi_1	mm/bin	207.0392	179.4937	156.872	121.6643	116.888	112.0206	129.5035	111.5122	106.7787	112.7059	110.2618	110.3342
SMi_1 (Soil Moisture bulan ini)	mm	0	0	0	0	48.3303	0	0	0	0	0	0	0
SMi_1 (Soil Moisture bulan lalu)	mm	48.33031	48.33031	48.33031	48.33031	48.33031	0	0	0	0	0	0	48.33031
SMi_0 (Soil Moisture Capacity)	mm	48.33031	48.33031	48.33031	48.33031	48.33031	0	0	0	0	0	0	0
ISM (Initial Soil Moisture)	mm	48.33031	48.33031	48.33031	48.33031	48.33031	0	0	0	0	0	0	48.33031
i (Infiltrasi) = $WS_i - (WIC_i \text{ atau } DIC_i)$		163.0349	209.2317	25.76255	68.95	0	0	0	0	0	0	0	188.269
WIC_i (Koeffisien infiltrasi musim hujan)		0.719106	0.719106	0.719106	0.640729	0.640729	0.640729	0.640729	0.640729	0.640729	0.640729	0.640729	0.719106
DIC_i (Koeffisien infiltrasi musim kemarau)													
BSF (Aliran dasar)													
$BSF = I - AV$		43.90798	54.64808	59.39411	58.48507	56.67196	52.3924	48.436	44.77837	41.39695	38.27087	35.38086	39.81762
(Infiltrasi)	mm/bin	163.0349	209.2317	25.76255	68.95	0	0	0	0	0	0	0	188.269
ΔV (perubahan volume tanah)													
$\Delta V = GWS - IGWS$													
GWS (Ground Water Storage)													
$GWS = 0.5 \cdot (1-k) \cdot k \cdot (GWS)$	mm	119.1269	154.5836	-33.6316	10.46493	-56.672	-52.3924	-48.436	-44.7784	-41.3969	-38.2709	-35.3809	148.4514
k (Koeffisien resesi aliran tanah)	mm	619.0591	773.6428	740.0112	750.4761	693.8042	641.4118	592.9758	548.1974	506.8004	468.5296	433.1487	581.6001
$IGWS$ (Initial Ground Water Storage)	mm	499.9322	619.0591	773.6428	740.0112	750.4761	693.8042	641.4118	592.9758	548.1974	506.8004	468.5296	433.1487
SRO (Strom Run Off) = $P \cdot PF$	mm/bin	17.4	22.4	11	11.7	3.55	0	0	0	0	0	3.5	21.275
Percentage factor (PF)		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Debit Terhitung	m^3/s	0.064865	0.091226	0.041753	0.058369	0.031252	0.028095	0.025136	0.023238	0.022199	0.019661	0.02085	0.065868

Lampiran C.3. Perhitungan Debit DAS Curuk tahun 2003

	Uraian	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AGUST	SEPT	OKESTR	NOV	DECS
Debit yang tersedia (Qn)	Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Qn = Tro . A	m^3/s	0,078285	0,116313	0,120433	0,048767	0,043532	0,041213	0,036152	0,033422	0,031928	0,030381	0,029561	0,028719
Luas DAS (A)	km ²	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996
Total limbahan (Tro)	mm/bin	150,8516	202,4411	232,0695	90,94167	83,88379	76,83368	69,66337	64,40276	59,53941	58,54331	94,28641	113,1493
DRO (Direct runoff)													
DRO = WS - i		79,13317	109,2568	118,7693	0	0	0	0	0	0	0	0	27,67462
WS (Water Surplus)		281,7189	388,9609	422,8258	0	0	0	0	0	0	0	0	98,52331
(P-Ea)		281,7189	388,9609	422,8258	-70,8838	-75,4014	-97,0838	-146,066	-133,967	-126,766	-54,0589	146,8536	154,1401
P (Hujan)	mm/bin	403,00	546,00	607,00	55,50	47,50	30,00	0,00	0,00	0,00	70,00	261,00	269,50
Ea (Evapotranspirasi aktual)	mm/bin	121,2811	157,0391	184,1742	126,3882	122,9014	127,0838	146,0564	133,9673	126,7657	124,089	114,1464	115,3599
Ea = Eto - ΔE (Evapotranspirasi Terbatas)		0	0	0	0	0	0	0	0	0	0	0	0
ΔE = Eto (m/20)/(18-h)	%	0	0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)		15,0000	22,0000	21,0000	10,0000	6,0000	1,0000	0,0000	0,0000	0,0000	17,0000	18,0000	
Jumlah Hari Hujan (n)		166,1993	117,5919	115,8861	135,8417	131,3614	111,0909	114,44881	131,6884	125,6596	134,9303	129,5107	138,4739
Eto (Evapotranspirasi potensial)	mm/bin	0	0	0	48,39303	0	0	0	0	0	0	0	0
SS (Soil Storage) = SMI(SM_i - SM_{i-1})	mm/bin	48,33031	48,33031	48,33031	0	0	0	0	0	0	0	0	48,33031
SM_{i-1} (Soil Moisture bulan lalu)		48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
SMC (Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	0	0	0	0	0	48,33031
i (Infiltrasi) = W_s - (WIC atau DIC)		202,5857	279,7041	304,0565	0	0	0	0	0	0	0	0	70,8487
WIC (Koeffisien infiltrasi musim hujan)		0,719106	0,719106	0,719106									0,719106
DIC (Koeffisien infiltrasi musim kemarau)													
BSF (Airan dasar)													
BSF = i - ΔV		51,56844	65,88424	82,95026	88,16667	81,50879	75,35368	69,66337	64,40276	59,53941	55,04331	53,56179	56,37729
i (Infiltrasi)	mm/bin	202,5857	279,7041	304,0565	0	0	0	0	0	0	0	0	70,8487
ΔV (perubahan volume tanah)		151,0173	213,8199	221,1063	-88,1667	-81,5088	-75,3537	-69,6634	-64,4028	-59,5394	-55,0433	17,28691	54,46578
GWS (Ground Water Storage)		mm	732,6174	946,4372	1167,543	1079,377	997,868	922,5143	852,851	788,4482	728,9088	673,8655	691,1524
GWS = 0,5 · (1+i) · i · (GWS_i)			0,924495	0,924495	0,924495	0,924495	0,924495	0,924495	0,924495	0,924495	0,924495	0,924495	0,924495
k (Koeffisien resesi airan tanah)		581,6001	732,6174	946,4372	1167,543	1079,377	997,868	922,5143	852,851	788,4482	728,9088	673,8655	691,1524
(GWS Initial Ground Water Storage)	mm	20,15	27,3	30,35	2,775	1,5	0	0	0	0	0	0	13,475
SRO (Strom Run Off) = P · PF	mm/bin	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Percentage factor (PF)													
Debit Terhitung	m^3/s	0,078285	0,116313	0,120433	0,048767	0,043532	0,041213	0,036152	0,033422	0,031928	0,030381	0,029561	0,028719

Lampiran C.4. Perhitungan Debit DAS Curuk tahun 2004

Urain	JAN	FEB	MARET	<th>MEL</th> <th>JUNI</th> <th>JULI</th> <th>AGUST</th> <th>SEPT</th> <th>OKEBR</th> <th>NOV</th> <th>DEK</th>	MEL	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DEK
Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Debit yang tersedia (Qn)												
On = Tro / A	m ³ /s	0,07728	0,061622	0,04586	0,073069	0,040028	0,033787	0,030094	0,026814	0,026206	0,074084	0,089244
Luas DAS (A)	km ²	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996
Total Limpasan (Tr)												
Tro = DRO + BSF + SRO	mm/bln	148,9156	107,2521	88,36959	136,2385	77,13208	63,00602	57,99071	51,67014	48,86828	142,7569	166,4232
DRO (Direct runoff)												
DRO = WS - i		67,89741	27,23575	11,21492	56,26612	5,24485	0	0	0	0	74,57421	86,47427
WS (Water Surplus)		241,7189	96,96092	39,9258	156,6118	14,59858	0	0	0	0	207,5708	307,8536
WS = (P-Ea) SS		241,7189	96,96092	39,9258	156,6118	14,59858	-76,0838	-104,066	-133,967	-104,766	255,9011	307,8536
(P-Ea)												
P (Hujan)	mm/bln	363,00	254,00	224,10	283,00	137,50	51,00	42,00	0,00	22,00	380,00	422,00
Ea (Evapotranspirasi aktual)												
Ea = Eto - ΔE	mm/bln	121,2811	157,0391	184,1742	126,3882	122,9014	127,0838	146,0664	133,9673	126,7657	124,0989	114,1464
ΔE (Evapotranspirasi Terbatas)												115,3599
ΔE = Eto (m/20)(18-n)		0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)	%	0	0	0	0	0	0	0	0	0	0	0
Jumlah Hari Hujan (n)	hari	23,0000	19,0000	19,0000	6,0000	9,0000	1,0000	0,0000	0,0000	3,0000	14,0000	22,0000
Eto (Evapotranspirasi potensial)												
SS (Soil Storage) = SMn/SMi-1	mm/bln	419,5493	386,2479	405,3943	333,9398	412,7666	296,1278	266,2428	257,9192	309,6783	297,6685	407,0416
SMi (Soil Moisture bulan ini)		0	0	0	0	0	0	0	0	0	0	0
SMi-1 (Soil Moisture bulan lalu)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
SMiC (Soil Moisture Capacity)												
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
i (Infiltrasi) = WS - (WIC atau DIC)		173,8215	69,72517	28,71088	100,3457	9,355732	0	0	0	0	132,9566	221,3794
WIC (Koeffisien infiltrasi musim hujan)		0,719106	0,719106	0,719106							0,719106	0,719106
DIC (Koeffisien infiltrasi musim kemarau)												
BSF (Aliran dasar)												
BSF = I - AV		62,86815	67,31635	65,94967	65,8433	65,01223	50,45602	55,89071	51,67014	47,76828	49,18267	58,84895
I (Infiltrasi)	mm/bln	173,8215	69,72517	28,71088	100,3457	9,355732	0	0	0	0	132,9566	221,3794
AV (perubahan volume tanah)												
ΔV = GWS - IGWS		110,9533	2,408817	-37,72388	34,50338	-55,6585	-60,456	-55,8307	-51,6701	-47,7683	83,8191	162,5304
GWS (Ground Water Storage)												
GWS = 0,5 · (1+ $\frac{1}{k}$)·k/(GWS)		855,6715	858,3803	821,7415	836,2449	800,5864	740,1304	684,2397	632,5695	584,8013	668,1556	805,1904
k (Koeffisien resesi aliran tanah)		0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485
IGWS (Initial Ground Water Storage)	mm	745,6182	856,5715	838,9803	821,7415	856,4449	800,5864	740,1304	684,2397	632,5695	584,8013	668,1552
SRO (Strom Run Off) = P · PF	mm/bln	18,15	12,7	11,205	14,15	6,875	2,55	0	1,1	19	21,1	8,5
Precantage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Debit Terhitung	m ³ /s	0,07728	0,061622	0,04586	0,073069	0,040028	0,033787	0,030094	0,026814	0,026206	0,074084	0,089244
												0,045717

Lampiran C.5. Perhitungan Debit DAS Curuk tahun 2005

Urain	JAN	FEB	MARET	/APRIL	MEL	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DEK
Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Debit yang tersedia (Qn)												
On = Tro / A	m ³ /s	0,06386	0,044837	0,03536	0,034064	0,026806	0,026331	0,023325	0,021258	0,02085	0,021631	0,0289
Luas DAS (A)	km ²	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996
Total Limpasan (Tr)	mm/bln	123,0558	78,03761	68,13642	63,52258	51,65338	49,10279	44,94676	40,96303	38,88105	41,6818	53,89223
DRO (Direct runoff)												
DRO = WS - i		44,02141	4,483329	0	0	0	0	0	0	0	0	0
WS (Water Surplus)		156,7189	15,96092	0	0	0	0	0	0	0	0	0
WS = (P-Ea) SS		156,7189	15,96092	-30,1742	26,61184	-122,901	-100,084	-130,066	-130,967	-103,766	11,9011	75,55362
(P-Ea)	P (Hujan)	mm/bln	278,00	173,00	154,00	153,00	0,00	27,00	16,00	3,00	23,00	136,00
Ea (Evapotranspirasi aktual)		121,2811	157,0391	184,1742	126,3882	122,9014	127,0838	146,0664	133,9673	126,7657	124,0889	114,1464
Ea = Eto - ΔE												115,3599
ΔE (Evapotranspirasi Terbatas)												
ΔE = Eto (m/20)(18-n)		0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)	%	0	0	0	0	0	0	0	0	0	0	0
Jumlah Hari Hujan (n)	hari	17,0000	14,0000	11,0000	12,0000	0,0000	5,0000	2,0000	2,0000	3,0000	15,0000	13,0000
Eto (Evapotranspirasi potensial)												
SS (Soil Storage) = SMn/SMi-1	mm/bln	132,0232	118,2534	126,5944	130,341	141,3292	109,6985	107,0725	101,7511	101,4707	108,8501	137,3391
SMi-1 (Soil Moisture bulan ini)	mm	0	0	0	0	0	0	0	0	0	11,9011	36,28291
SMi-1 (Soil Moisture bulan lalu)	mm	48,33031	48,33031	18,15611	44,76795	0	0	0	0	0	11,9011	48,33031
SMiC (Soil Moisture Capacity)	mm	48,33031	48,33031	18,15611	44,76795	0	0	0	0	0	11,9011	48,33031
ISM (Initial Soil Moisture)	mm	0	48,33031	48,33031	18,15611	44,76795	0	0	0	0	0	11,9011
i (Infiltrasi) = WS - (WIC atau DIC)		112,6975	11,47759	0	0	0	0	0	0	0	0	28,5033
WIC (Koefisien infiltrasi musim hujan)		0,719106	0,719106	0,719106								169,0906
DIC (Koefisien infiltrasi musim kemarau)												
BSF (Aliran dasar)												
BSF = I - AV		65,13436	64,90428	60,43642	55,87258	51,65338	47,75279	44,14676	40,81303	37,73105	34,8818	33,31814
(Infiltrasi)	mm/bln	112,6975	11,47759	0	0	0	0	0	0	0	0	28,5033
ΔV (perubahan volume tanah)												
ΔV = GWS - IgWS		47,56311	-53,4267	-60,4364	-55,8726	-51,6534	-47,7528	-44,1468	-40,813	-37,731	-34,8818	-4,96782
GWS (Ground Water Storage)	mm	853,7535	800,3268	739,8304	684,0178	632,3644	584,6116	540,4649	499,6518	461,9208	427,039	130,8337
k (Koefisien resesi aliran tanah)		0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485
IgWS (Initial Ground Water Storage)	mm	806,1904	853,7535	800,3268	739,8304	684,0178	632,3644	584,6116	540,4649	499,6518	461,9208	427,039
SRO (Strom Run Off) = P · PF	mm/bln	13,9	8,65	7,7	7,65	0	1,35	0,8	0,15	1,15	6,8	9,5
Preccentage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Debit Terhitung	m ³ /s	0,06386	0,044837	0,05536	0,034064	0,026806	0,026331	0,023325	0,021258	0,02085	0,021631	0,0289
												0,063225

Lampiran C.6. Perhitungan Debit DAS Curuk tahun 2006

Urain	JAN	FEB	MARET	/APRIL	MELI	JUNI	JULI	AUGUST	SEPT	OKEBR	NOV	DEK
Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Debit yang tersedia (Qn)												
On = Tro / A	m ³ /s	0,07356	0,054511	0,039522	0,067396	0,034953	0,028939	0,025757	0,022805	0,022375	0,070657	0,085971
Luas DAS (A)	km ²	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996	1,38996
Total Limpasan (Tr)	mm/bln	141,7476	94,87607	76,92813	125,681	67,35337	33,96575	49,63311	43,94366	41,72527	136,1533	160,3183
DRO (Direct runoff)												
DRO = WS - i												
WS (Water Surplus)												
WS = (P-Ea) SS		262,3439	96,96092	39,9258	156,6118	14,59858	0	0	0	207,5708	307,8536	54,64012
(P-Ea)												
P (Hujan)	mm/bln	383,63	254,00	224,10	283,00	137,50	51,00	42,00	0,00	22,00	380,00	422,00
Ea (Evapotranspirasi aktual)												
Ea = Eto - ΔE												
ΔE (Evapotranspirasi Terbatas)												
ΔE = Eto (m/20)(18-n)		0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)	%	0	0	0	0	0	0	0	0	0	0	0
Jumlah Hari Hujan (n)	hari	15,0000	20,0000	19,0000	17,0000	14,0000	2,0000	0,0000	3,0000	0,0000	0,0000	16,0000
Eto (Evapotranspirasi potensial)												
SS (Soil Storage) = SMi/SMi-1	mm/bln	140,9239	100,727	111,9551	106,4158	110,999	108,7275	107,3394	105,8337	106,3238	116,4479	121,1481
SMi (Soil Moisture bulan ini)	mm	0	0	0	0	0	0	0	0	0	0	0
SMi-1 (Soil Moisture bulan lalu)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
SMiC (Soil Moisture Capacity)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
ISM (Initial Soil Moisture)	mm	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
i (Infiltrasi) = WS - (WIC atau DIC)		188,653	69,72517	28,71088	100,3457	9,353732	0	0	0	132,9566	221,3794	39,29203
WIC (Koeffisien infiltrasi musim hujan)		0,719106	0,719106	0,719106	0,640729	0,640729	0,640729	0,640729	0,640729	0,719106	0,719106	
DIC (Koeffisien infiltrasi musim kemarau)												
BSF (Aliran dasar)												
BSF = I - AV		48,87547	54,94032	54,50821	55,26487	55,23352	51,41575	47,3311	43,94366	40,62527	42,57906	52,74401
I (Infiltrasi)	mm/bln	188,653	69,72517	28,71088	100,3457	9,353732	0	0	0	0	132,9566	221,3794
ΔV (perubahan volume tanah)												
ΔV = GWS - IGWS												
GWS (Ground Water Storage)	mm	139,7776	14,78485	-25,7973	45,08084	-45,8798	51,4158	-47,5331	-43,9437	-40,6253	90,41752	168,6353
GWS = 0,5 · (1+ $\frac{1}{k}$)·k/(GWS)												
k (Koeffisien resesi aliran tanah)	mm	692,6834	707,4673	681,6699	726,7508	680,871	629,4552	581,9221	537,9785	497,5532	587,7707	756,4061
IGWS (Initial Ground Water Storage)	mm	552,9048	692,6834	707,4673	681,6699	726,7508	680,871	629,4552	581,9221	537,9785	497,3332	587,7707
SRO (Strom Run Off) = P · PF	mm/bln	19,18125	12,7	11,205	14,15	6,875	2,55	0	1,1	19	21,1	8,5
Preccentage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Debit Terhitung	m ³ /s	0,07556	0,054511	0,039522	0,067396	0,034953	0,028939	0,025757	0,022375	0,022805	0,070657	0,085971

Lampiran C.7. Perhitungan Debit DAS Curuk tahun 2007

Urain	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DEK
	31	28	31	30	31	30	31	31	30	31	30	31
Debit yang tersedia (Qn)												
On = Tro · A	0.031844	0.082913	0.041325	0.082409	0.033846	0.032047	0.027652	0.025603	0.024421	0.023351	0.027095	0.0272719
Luas DAS (A)	m ³ /s	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996
Total Limpasan (Tr)	mm/bln	61,36147	144,369	79,63254	133,6761	65,2194	59,76148	53,28408	49,33535	45,54047	44,9965	50,52744
DRO (Direct runoff)												
DRO = WS - i	0	66,39769	8,237445	74,94822	0	0	0	0	0	0	0	0
WS (Water Surplus)		0	236,3798	29,2258	208,6118	0	0	0	0	0	0	0
WS = (P-Ea) · SS		-7,28112	243,6609	29,2258	208,6118	-65,4014	-84,5838	-146,666	-132,467	-126,766	-66,189	58,05362
(P-Ea)	P (Hujan)	mm/bln	114,00	400,70	213,50	335,00	57,50	42,50	0,00	1,50	0,00	57,90
Ea (Evapotranspirasi aktual)												
Ea = Eto - ΔE												
ΔE (Evapotranspirasi Terbatas)												
ΔE = Eto (m/20)(18-n)	0	0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)	%	0	0	0	0	0	0	0	0	0	0	0
Jumlah Hari Hujan (n)	hari	10,0000	22,0000	19,0000	21,0000	10,0000	7,0000	0,0000	1,0000	0,0000	19,0000	29,0000
Eto (Evapotranspirasi potensial)												
SS (Soil Storage) = SMn/SMi-1	mm/bln	107,6383	93,99682	79,6182	108,0045	115,0128	105,1903	102,536	101,0953	99,89928	103,1524	103,6442
SMi (Soil Moisture bulan ini)		-7,28112	7,28112	0	0	48,3303	0	0	0	0	0	48,3303
SMi-1 (Soil Moisture bulan lalu)		41,04919	48,33031	48,33031	48,33031	0	0	0	0	0	0	48,33031
SMiC (Soil Moisture Capacity)	mm	48,33031	41,04919	48,33031	48,33031	0	0	0	0	0	0	48,33031
ISM (Initial Soil Moisture)	mm	48,33031	41,04919	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031	48,33031
i (Infiltrasi) = WS - (WIC atau DIC)	0	169,9821	21,08836	133,6636	0	0	0	0	0	0	0	6,992093
WIC (Koeffisien infiltrasi musim hujan)	0,719106	0,719106										196,5605
DIC (Koeffisien infiltrasi musim kemarau)												
BSF (Aliran dasar)												
BSF = I - AV												
(AV) (perubahan volume tanah)	mm/bln	0	169,9821	21,08836	133,6636	0	0	0	0	0	0	6,992093
ΔV = GWS - IGWS	mm	-55,6615	112,1058	-39,6317	71,68576	-62,3444	-57,6365	-53,2841	-49,2604	-45,5405	-42,1015	39,18632
GWS (Ground Water Storage)												
GWS = 0,5 · (1+ $\frac{1}{k}$) · k · (GWS)	mm	681,4333	793,3391	753,9074	825,5932	763,2488	705,6123	652,3382	603,0678	557,5274	515,4259	483,2317
k (Koeffisien resesi aliran tanah)		0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485	0,924485
IGWS (Initial Ground Water Storage)	mm	731,0948	681,4333	793,5391	733,9074	825,5932	763,2488	705,6123	652,3382	603,0678	557,5274	515,4259
SRO (Strom Run Off) = P · PF	mm/bln	5,7	20,035	10,675	16,75	2,875	2,125	0	0,075	0	2,895	8,61
Preccentage factor (PF)	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Debit Terhitung	m ³ /s	0,031844	0,082913	0,041325	0,082409	0,033846	0,032047	0,027652	0,025603	0,024421	0,023351	0,027095
												0,0272719

Lampiran C.8. Perhitungan Debit DAS Curuk tahun 2008

Urain	JAN	FEB	MARET	APRIL	MEI	JUNI	JULI	AGUST	SEPT	OKEBR	NOV	DEK
Satuan	31	28	31	30	31	30	31	31	30	31	30	31
Debit yang tersedia (Qn)												
On = Tro · A	m ³ /s	0.045889	0.083022	0.040537	0.081656	0.033172	0.030264	0.027076	0.025071	0.023913	0.037514	0.114965
Luas DAS (A)	km ²	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996	1.38996
Total Limpasan (Tr)	mm/bin	88.42563	144.4979	78.11407	152.2723	63.9216	56.43669	52.17489	48.30992	44.59248	72.28729	214.3871
DRO (Direct runoff)												
DRO = WS - i												
WS (Water Surplus)	mm/bin	26.94305	68.44292	8.237445	74.94822	0	0	0	0	0	18.59575	131.9229
WS = (P-Ea)·SS	mm/bin	95.91888	243.6609	29.2258	208.6118	0	0	0	0	51.77079	459.6536	0
(P-Ea)	%	95.91888	243.6609	29.2258	208.6118	-65.4014	-127.084	-146.066	-132.467	-126.766	100.1011	469.6536
P (Hujan)	mm/bin	217,20	400,70	213,50	335,00	57,50	0,00	0,00	1,50	0,00	224,20	583,80
Ea (Evapotranspirasi aktual)	mm/bin	121.2811	157.0391	184.1742	126.3882	122.9014	127.0838	146.0664	133.9673	126.7657	124.0989	114.1464
Ea = Eto - ΔE												115.3599
ΔE (Evapotranspirasi Terbatas)												
ΔE = Eto (m/20)(18-n)		0	0	0	0	0	0	0	0	0	0	0
Exposed Surface (m)	%	0	0	0	0	0	0	0	0	0	0	0
Jumlah Hari Hujan (n)	hari	18.0000	22.0000	19.0000	21.0000	10.0000	0.0000	1.0000	0.0000	14.0000	25.0000	10.0000
Eto (Evapotranspirasi potensial)	mm/bin	109.1067	96.83091	107.6286	106.44338	108.2106	96.87216	92.9888	98.33651	101.1905	107.1849	101.4632
SS (Soil Storage) = SMI(SM _{i-1} - SM _i)	mm/bin	0	0	0	0	48.3303	0	0	0	0	48.3303	0
SM _{i-1} (Soil Moisture bulan ini)	mm	48.33031	48.33031	48.33031	48.33031	48.33031	0	0	0	0	48.33031	48.33031
SM _i (Soil Moisture bulan lalu)	mm	48.33031	48.33031	48.33031	48.33031	48.33031	0	0	0	0	48.33031	48.33031
SMC (Soil Moisture Capacity)	mm	48.33031	48.33031	48.33031	48.33031	48.33031	48.33031	48.33031	48.33031	48.33031	48.33031	48.33031
ISM (Initial Soil Moisture)	mm	48.33031	48.33031	48.33031	48.33031	48.33031	0	0	0	0	48.33031	48.33031
i (Infiltrasi) = WS - (WIC atau DIC)	mm	68.97583	175,218	21.08836	133.6636	0	0	0	0	33.17104	337.7307	0
WIC (Koeffisien infiltrasi musim hujan)		0.719106	0.719106	0.719106	0.640729	0.640729	0.640729	0.640729	0.640729	0.719106	0.719106	
DIC (Koeffisien infiltrasi musim kemarau)												
BSF (Aliran dasar)												
BSF = I - AV		50.62258	56.01994	59.20162	60.57405	61.0466	56.43669	52.17489	48.33492	44.59248	42.47754	53.27412
I (Infiltrasi)	mm/bin	68.97583	175,218	21.08836	133.6636	0	0	0	0	0	33.17104	337.7307
AV (perubahan volume tanah)												
ΔV = GWS - IGWS												
GWS (Ground Water Storage)	mm	18.35335	119.1981	38.1133	73.08956	-61.0466	-56.4367	-52.1749	-48.2349	-44.5925	-9.3065	284.4566
GWS = 0,5 · (1+ $\frac{1}{k}$) · k · (GWS)	mm	654,2328	773,3109	735,3176	808,4072	747,3606	690,9239	638,749	590,5141	545,9216	536,6151	821,0716
k (Koeffisien resesi aliran tanah)		0.924485	0.924485	0.924485	0.924485	0.924485	0.924485	0.924485	0.924485	0.924485	0.924485	0.924485
IGWS (Initial Ground Water Storage)	mm	635,8796	654,2328	773,4309	735,3176	808,4072	747,3606	690,9239	638,749	590,5141	545,9216	536,6151
SRO (Strom Run Off) = P · PF	mm/bin	10,86	20,035	10,675	16,75	2,875	0	0	0,075	0	11,21	29,19
Percentage factor (PF)		0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Debit Terhitung	m ³ /s	0,045889	0,083022	0,040537	0,081656	0,033172	0,030264	0,027076	0,025071	0,023913	0,037514	0,114965
												0,034478