TUGAS AKHIR TERAPAN – VC181819

# OPTIMASI AIR WADUK PIDEKSO WONOGIRI JAWA TENGAH UNTUK KEPENTINGAN AIR BAKU, IRIGASI, DAN MIKRO HIDRO DENGAN BEBERAPA ALTERNATIF POLA TANAM

MEIKA VICTORIA
NRP 10111610000001

Dosen Pembimbing I :
Dr. Ir. Kuntjoro, M.T.
NIP. 19580629 198703 1 002

Dosen Pembimbing II :
Dwi Indriyani, S.T., M.T.
NIP. 19810210 201404 2 001

DEPARTEMEN TEKNIK INFRASTUKTUR SIPIL
Fakultas Vokasi
Institut Teknologi Sepuluh Nopember
Surabaya 2020

APPLIED FINAL PROJECT – VC181819

# OPTIMIZATION OF PIDEKSO RESERVOIR IN WONOGIRI CENTRAL FOR THE NEEDS OF RAW WATER, IRRIGATION, AND MICRO HYDRO WITH SOME ALTERNATIVE PLANTING PATTERNS

MEIKA VICTORIA
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Surabaya 2020

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Surabaya 2020

# LEMBAR PENGESAHAN

## OPTIMASI AIR WADUK PIDEKSO WONOGIRI JAWA TENGAH UNTUK KEPENTINGAN AIR BAKU, IRIGASI, DAN MIKRO HIDRO DENGAN BEBERAPA ALTERNATIF POLA TANAM

**TUGAS AKHIR TERAPAN**

Diajukan Untuk Memenuhi Salah Satu Syarat Memperoleh
Gelar Sarjana Sains Terapan Pada
Program Studi Sarjana Terapan
Departemen Teknik Infrastruktur Sipil
Fakultas Vokasi
Institute Teknologi Sepuluh Nopember
Surabaya

Surabaya, 21 Agustus 2020

Oleh :
**MAHASISWA**

**Meika Victoria**
NRP. 10111610000001

Disetujui oleh :

| DOSEN PEMBIMBING I | DOSEN PEMBIMBING II |
|---|---|
| **Dr. Ir. Kuntjoro, M.T** | **Dwi Indriyani, S.T., M.T.** |
| NIP 19580629 198703 1 002 | NIP. 19810210 201404 2 001 |

# Berita Acara Sidang Proyek Akhir

Departemen Teknik Infrastruktur Sipil Fakultas Vokasi ITS
Semester Genap 2019-2020
Nomor BA :
Nomor Jadwal : 13

Program Studi : D4 Teknik Sipil (TRPPBS)
Diinput oleh : Dwi Indriyani, ST., MT.
Bahwa pada hari ini : Selasa, 04-Agt-2020 Pukul : 12.30 s/d 15:00
Di tempat : Online Meeting

Telah dilaksanakan sidang Proposal Tugas Akhir dengan judul:

OPTIMASI AIR WADUK PIDEKSO WONOGIRI JAWA TENGAH DENGAN METODE PROGRAM DINAMIK UNTUK AIR BAKU, IRIGASI, DAN MIKRO HIDRO

| Yang dihadiri dan dipresentasikan oleh mahasiswa : | ( Hadir / Tidak Hadir) |
|---|---|
| 10111610000001 MEIKA VICTORIA | Hadir |

| Yang dihadiri oleh dosen Pembimbing: | | ( Hadir / Tidak Hadir) |
|---|---|---|
| 1 | Dr. Ir. Kuntjoro, MT. | Hadir |
| 2 | Dwi Indriyani, ST., MT. | Hadir |

| Yang dihadiri oleh dosen Penguji: | | ( Hadir / Tidak Hadir) |
|---|---|---|
| 1 | Dr. Ir. Suharjoko, MT. | Hadir |
| 2 | Ir. Edy Sumirman, MT. | Hadir |
| 3 | Muh. Hafiizh Imaaduddiin, ST., MT. | |

Bahwasanya, musyawarah pembimbing dan penguji pada sidang proyek akhir ini memutuskan:

**10111610000001 MEIKA VICTORIA**

**LULUS, DENGAN REVISI MINOR**

Catatan / revisi / masukan :

Dr. Ir. Suharjoko, MT.

a Saran judulnya diganti dengan judul "Optimasi pemanfataan waduk Pidekso untuk kepentingan air baku, irigasi dan PTMH dengan beberapa alternatif pola tanam"
b Constrain akumulasi release tidak boleh lebih dari pada inflow waduk dalam setahun
c Di batasan ditambahkan penjelasan pola tanamnya
d
e
f

Ir. Edy Sumirman, MT.

a
b
c
d
e
f

Muh. Hafiizh Imaaduddiin, ST., MT.

a penulisan pada kesimpulan sebaiknya disamakan untuk tanda koma dan titik.

b satuan debit disamakan dalam m3/dtk atau lt/dtk

c hasil simulasi pada bab Analisa ditampilkan secara prioritas nilai-K = inflow/demand agar mudah dipahami. (K akumulasi setahun harus >= 1)

d
e
f

## Tindak lanjut :

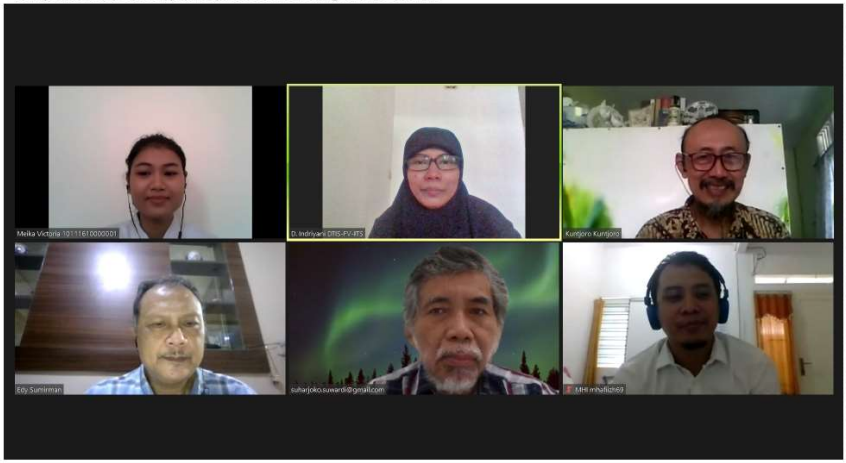
Mahasiswa memperbaiki/merevisi Proyek Akhir sesuai dengan masukan di atas.

## Penutup :

Demikian Berita Acara Sidang Proyek Akhir ini dibuat sebagai panduan revisi oleh Mahasiswa.

## Lampiran :

Tempelkan screen capture peserta meeting online disini.



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Kampus ITS , Jl. Menur 127 Surabaya 60116
Telp. 031-5947637 Fax. 031-5938025
http://www.diplomasipil-its.ac.id

# ASISTENSI TUGAS AKHIR TERAPAN

**Nama** : 1 Meiva Victoria 2
**NRP** : 1 10111610000001 2
**Judul Tugas Akhir** : Optimasi Air Waduk Pidekso Wonogiri Jawa Tengah Dengan Metode Program Dinamik Untuk Air Baku, Irigasi dan Mikrohidro
**Dosen Pembimbing** : 1. Dr. Ir. Kuntjoro, M.T.
2. Dr. Ir. Indriyani, ST., M.T.

| No | Tanggal | Tugas / Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| 1 | 07/02/2020 | - Mencari debit andalan | | | | |
| | | - Memperbaiki perhitungan FJ Mock | | | | |
| | | - mencari referensi lagi untuk | | B | C | K |
| | | perhitungan (Direct Requirement | | ☐ | ☐ | ☐ |
| | | dan Direct (un-REF) | | | | |
| | | - perhitungan air baku, irigasi | | | | |
| | | PLTMH dan membuat grafiknya | | B | C | K |
| | | ← → | | ☐ | ☐ | ☐ |
| 2 | 19/04/2020 | - Data sesuai apa adanya | | | | |
| | | - Melanjutkan sampai pptx | | | | |
| | | bahasan program dinamik | | B | C | K |
| | | - Mulai progress laporan | | ☐ | ☐ | ☐ |
| | | Tugas akhir Terapan | | | | |
| | | | | | | |
| 3 | 15/06/2020 | - Hubungan antara kebutuhan | | B | C | K |
| | | air dengan program dinamik | | ☐ | ☐ | ☐ |
| | | | | | | |
| 4 | 19/06/2020 | - tambahkan perhitungan untuk | | | | |
| | | PLTMH 2 | | B | C | K |
| | | - Rumus presipitasi (PP1) = R A | | ☐ | ☐ | ☐ |
| | | R : rata-rata periode ; | | | | |

Ket :
B = Lebih cepat dari jadwal
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# ASISTENSI TUGAS AKHIR TERAPAN

**Nama** : 1 Meika Victoria 2
**NRP** : 1 10111610000001 2
**Judul Tugas Akhir** : Optimasi Air Waduk Pidekso Wonogiri, Jawa Tengah dengan Metode Program Dinamik untuk Air Baku, Irigasi, dan Mikro Hidro

**Dosen Pembimbing** : 1. Dr. Ir. Kuntjoro, M.T.
2. Dwi Indriyani, ST., M.T

| No | Tanggal | Tugas/Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| | | A = luas genangan waduk | | | | |
| | | | | | | |
| 5 | 27/06/2020 | - Prioritas pemanfaatan air | | B | C | K |
| | | 1. Air Baku | | ☐ | ☐ | ☐ |
| | | 2. Irigasi | | | | |
| | | 3. PLTMH | | | | |
| | | - Operasional waduk jangan | | B | C | K |
| | | sampai kosong, PLTMH | | ☐ | ☐ | ☐ |
| | | dikurangi debitnya, jika | | | | |
| | | masih kosong air direservoir | | | | |
| | | maka luas tanamnya | | B | C | K |
| | | dikurangi. | | ☐ | ☐ | ☐ |
| | | - Tambahkan kolom elevasi | | | | |
| | | muka air per periode | | | | |
| | | (15 harian) | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| 6 | 30/06/2020 | - Debit PLTMH dibagi 2 | | | | |
| | | (PLTMH 1 dan PLTMH 2) | | | | |
| | | - Data evaporasi (klimatologi) | | B | C | K |
| | | disesuaikan dgn perhitungan | | ☐ | ☐ | ☐ |
| | | tambahkan dilaporan | | | | |

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**Nama** : 1 Melka Victoria 2
**NRP** : 1 10111610000001 2
**Judul Tugas Akhir** : Optimasi Air Waduk Pidekso Wonogiri, Jawa Tengah dengan Metode Program Dinamik untuk Air Baku, Irigasi, dan Mikro Hidro

**Dosen Pembimbing** : 1 Dr. Ir. Kuntjoro, M.T.
2. Dwi Indriyani, S.T., M.T

| No | Tanggal | Tugas/Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| | | - Bagaimana pola tata tanam | | | | |
| | | setelah simulasi ? | | | | |
| | | - lengkapi dan perjelas | | B | C | K |
| | | laporan mengenai program | | ☐ | ☐ | ☐ |
| | | dinamik | | | | |
| | | | | | | |
| 7. | 4/07/2020 | - Status melimpas "OK" | | B | C | K |
| | | dan diberi keterangan | | ☐ | ☐ | ☐ |
| | | melimpas | | | | |
| | | - Tambahkan kolom | | | | |
| | | mengenai kebutuhan | | B | C | K |
| | | yang terpenuhi dan | | ☐ | ☐ | ☐ |
| | | irigasi, air baku, PTMH | | | | |
| | | | | | | |
| 8. | 05/07/2020 | - Constraint usahakan "OK" | | B | C | K |
| | | - usahakan penggunaan | | ☐ | ☐ | ☐ |
| | | untuk irigasi dan PTMH | | | | |
| | | menyesuaikan kondisi | | | | |
| | | ketersediaan, defisit = 0 | | B | C | K |
| | | - Buat Grafik Hasil | | ☐ | ☐ | ☐ |
| | | Grafik hasil adalah output | | | | |

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# ASISTENSI TUGAS AKHIR TERAPAN

**Nama** : 1 Meika Victoria 2
**NRP** : 1 10111910000001 2
**Judul Tugas Akhir** : Optimasi Air Waduk perekso wonogiri jawa Tengah dan metode program Dinamic untuk air baku , irigasi , dan Mikro Hidro.
**Dosen Pembimbing** : 1. Dr. Ir. Kuntjoro , M.T
2. Dwi Ina Nyoni , ST , M.T

| No | Tanggal | Tugas/Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| | | optimum dan tahun 1-50 | | | | |
| | | 1. Air baku tetap | | | | |
| | | 2. Irigasi fluktuatif | | B | C | K |
| | | 3. PLTMH fluktuatif | | ☐ | ☐ | ☐ |
| | | Dibuat > grafik dalam | | | | |
| | | 1 chart . yang digabungkan | | | | |
| | | bisa faktor K, demand, | | B | C | K |
| | | dan release pada masing" | | ☐ | ☐ | ☐ |
| | | | | | | |
| 9 | 06/07/2020 | - tarafik hasil diperbaiki | | | | |
| | | tulisannya supaya lebih | | B | C | K |
| | | jelas | | ☐ | ☐ | ☐ |
| | | - PLTMH dan ditinggalkan | | | | |
| | | sesuai dengan AB + IR | | | | |
| | | (pola operasi PLTMH | | B | C | K |
| | | mengikuti pola AB + IR) | | ☐ | ☐ | ☐ |
| | | | | | | |
| 10 | 12/07/2020 | memperbaiki laporan | | | | |
| | | dan melengkapi | | B | C | K |
| | | Laporan. | | ☐ | ☐ | ☐ |
| | | | | | | |

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**Judul Tugas Akhir** : Optimasi Air Waduk Prijetan Wonogiri Jawa Tengah dengan Metode program dinamik untuk Air Baku, Irigasi dan Mikro Hidro
**Dosen Pembimbing** : 1. Dr. Ir. Kuntjoro, M.T
2. Dwi Indiyani, S.T., M.T

| No | Tanggal | Tugas/Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| 1. | 18/07/20 | - memperbaiki laporan | | | | |
| | | - Optimasi untuk 1 tahun | | | | |
| | | ke depan | | B | C | K |
| | | - Pola tanam, kebutuhan | | ☐ | ☐ | ☐ |
| | | irigasi dengan waktu awal | | | | |
| | | yang berbeda-beda | | | | |
| | | | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| | | | | | | |
| | | | | | | |
| | | | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| | | | | | | |
| | | | | | | |
| | | | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| | | | | | | |

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**Nama** : 1 Meika Victoria 2
**NRP** : 1 10111810000001 2
**Judul Tugas Akhir** : Optimasi Air Waduk Pidekso Wonogiri Jawa Tengah Dengan Metode Program Dinamik Untuk Air Baku, Irigasi, dan Mikrohidro

**Dosen Pembimbing** : 1 Dr. Ir. Suntoro, M.T.
2 Dwi Ratnaningsih, ST., M.T.

| No | Tanggal | Tugas / Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| 1 | 20/01/2020 | - perhitungan kebutuhan air | | | | |
| | | irigasi berdasarkan pembagian | | | | |
| | | tahun basah normal dan kering | | B | C | K |
| | | - Plimh dihitung setelah perhitung- | | ☑ | ☐ | ☐ |
| | | an kebutuhan air baku dan | | | | |
| | | kebutuhan air irigasi | | | | |
| | | - Selanjutnya perhitungan | | B | C | K |
| | | Air baku dan irigasi | | ☐ | ☐ | ☐ |
| | | | | | | |
| 2 | 27/01/2020 | - Pengelompokkan Debit untuk | | | | |
| | | inflow & pengelompokkan | | B | C | K |
| | | - membuat daftar isi sesuai | | ☑ | ☐ | ☐ |
| | | pemahaman bab 2 dan bab 3 | | | | |
| | | - mencari referensi untuk | | | | |
| | | data klimatologi dan data | | B | C | K |
| | | curah hujan | | ☐ | ☐ | ☐ |
| | | | | | | |
| 3 | 26/02/2020 | - mengerjakan rumpai debit bendungan | | | | |
| | | | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| | | | | | | |

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**Judul Tugas Akhir** : Optimasi Air Waduk Prderes Wonogiri, Jawa tengah Dengan Metode Program Dinamik Untuk Air baku, irigasi, dan Mikro hidro
**Dosen Pembimbing** : 1. Dr. Ir Kuntjoro., M.T
2. Dwi Indriyani, S.T, M.T.

| No | Tanggal | Tugas/Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| 4 | 17/04/2020 | - Cek lagi data klimatologi | | | | |
| | | - debit FJ mock dibuat | | | | |
| | | sesuai tahun data klimatolo | | B | C | K |
| | | - gi | | ☐ | ☐ | ☐ |
| | | - Laporan Tugas Akhir Terapan | | | | |
| | | - Cek lagi klasifikasi musim | | | | |
| | | | | B | C | K |
| 5 | 01/05/2020 | - untuk debit andalan DLTMH | | ☐ | ☐ | ☐ |
| | | pakai 95%, sesuai dgn | | | | |
| | | SNI 2015 | | | | |
| | | | | B | C | K |
| 6 | 08/05/2020 | -Lampirkan CAD untuk DLTMH | | ☐ | ☐ | ☐ |
| | | - Mulai progress pemodelan | | | | |
| | | Program dinamic dgn | | | | |
| | | excel | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| 7 | 15/05/2020 | - pemrograman masing-masing | | | | |
| | | elemen pada program dinamis | | | | |
| | | - menambahkan perhitungan | | B | C | K |
| | | DLTMH | | ☐ | ☐ | ☐ |
| | | - pola simulasi | | | | |

Ket
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**Nama** : 1 Melka Victoria 2
**NRP** : 1 10111610000001 2
**Judul Tugas Akhir** : Optimasi Air Waduk Pidekso Wonogiri, Jawa Tengah dengan Metode Program dinamik untuk Air Baku, Irigasi dan Mikrohidro
**Dosen Pembimbing** : 1. Dr. Ir. Kuntjoro, M.T.
2. Ruli Indriyani, S.T., M.T.

| No | Tanggal | Tugas/Materi yang dibahas | Tanda tangan | Keterangan | | |
|---|---|---|---|---|---|---|
| 8 | 10/06/2020 | - ST (Tampungan) awal adalah | | | | |
| | | full storage | | | | |
| | | | | B | C | K |
| 9 | 23/06/2020 | - perbaiki penulisan tabel u/ | | ☐ | ☐ | ☐ |
| | | sumber tanah dibawah tabel | | | | |
| | | | | | | |
| 10 | 28/06/2020 | - memperbaiki rumus excel | | B | C | K |
| | | - melanjutkan hingga tahap | | ☐ | ☐ | ☐ |
| | | ke 50 tahun | | | | |
| | | | | | | |
| 11 | 18/07/2020 | - memperbaiki laporan | | B | C | K |
| | | - optimasi dilakukan untuk | | ☐ | ☐ | ☐ |
| | | 1 tahun kedepan | | | | |
| | | - pola tanam, kebutuhan | | | | |
| | | irigasi dgn waktu awal | | B | C | K |
| | | yang terbeda-beda | | ☐ | ☐ | ☐ |
| | | | | | | |
| | | | | | | |
| | | | | B | C | K |
| | | | | ☐ | ☐ | ☐ |
| | | | | | | |

Ket :
B = Lebih cepat dari jadwal
C = Sesuai dengan jadwal
K = Terlambat dari jadwal

“Halaman ini sengaja dikosongkan”

# OPTIMASI AIR WADUK PIDEKSO WONOGIRI JAWA TENGAH UNTUK KEPENTINGAN AIR BAKU, IRIGASI, DAN MIKRO HIDRO DENGAN BEBERAPA ALTERNATIF POLA TANAM


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## Abstrak


*Waduk Pidekso terletak di Kabupaten Wonogiri, Provinsi Jawa Tengah. Waduk ini berfungsi untuk memenuhi kebutuhan air baku, air irigasi, serta dimanfaatkan sebagai pembangkit listrik tenaga mikro hidro (PLTMH). Waduk ini dibangun untuk mengatasi permasalahan yang sering terjadi di aliran Sungai Bengawan Solo Hulu, dimana waktu musim hujan sering menimbulkan banjir, karena debit sungai yang besar. Hal ini berbanding terbalik ketika musim kemarau, aliran sungai mempunyai debit yang sangat kecil. Salah satu permodelan sumber daya air yang dapat diterapkan untuk permasalahan ini yaitu teknik optimasi. Konfigurasi tata air begitu kompleks, sehingga dalam Tugas Akhir Terapan ini diterapkan teknik optimasi yang ditemukan oleh Richard Bellman.*

*Optimasi diawali dengan melakukan analisis data untuk mendapatkan besar debit yang tersedia, kebutuhan air baku, irigasi, dan PLTMH. Simulasi optimasi dilakukan dengan menggunakan metode teknik optimasi yang ditemukan oleh Richard Bellman untuk mendapatkan hasil yang optimum dengan waktu awal tanam yang berbeda-beda untuk jangka waktu satu tahun ke depan untuk pola pengoperasian Waduk Pidekso sebagai waduk serbaguna.*

*Hasil analisis yang didapatkan adalah Perhitungan untuk tahun 2020, didapatkan nilai debit terbesar yang tersedia adalah 4,478 $m^3$/dtk dan debit terkecil adalah 0,385 $m^3$/dtk. Perhitungan kebutuhan air baku, didapatkan nilai besar kebutuhan air baku pada kondisi harian sebesar 0,023 $m^3$/dtk, pada kondisi harian maksimum sebesar 0.026 $m^3$/dtk, pada kondisi jam puncak sebesar 0,040 $m^3$/dtk. Perhitungan kebutuhan air irigasi, didapatkan nilai debit terbesar adalah 6,169 $m^3$/dtk dan nilai debit yang terkecil adalah 0 $m^3$/dtk. Perhitungan kebutuhan PLTMH dengan menggunakan debit andalan 95% sebesar 1,152 $m^3$/dtk didapatkan daya listrik untuk PLTMH 1 sebesar 58,707 kW dan energi listrik sebesar 5.144.273,9 kWh. Sedangkan daya listrik untuk PLTMH 2 sebesar 48,865 kW dan energi listrik sebesar 401.776.5 kWh. Simulasi teknik optimasi yang disusun dengan metode Richard Bellman terdiri dari 24 model simulasi dengan waktu awal tanam yang berbeda-beda berdasarkan bulan dan periode, dengan kendala (constraint) ketersediaan air dan kapasitas tampungan waduk. Waktu awal tanam yang paling optimum untuk setiap kebutuhan adalah bulan September Periode II dengan solusi optimasi, penambahan luas tanam irigasi untuk untuk masa tanam padi 1 sebesar 1.852 ha, masa tanam padi 2 sebesar 6.105 ha, dan masa tanam palawija sebesar 5.776 ha, serta peningkatan penggunaan PLTM dengan debit andalan 95% sebesar 6,911$m^3$/dtk.*

***Kata Kunci : Teknik Optimasi, Waduk.***

# OPTIMIZATION OF PIDEKSO RESERVOIR IN WONOGIRI CENTRAL JAVA FOR THE NEEDS OF RAW WATER, IRRIGATION, AND MICRO HYDRO WITH SOME ALTERNATIVE PLANTING PATTERNS


| | |
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## Abstract

*Pidekso Reservoir is located in Wonogiri Regency, Central Java Province. This reservoir functions to meet the needs of raw water, irrigation water, and is used as a micro hydro power plant (PLTMH). This reservoir was built to solve problems that often occur in the Upper Solo River, where during the rainy season it often causes flooding, due to the large river discharge. This is inversely proportional to the dry season, the river flow has a very small discharge. One of the water resources modeling that can be applied to this problem is the optimization technique. The configuration of the water system is so complex, that in this Applied Final Project, the optimization technique found by Richard Bellman is applied*

*Optimization begins with analyzing data to obtain available debit, raw water needs, irrigation, and PLTMH. Optimization simulations are carried out using the optimization technique method invented by Richard Bellman to obtain optimum results with different initial planting times for the next one year for the Pidekso Reservoir operating pattern as a multipurpose reservoir..*

*The results of the analysis obtained are the calculation for 2020, the measurement of the largest available discharge value is 4,478 $m^3/s$ and the best discharge is 0,385 $m^3/s$. Calculation of raw water needs, obtained a large value of raw water needs in daily conditions of 0,023 $m^3/s$, at a maximum daily condition of 0,026 $m^3/s$, at peak conditions of 0,040 $m^3/s$. The calculation of the need for irrigation water, the largest discharge value is 6,169 $m^3/s$ and the highest discharge value is 0 $m^3/s$. Calculating the need for PLTMH using a reliable 95% discharge of 1,152 $m^3/s$, the electric power for PLTMH 1 is 58,707 kW and electrical energy is 5,144,273.9 kWh. Meanwhile, the electric power for PLTMH The optimization technique simulation prepared using the Richard Bellman method consists of 24 simulation models with different initial planting times based on months and periods, with constraints on water availability and reservoir storage capacity. The most optimal initial planting time for each need is in September Period II with the optimal solution, additional irrigation area for rice planting 1 1.852 ha, rice planting period 2 is 6.105 ha, and secondary crops planting period of 5.776 ha, and increased usage. PLTM with a reliable discharge of 95% of 6,911 $m^3/s$.*

***Keywords : Optimization Technique, Reservoir.***

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**OPTIMASI AIR WADUK PIDEKSO WONOGIRI JAWA TENGAH UNTUK KEPENTINGAN AIR BAKU, IRIGASI, DAN MIKRO HIDRO DENGAN BEBERAPA ALTERNATIF POLA TANAM**

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# BAB I
# PENDAHULUAN

## 1.1 Latar Belakang

Air merupakan salah satu kebutuhan dasar manusia. Manfaat air bagi kehidupan manusia sangatlah beragam, seperti untuk kebutuhan irigasi, kebutuhan pembangkit listrik, kebutuhan air baku serta untuk memenuhi kebutuhan sehari-hari. Oleh karena itu, sumber daya air harus dilestarikan dan dikelola dengan baik dan bijak. Pengelolahan waduk merupakan salah satu cara agar sumber daya air dapat dikelola secara optimal. Waduk berfungsi untuk menampung air saat curah hujan tinggi yang kemudian digunakan saat curah hujan sangat rendah. Ketersediaan air yang ada di waduk diharapkan mampu memenuhi kebutuhan air sesuai fungsi dari waduk tersebut yang berubah-ubah dari waktu ke waktu.

Pembangunan Waduk Pidekso terletak di aliran Sungai Bengawan Solo bagian hulu dan berada di Desa Pidekso, Kecamatan Giriwoyo, Kabupaten Wonogiri Provinsi Jawa Tengah. Kabupaten Wonogiri secara geografis terletak pada garis lintang 7°32' - 8°15' Lintang Selatan dan garis bujur $110^{0}$41'- 111°18' bujur Timur. Menurut fungsinya Waduk Pidekso digolongan menjadi waduk serbaguna (*Multipurpose dam*) karena mempunyai fungsi lebih dari satu (PT.Mettana, 2011).

Waduk Pidekso dibangun untuk mengatasi permasalahan yang sering terjadi di aliran Sungai Bengawan bagian Hulu. Solo, dimana waktu musim hujan sering menimbulkan banjir. Kondisi debit sungai pada saat musim hujan sangat besar. Hal ini berbanding terbalik ketika musim kemarau, aliran sungai mempunyai debit yang sangat kecil. Dengan demikian, *release* air pada Waduk Pidekso membutuhkan suatu pola pengaturan yang optimal agar kebutuhan air yang meliputi, air baku, irigasi, dan PLTMH di daerah layanan dapat terpenuhi.

Seiring dengan pertumbuhan penduduk kebutuhan air dari tahun ke tahun terus mengalami peningkatan. Besarnya debit yang yang harus dialirkan perlu dilakukan perhitungan yang cermat. Salah satu permodelan sumber daya air yang dapat diterapkan untuk permasalahan ini yaitu teknik optimasi, yaitu untuk mendapatkan manfaat yang sebesar-besarnya. Konfigurasi tata air adalah hal yang begitu kompleks, sehingga dalam Tugas Akhir Terapan ini diterapkan teknik optimasi dengan Metode Richard Bellman untuk mendapatkan hasil *output* yang realistis.

Pada Tugas Akhir Terapan ini dibahas mengenai bagaimana menentukan pola *release* air Waduk Pidekso yang optimal. Pola *release* ini selanjutnya digunakan sebagai pedoman pengaturan dalam me-*release* air Waduk Pidekso untuk satu tahun ke depan berdasarkan waktu awal tanam yang berbeda-beda untuk kebutuhan irigasi dengan karakteristik ketersediaan air di tampungan Waduk Pidekso. Teknik optimasi metode Richard Bellman menjawab suatu masalah dalam bentuk tahap-tahap. Perhitungan pada tiap tahap yang berbeda dihubungan melalui perhitungan rekursif untuk menghasilkan pemecahan yang optimal yang dimungkinkan bagi seluruh masalah. (Taha, 1996).

## 1.2 Rumusan Masalah

Dari latar belakang tersebut permasalahan dalam Tugas Akhir Terapan ini dapat dirumuskan sebagai berikut :

1. Berapa besar debit yang tersedia di Waduk Pidekso ?
2. Berapa besar kebutuhan air baku di daerah layanan ?
3. Berapa besar kebutuhan air irigasi berdasarkan pola tanam padi-padi-palawija ?
4. Berapa besar potensi PLTMH yang dihasilkan di Waduk Pidekso ?
5. Bagaimana model dan simulasi metode Richard Bellman untuk optimasi kebutuhan air baku, air irigasi, dan mikro hidro?
6. Bagaimana hasil analisis dari permodelan dan simulasi metode Richard Bellman untuk optimasi kebutuhan air baku, air irigasi, dan mikro hidro?

## 1.3 Tujuan

Adapun tujuan yang ingin dicapai pada penulisan Tugas Akhir Terapan ini adalah :

1. Mengetahui besar debit yang tersedia di Waduk Pidekso.
2. Mengetahui besar kebutuhan air baku di daerah layanan.
3. Mengetahui besar kebutuhan air irigasi berdasarkan pola tanam padi-padi-palawija.
4. Menge tahui besar potensi PLTMH yang dihasilkan di Waduk Pidekso.
5. Menyusun model dan simulasi metode Richard Bellman untuk optimasi kebutuhan air baku, air irigasi, dan mikro hidro.
6. Mendapatkan hasil analisis dari permodelan dan simulasi metode Richard Bellman untuk optimasi kebutuhan air baku, air irigasi, dan mikro hidro.

## 1.3 Batasan Masalah

Dalam pengerjaan Tugas Akhir Terapan ini terdapat beberapa batasan yang diberikan, sebagai berikut :

1. Hanya menghitung fungsi waduk sebagai penyedia air baku, irigasi, dan PLTMH.
2. Tidak merencanakan struktur bangunan Waduk Pidekso.
3. Tidak meninjau pemasaran energy listrik yang dihasilkan PLTMH.
4. Simulasi pola *release* air Waduk Pidekso dilakukan untuk satu tahun yang akan datang.
5. Pola tanam yang digunakan adalah Padi-padi-palawija.

## 1.4 Manfaat

Penulisan Tugas Akhir Terapan ini bermanfaat untuk mendapatkan pola *release* air Waduk Pidekso yang optimal untuk kebutuhan air baku, air irigasi dan mikro hidro sebagai waduk serbaguna dengan menggunakan metode Richard Bellman agar dapat menjadi acuan dalam me-*release* air waduk untuk satu tahun ke depan.

“Halaman ini sengaja dikosongkan”

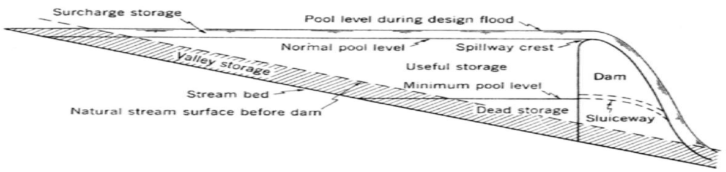
# BAB II
# TINJAUAN PUSTAKA

## 2.1 Definisi Waduk

Waduk merupakan salah satu sarana pemanfaatan sumber daya air yang mempunyai fungsi sebagai penyimpan dan penyedia air, baik sebagai bahan baku air bersih, irigasi maupun untuk PLTMH. Waduk penampung atau konservasi air dapat menahan kelebihan air saat aliran air tinggi dan dapat digunakan selama masa kekurangan air. Berapapun ukuran suatu waduk atau apapun tujuan akhir dari pemanfaatan airnya, fungsi utama dari suatu waduk ialah untuk menyediakan simpanan (tampungan), maka ciri fisik yang utama dari waduk adalah kapasitas tampungan (Linsey, 1994).

Berdasarkan **Gambar 2.1**, daerah-daerah simpanan di dalam suatu waduk (kapasitas waduk, *storage capatity*) dapat dibedakan menjadi tiga bagian (Linsey, 1994), yaitu:

1. Simpanan Mati (*dead storage*) merupakan air yang ditahan pada permukaan bawah genangan minimum.
2. Simpanan berguna (*effective/usefull storage*) merupakan simpanan yang dipergunakan untuk konservasi sumber air (penyediaan air baku, irigasi, dll), yang berada di antara permukaan genangan minimum dan permukaan genangan normal.
3. Simpanan Tambahan (*Surcharge storagel*), umumnya simpanan ini tidak terkendali, yaitu simpanan ini hanya pada waktu banjir dan tidak dapat dipertahankan




**Gambar 2. 1.** Daerah-Daerah Simpanan di dalam Suatu Waduk (*Sumber : Linsey, 1994)*

## 2.2 Analisis Hidrologi

Analisi hidrologi dalam Tugas Akhir Terapan ini dilakukan untuk mencari curah cujan efektif. Curah hujan efektif digunakan untuk menghitung kebutuhan irigasi. Curah hujan efektif atau andalan adalah seluruh curah hujan yang jatuh ke bumi dan secara efektif tersedia untuk kebutuhan air tanaman (KP-01, 2013).

Curah hujan efektif ($R_{eff}$) ditentukan berdasarkan besarnya $R_{80}$ dimana curah hujan yang besarnya dapat melampaui sebanyak 80% atau melampaui 8 kali kejadian dari 10 kali kejadian (Priyonugroho, 2014). Dengan kata lain kemungkinan tidak terpenuhi sebesar 20%. Untuk menghitung curah hujan efektif $R_{80}$ dapat dinyatakan dengan rumus Harza sebagai berikut :

$$\boldsymbol{R_{80} = \frac{n}{5} + 1} \qquad (2.1)$$

dimana :

$R_{eff} = R_{80}$ = Curah hujan efektif 80% (mm/hari).
n/5 + 1 = Rangking dari urutan terkecil.
n = Jumlah tahun pengamatan

Berdasarkan Standar Perencanaan Irigasi KP – 01, besarnya curah hujan efektif untuk tanaman padi adalah 70% dari curah hujan rata-rata mingguan atau tengah bulanan dengan kemungkinan tidak terjadi 20% (Triatmodjo, 2010), dengan persamaan sebagai berikut :

$$\boldsymbol{Re = 0.7\ x\ \frac{1}{15}(R_{80})} \qquad (2.2)$$

dimana :

Re = Curah hujan efektif (mm/hari)
R80 = Curah hujan yang kemungkinan tidak terpenuhi sebesar 20% (mm)

## 2.3 Analisis Klimatologi

### 2.3.1 Unsur-Unsur Klimatologi

Klimatologi adalah ilmu yang mempelajari tentang proses-proses fisik yang terjadi di atmosfer pada suatu daerah dan berlangsung dalam kurun waktu tertentu. Evaporasi sangat mempengaruhi pengembangan sumber daya air, seperti debit sungai, besarnya kapasitas waduk, penggunaan konsumtif untuk tanaman dan lain-lain (Soemarto, 1987). Besarnya evaporasi dipengaruhi oleh beberapa unsur-unsur klimatologi. Berikut adalah unsur-unsur yang mempengaruhi besarnya evaporasi :

a. Radiasi Matahari

Evaporasi adalah proses perubahan air menjadi uap air. Proses ini berjalan terus-menerus tanpa henti di siang hari dan dapat terjadi juga pada malam hari. Proses perubahan dari air menjadi uap air memerlukan energi berupa panas laten untuk evaporasi.

b. Angin

Kecepatan angin memegang peran penting dalam proses evaporasi. Ketika air menguap maka lapiran batas antara permukaan tanah dan udara menjadi jenuh sehingga proses penguapan berhenti. Agar proses penguapan terus berlangsung, lapisan jenuh diganti oleh udara kering. Pergantian itu hanya dapat terjadi jika ada angin yang menggeser komponen uap air.

c. Kelembaban Relatif

Jika kelembaban relative naik, maka kemampuan udara untuk menyerap air akan berkurang sehingga laju evaporasi turun.

d. Suhu (Temperatur)

Jika suhu udara dan tanah tinggi, maka proses evaporasi berjalan lebih cepat. Kemampuan udara untuk menyerap uap air naik jika suhu naik, maka di sini suhu mempunyai efek ganda terhadap besarnya evaporasi dengan mempengaruhi kemampuan udara menyerap uap air dan mempengaruhi suhu tanah untuk mempercepat penguapan.

### 2.3.2 Evapotranspirasi

Evapotranspirasi adalah penguapan pada permukaan lahan yang ditumbuhi tanaman. Evapotrasnpirasi sama dengan kebutuhan air konsumtif yang diartikan sebagai penguapan total dari lahan dan air pada tanaman. Beberapa metode yang dikembangkan untuk mengetahui nilai evapotranspirasi, seperti Persamaan empiris Thornthwaite. Metode Blaney-Criddle, dan metode Penman (Triatmodjo, 2010).

Dalam pengerjaan Tugas Akhir Terapan ini, perhitungan evapotranspirasi menggunakan Metode Penman Modifikasi karena menggunakan unsur-unsur klimatologi yang mempengaruhi evapotranspirasi.

Perhitungan Evapotranspirasi dengan Metode Penman (Doorenbos, 1977), menggunakan rumus sebagai berikut :

$$\boldsymbol{ETo = c[W \,.\, Rn + (1 - W)\, x\, f(u).(ea\text{-}ed)]} \qquad (2.3)$$

dimana :

Eto = Evapotranspirasi tanaman acuan (mm/hari).
c = Angka koreksi Penman (Tabel B.9).
W = Faktor pemberat untuk pengaruh penyinaran matahari (Tabel B.5)
(1 – W) = Faktor pemberat untuk pengaruh kecepatan angina dan kelembaban (Tabel B.4).
f(u) = Fungsi pengaruh angin. Dimana U2 adalah kecepatan angin selama 24 jam dalam km/hari di ketinggian 2 meter

$$\boldsymbol{f(u) = 0.27\left(1 + \frac{U2}{100}\right)} \qquad (2.4)$$

(ea-ed) = Perbedaan antara tekanan uap jenuh pada suhu rata-rata (ea) dengan tekanan uap air nyata rata-rata di udara (ed) (mbar)

$$\boldsymbol{ed = ea\, x\, RH/100} \qquad (2.5)$$

RH = Kelembaban udaran relative (%)
Rn = Radiasi matahari bersih (mm/hari)

$$\boldsymbol{Rn = Rns - Rn1} \quad (2.6)$$

Ra = Radiasi ekstra teretrial (mm/day) (Tabel B.6)
Rs = Radiasi solar (mm/day)

$$\boldsymbol{Rs = (0.25 + 0.50\, n/N)Ra} \quad (2.7)$$

Rns = Radiasi gelombang pendek (mm/day)

$$\boldsymbol{Rns = (1 - \alpha)Rs} \quad (2.8)$$

Rn1 = Radiasi gelombang panjang (mm/day)

$$\boldsymbol{Rn1 = f(T)xf(ed).f\left(\frac{n}{N}\right)} \quad (2.9)$$

## 2.4 Analisis Ketersediaan Debit

Analisa debit sungai dan penentuan debit andalan berpengaruh untuk mengetahui ketersediaan air. Debit andalan di artikan sebagai didebit rata-rata minumin rata-rata mingguan atau tengah bulan, dimana untuk kemungkinan tidak terpenuhi 20% (KP-01, 2013)

### 2.4.1 Model FJ Mock

Model neraca air *Dr.Mock* memberikan metode perhitungan yang sederhana untuk bermacam-macam komponen berdasarkan hasil riset pada aliran sungai di seluruh Indonesia. Curah hujan rata-rata dihitung berdasarkan hasil pengukuran dan evapotranspirasi dari data klimatologi (rumus Penman), dan karakteristik hidrologi pada suatu daerah aliran sungai. Data dan asumsi yang diperlukan untuk perhitungan metode Mock (KP-01, 2013), sebagai berikut :

1. Data Meteorologi
   a. Data Curah Hujan

Stasiun hujan yang digunakan adalah stasiun curah hujan yang mewakili kondisi curah hujan di daerah yang ditinjau. Data yang diperlukan adalah nilai hujan bulanan (P) dan jumlah hari hujan (h)

2. Evapotranspirasi Terbatas (Et)

Evapotranspirasi terbatas adalah evapotranspirasi aktual yang mempertimbangkan frekuensi curah hujan, kondisi vegetasi dan permukaan tanah, sehingga persamaannya :

$$\boldsymbol{Et = ETo - E} \tag{2.10}$$

dimana :

Et = Evapotranspirasi terbatas (mm).
ETo = Evapotranspirasi potensial (mm).
E = Beda antara evapotranspirasi potensial dengan evapotranspirasi terbatas (mm).

$$\boldsymbol{E = ETo\left(\frac{m}{20}\right)(18 - h)} \tag{2.11}$$

dimana :

m = Singkapan lahan (*Exposed surface*), ditaksir berdasarkan tata guna lahan atau dengan asumsi :
- m = 0% untuk lahan dengan hutan lebat.
- m = 10-40% untuk lahan tererosi.
- m = 20-40% untuk lahan pertanian yang diolah.

n = Jumlah hari hujan (hari).

Berdasarkan pengamatan di lapangan untuk seluruh daerah studi merupakan daerah lahan pertanian yang diolah dan lahan tererosi maka dapat diasumsikan singkapan lahan (m) diambil 30%.

3. Keseimbangan Air di Permukaan Tanah

Keseimbangan air di permukaan tanah dipengaruhi oleh factor-faktor sebagai berikut :

- Air hujan
- Kandunganair tanah (*soil storage*)
- Kapasitas kelembaban tanah (SMC)

Keseimbangan air di permukaan tanah dihitung berdasarkan besarnya curah hujan dikurangi dengan nilai evapotranspirasi terbatas, dengan persamaan :

$$\Delta S = P - Et \quad (2.12)$$

dimana :

ΔS = Perubahan kandungan air tanah (*soil storage*). Nilainya positip apabila P > Et, maka kelembaban tanah akan bertambah. Nilainya negatif apabila P < Et, maka kapasitas kelembaban tanah akan berkurang.

*Soil Moisture Capacity* adalah kapasitas kandungan air pada lapisan tanah permukaan (*surface soil*) per $m^2$. *Water surplus* adalah volume air yang akan masuk kepermukaan tanah. *Initial Storage* (IS) atau tampungan awal adalah besarnya volume air pada awal hitungan. IS di lokasi studi diasumsikan sebesar 100 mm.

4. Limpasan dan Penyimpanan Air Tanah

Penyimpanan air tanah (*Ground Water Storage*) besarnya tergantung karakteristik geologi suatu daerah dan waktu. Perhitungan nilai penyimpanan air menggunakan persamaan :

$$Vn = k\ x\ V_{n-1} + 0.5(1 + k)I \quad (2.13)$$

$$DVn = V_n - V_{n-1} \quad (2.14)$$

dimana :

Vn = Volume air tanah period ke-n
Dvn = Perubahan volume air tanah bulan ke-n
Vn-1 = Volume air tanah bulan ke (n-1)
I = Koefisien infiltrasi. Batasan koefisien infiltrasi adalah 0-1.

k = Faktor resesi aliran tanah

5. Debit Aliran Sungai

Aliran sungai adalah jumlah dari aliran langsung (*direct run off*), aliran dalam tanah (*interflow*), dan aliran tanah (*base flow*). Persamaan masing-masing aliran tersebut adalah :

1. *Interflow* = Infiltrasi – Volume air tanah (2.15)
2. *Direct run off* = *Water surplus* – infiltrasi (2.16)
3. *Base flow* = Aliran yang selalu ada sepanjang tahun (2.17)
4. *Run off* = *Interflow* + *direct run off* + *base flow.* (2.18)

$$\boldsymbol{Debit\ Aliran\ Sungai} = \frac{\boldsymbol{Aliran\ Sungai\ x\ Luas\ DAS}}{\boldsymbol{1\ bulan\ dalam\ detik}} \quad (2.19)$$

### 2.4.2 Debit Andalan

Debit andalan (*dependable flow*) adalah debit minimum sungai untuk kemungkinan terpenuhi yang digunakan untuk kebutuhan irigasi. Kemungkinan terpenuhi ditetapkan 80% (kemungkinan bahwa debit sungai lebih rendah dari debit andalan adalah 20%). Perhitungan debit andalan dilakukan dengan mengurutkan data debit dari terkecil hingga terbesar. Kemudian menentukan prosentase debit andalan dengan menggunakan persamaan (Morena, 2017) :

$$\boldsymbol{P} = \frac{\boldsymbol{m}}{(\boldsymbol{n+1})}\boldsymbol{x100\%} \quad (2.20)$$

## 2.5 Analisis Bangkitan Metode Thomas-Fiering

Panjangnya data historis sangat berpengaruh pada proses perencanaan sumber daya air. Pengumpulan suatu data sekunder pada suatu lokasi studi yang berupa deret angka yang cukup panjang sangat penting untuk perencanaan bendungan, penyediaan air untuk irigasi, air baku, pembangkit tenaga listrik dan lainnya. Namun pengumpulan data sekunder bukanlah hal yang mudah hal ini disebabkan karena kurangnya alat pengukur, kurangnya tenaga

pelaksana yang terampil, kurang baiknya cara penyimpanan data, sukarnya komunikasi antara tempat-tempat pengumpulan data dengan lokasi pengukuran dan hal teknis maupun non teknis lainnya. Maka dari itu diperlukan cara simulasi dengan menggunakan model matematik. Dengan menggunakan model matematik kita dapat meramal atau membuat prakiraan data untuk masa yang datang. (Soemarto, 1999).

Model pembangkitan data histori dibagi menjadi tiga model stokastik, yaitu model Markov untuk data historis tahunan, model Thomas-Fiering, dan model Box Jenkins (ARIMA) untuk data historis bulanan (Gunawan, 2006).

Metode stokastik adalah model hidrologi yang selalu berhubungan dengan waktu, mewakili urutan peristiwa tertentu, dan selalu dipengaruhi oleh peristiwa sebelumnya (Gunawan, 2006)

Model Thomas-Fiering merupakan salah satu metode yang banyak diterapkan untuk membuat *data forecasting*. Model ini menganggap bahwa setahun terbagi menjadi musim atau terdiri dari 12 bulan.

Rumus Thomas-Fiering dinyatakan dengan persamaan :

$$\boldsymbol{q_{i+1,j} = \bar{q}_j + b_j\left(q_{i,j-1} - \overline{q_{j-1}}\right) + t_i Sd_j\left(1 - r_j\right)^{1/2}} \qquad (2.21)$$

dimana :

$q_{i+1,j}$ = Data hasil pembangkitan untuk bulan *j* dan tahun ke *(i+1)*
$q_{i\,j-1}$ =Data pada tahun ke i, pada bulan sebelumnya *(j-1)*
*rj* = Korelasi antara data bulan sebelumnya *(j-1)* dan bulan *j*
*bj* = Koefisien regesi antara data bulan *j* dan *j-1*
*ti* = Bilangan random normal
*Sdj* = Standar deviasi bulan *j*

Contoh perhitungan rumus Thomas-Fiering untuk bangkitan data debit adalah sebagai berikut:

1. Perhitungan aliran rata-rata untuk tiap bulannya

$$\boldsymbol{Q_{rerata} = \frac{1}{n}\sum_{i=1}^{n} Xi,j} \quad (2.22)$$

dimana :
$Q_{rerata}$ = Debit rata-rata
$n$ = Jumlah tahun.
$Xi,j$ = Data debit pada tahun ke -i dan bulan ke-j.

2. Perhitungan standar deviasi

$$\boldsymbol{Sd = \left[\frac{1}{n-1}\sum_{i=1}^{b}(Xi - \overline{X})^2\right]^{1/2}} \quad (2.23)$$

3. Perhitungan koefisien korelasi antar aliran dalam waktu bulan ke-j dan waktu bulan sebelumnya (j-1)

$$\boldsymbol{r_j = \frac{\sum_{i=1}^{n} X_{i,j}.X_{i,j-1} - n.\overline{X_j}.\overline{X_{j-1}}}{Sd_j.Sd_{j-1}.(n-1)}} \quad (2.24)$$

Perhitungan korelasi untuk mengukur kekuatan hubungan antara dua variabel (dapat lebih dari dua variabel) dengan skala-skala tertentu. Kuat lemah hubungan diukur diantara jarak (*range*) 0 sampai dengan 1. Korelasi mempunyai kemungkinan pengujian hipotesis dua arah (*two tailed*). Korelasi searah jika nilai koefesien korelasi bernilai positif, sebaliknya jika nilai koefesien korelasi negatif, korelasi disebut tidak searah. Yang dimaksud dengan koefesien korelasi ialah suatu pengukuran statistik kovariasi atau asosiasi antara dua variabel (Morena, 2017)

## 2.5 Analisis Kebutuhan Air Irigasi

Kebutuhan air irigasi adalah banyaknya air yang diperlukan untuk tanaman pada petak sawah ditambah dengan kehilangan air pada jaringan irigasi(PT Mettana, 2011)

Sebagian besar kebutuhan irigasi tercukupi dengan air permukaan. Faktor-faktor yang mempengaruhi kebutuhan air untuk pertanian bervariasi terhadap waktu dan ruang (Triadmodjo, 2010), seperti :

1. Jenis dan varitas tanaman yang ditanam petani.
2. Variasi koefisien tanaman, tergantung pada jenis dan tahap pertumbuhan dari tanaman.
3. Kapan dimulainya persiapan pengelolahan lahan (golongan).
4. Jadwal tanam yang dipakai oleh petani, termasuk di dalamnya pasok air sehubungan dengan persiapan lahan, pembibitan dan pemupukan.
5. Status sistem irigasi dan efisiensi irigasinya.
6. Jenis tanah dan faktor agro-klimatologi

Perhitungan kebutuhan irigasi dapat dihitung dengan persamaan :

$$\boldsymbol{KAI = \frac{(Etc+IR+WLR+P-Re)}{IE} x\ A} \qquad (2.25)$$

dimana :

KAI = Kebutuhan air irigasi (lt/dtk).
Etc - Kebutuhan air konsumtif (mm/hari).
IR =Kebutuhan air irigasi ditingkat persawahan (mm/hari).
WLR = Kebutuhan air untuk mengganti lapisan air (mm/hari).
P = Perkolasi (mm/hari).
Re = Hujan efektif (mm/hari).
IE = Efisiensi irigasi (%).
A = Luas areal irigasi (ha).

1. Kebutuhan air konsumtif

Kebutuhan air konsumtif dilahan merupakan kebutuhan air dengan memasukkan faktor tanaman (kc) dengan persamaan :

$$\boldsymbol{Etc = Eto\ x\ kc} \qquad (2.26)$$

dimana :

Etc = Kebutuhan air konsumtif (mm/hari).

Eto = Evapotranspirasi (mm/hari).
kc = Koefisien tanaman.

2. Kebutuhan air untuk penyiapan lahan

Perhitungan kebutuhan air selama penyiapan lahan perlu memperhatikan jenis tanaman, usia tanaman sampai dengan panen, pola tanam, efisiensi irigasi, lama penyinaran malam dan lain-lain

Metode yang digunakan adalah metode yang dikembangkan oleh Van De Goor dan Zijlstra (Standar Perencanaan Irigasi KP-01, 1986), yaitu dengan persamaan :

$$\boldsymbol{IR = M\left(\frac{e^k}{e^k - 1}\right)} \qquad (2.27)$$

dimana :

IR = Kebutuhan air irigasi di tingkat persawahan (mm/hari).
M = Kebutuhan air untuk mengganti kehilangan air akibat evaporasi dan perklorasi di sawah yang telah dijenuhkan.
= Eo + P (mm/hari).
P = Perklorasi (mm/hari).
Eo = Evaporasi potensial (= 1,1 x ETo) (mm/hari).
e = Koefisien.
k =M(T/S)
S = Kebutuhan air untuk penjenuhan ditambah dengan 50 mm.
T = Waktu penyinaran matahari (hari).

3. Kebutuhan air untuk mengganti lapisan air (WLR)

Kebutuhan air untuk mengganti lapisan air ditetapkan berdasarkan Standar Perencanaan Irigasi 2013, KP-01. Besarnya kebutuhan air untuk mengganti lapisan air adalah 50 mm/bulan (atau 3,3 mm/hari selama ½ bulan) sealama sebulan atau dua bulan setelah transplantasi.

4. Perkolasi (P)

Sifat tanah mempengaruhi lajunya perkolasi. Sifat tanah tergantung pada kegiatan pemanfaatan lahan atau pengelolahan

tanah, laju perkolasi dapat mencapai 1-3 mm/hari.

5. Efisiensi Irigasi (EI)

Efisiensi irigasi adalah faktor penentu yang utama pada kerja suatu sistem jaringan irigasi. Efisiensi irigasi terdiri dari efisiensi pengaliran yang biasanya terletak di jaringan utama dan efisiensi di jaringan sekunder (dari bangunan pembagi sampai petak sawah). Efisiensi irigasi didasari karena adanya asumsi bahwa terdapat kehilangan jumlah air di saluran maupun di petak sawah. Kehilangan jumlah air disebabkan oleh evaporasi, rembesan, dan paling utama adalah kegiatan eksploitasi, maka dari itu pemberian air di *intake* harus lebih besar dari pada kebutuhan air di sawah.

## 2.6 Analisis Kebutuhan Air Baku

Kebutuhan air baku merupakan prioritas utama dari rencana operasi waduk (PT. Mettana, 2011). Perencanaan layanan air baku berdasarkan asumsi sebagai berikut :

1. Indeks kebutuhan air baku adalah 60-90 lt/hari/orang
2. Laju peningkatan kebutuhan air bersih sejalan dengan peningkatan jumlah penduduk

Perhitungan laju pertumbuhan penduduk berdasarkan pertumbuhan penduduk tiap tahunnya. Proyeksi pertambahan penduduk untuk tahun mendatang dapat dihitung dengan metode "Geometrik" sebagai berikut :

$$\mathbf{Pn = Po\ (1 + r)^t} \qquad (2.28)$$

dimana :

Pn = Jumlah penduduk pada akhir tahun proyeksi (jiwa)
Po = Jumlah penduduk pada awal tahun proyeksi (jiwa)
r = Prosentase pertambahan penduduk (%)
t = Jumlah tahun proyeksi (tahun)

Berdasarkan Direktorat Jenderal Cipta Karya Departemen

Pekerjaan Umum, standar kebutuhan air ada dua macam, yaitu :

a. Standar Penyediaan Air Domestik

Standar penyediaan kebutuhan air domestik ini, seperti untuk minum, mandi, masak, dan lainnya. Kategori penyediaan kebutuhan air domestik dibagi menjadi lima ketegori, yaitu :

- Kota kategori I (metropolitan)
- Kota kategori II (kota besar)
- Kota kategori III (kota sedang)
- Kota kategori IV (kota kecil)
- Kota kategori V (desa)

Kriteria perencanaan pada tiap kategori disajikan pada **Tabel 2.1** :

**Tabel 2. 1** Kriteris Perencanaan untuk Tiap Kategori

| Uraian | Kategori Kota Berdasarkan Jumlah Penduduk (Jiwa) | | | | |
|---|---|---|---|---|---|
| | >1.000.000 | 500.000 s/d 1.000.000 | 100.000 s/d 500.000 | 20.000 s/d 100.000 | <20.000 |
| | Kota Metropolitan | Kota Besar | Kota Sedang | Kota Kecil | Desa |
| 1. Konsumsi Unit Sambungan Rumah (SR) (liter/org/hari) | >150 | 150-120 | 90-120 | 80-120 | 60-80 |
| 2. Konsumsi Unit Hidran (HU) (liter/org/hari) | 20-40 | 20-40 | 20-40 | 20-40 | 20-40 |
| 3. Konsumsi Unit Non Domestik | | | | | |
| a. Niaga Kecil (liter/org/hari) | 600-900 | 600-900 | | 600 | |
| b. Niaga Besar (liter/org/hari) | 1000-5000 | 1000-5000 | | 1500 | |
| c. Industri Besar (liter/org/hari) | 0.2-0.8 | 0.2-0.8 | | 0.2-0.8 | |
| d. Pariwisata (liter/org/hari) | 0.1-0.3 | 0.1-0.3 | | 0.1-0.3 | |
| 4. Kehilangan Air (%) | 20-30 | 20-30 | 20-30 | 20-30 | 20-30 |
| 5. Faktor Hari Maksimum | 1.15-1.25 | 1.15-1.25 | 1.15-1.25 | 1.15-1.25 | 1.15-1.25 |
| 6. Faktor Jam Puncak | 1.75-2.0 | 1.75-2.0 | 1.75-2.0 | 1.75 | 1.75 |
| 7. Jumlah Jiwa PerSR (Jiwa) | 5 | 5 | 5 | 5 | 5 |
| 8. Jumlah Jiwa PerHu (Jiwa) | 100 | 100 | 100 | 100-200 | 200 |
| 9. Sisa Tekan di Penyediaan Distribusi (Meter) | 10 | 10 | 10 | 10 | 10 |
| 10. Jam Operasi (Jam) | 24 | 24 | 24 | 24 | 24 |
| 11. Volume Reservoir (% Max Day Demand) | 15-25 | 15-25 | 15-25 | 15-25 | 15-25 |
| 12. SR : HU | 50:50 s/d 80:20 | 50:50 s/d 80:20 | 80.20.00 | 70.30.00 | 70.30.00 |
| 13. Cakupan Pelayanan (%) | 90 | 90 | 90 | 90 | 90 |

*(Sumber : Ditjen Cipta Karya PU, 1996)*

b. Standar Penyedia Air Non Domestik

Standar penyediaan kebutuhan air non domestik ini, digunakan untuk fasilitas seperti perkantoran, kesehatan, industri,

komersial, umum dan lainnya. Kategori penyediaan kebutuhan air domestik dibagi menjadi tiga ketegori, yaitu :

- Umum, seperti : tempat ibadah, rumah sakit, sekolah, terminal, kantor dan lainnya.
- Komersil, seperti : hotel, pasar, pertokoan, rumah makan dan lainnya.
- Industri, seperti : peternakan, industri, dan lainnya.

## 2.7 Analisi Kebutuhan Air Pembangkit Listrik Tenaga Mikro Hidro (PLTMH)

Suatu pembangkit listrik tenaga air dapat mengubah potensi tenaga air (energi potensial dan energi kinetik) menjadi energi listrik. Besarnya energi yang dihasilkan bergantung pada debit yang tersedia dan tinggi jatuh air (*head*).

Secara umum, pembangkit listrik tenaga hidro dapat dikategorikan sesuai besar daya yang dihasilkan yaitu:

a. Pembangkit Listrik Tenaga Air (PLTA), daya yang dihasilkan lebih besar dari 5 MW.
b. Pembangkit Listrik Tenaga Mini Hidro (PLTM), daya yang dihasilkan berkisar 100 kW – 5.000 kW.
c. Pembangkit Listrik Tenaga Mikro Hidro (PLTMH), daya yang dihasilkan kurang dari 100 kW.

Pembangkit listrik tenaga mikrohidro (PLTMH) adalah pembangkit listrik dalam skala kecil dengan mengandalkan debit yang menuju intake dan tinggi jatuh (*head*) (Morena, 2017).

Perhitungan total daya yang dihasilkan oleh tubin air dirumuskan dengan persamaan :

$$\boldsymbol{P = Q.g.H_{eff}} \tag{2.29}$$

dimana :

P = Daya listrik (kW).

g = Percepatan gravitasi ($m^2$/detik).
$H_{eff}$ = Tinggi jatuh efektif (m)

Perhitungan daya yang dihasilkan setelah keluar generator karena adanya nilai efisiensi dari turbin dan generator, dirumuskan dengan persamaan :

$$\boldsymbol{P = \eta . \rho . Q . g . H_{eff}} \quad (2.30)$$

dimana :
η = Efisiensi Turbin.
P = Massa jenis air ($kg/m^3$)

Perhitungan energi listrik yang dihasilkan oleh PLTMH, dirumuskan dengan persamaan :

$$\boldsymbol{E = P\ x\ t} \quad (2.31)$$

dimana :
E = Energi listrik (kWh).
t = Waktu (jam).

## 2.8 Teknik Optimasi Metode Richard Bellman

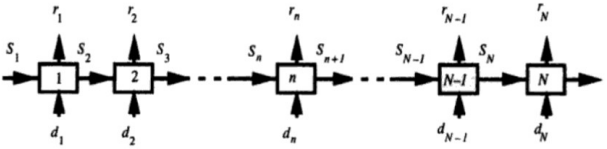
Konsep dasar dari teknik optimasi metode Richard Bellman adalah suatu prinsip optimalitas. Prinsip tersebut menentukan suatu masalah yang telah diuraikan dengan benar dapat diselesaikan dengan tahap demi tahap (Taha, 1996). Masalah optimasi dalam pengairan lebih sering bersifat non linear. Salah satu usaha untuk menyelesaikan masalah non linear ini adalah teknik optimasi dengan metode Richard Bellman (Indriyani, 2009).

Teknik optimasi dengan metode Richard Bellman dapat dihitung dengan konsep (Mays, 1992):

1. Setiap masalah diuraikan menjadi tahapan-tahapan yang lebih kecil.

2. Dikarenakan optimasi diterapkan di setiap tahapan yang lebih kecil, kombinasi yang tidak optimal akan tereleminasi secara otomatis.
3. Setiap tahapan harus dihubungkan bersama sehingga tidak terdapat kemungkinan yang tidak layak.

Elemen dasar dalam teknik optimasi dengan metode Richard Bellman disajikan pada **Gambar 2.**2




**Gambar 2. 2**. Elemen Dasar Teknik Optimasi Dengan Metode Richard Bellman
*(Sumber :* Mays, 1992*)*

dimana :

1. *Stage* (n) : tahap atau langkah yang menunjuk unit dekomposisi persoalan (waktu, lokasi, ruas saluran/sungai),
2. *Decision variable* ($d_n$) : variabel yang harus dicari/diputuskan nilainya pada setiap stage (debit release waduk, alokasi suplai air),
3. *State variable* ($S_n$) : variabel yang menyatakan keadaan sistem pada setiap stage sebagai akibat dari penetapan nilai variabel keputusan (*decision variable*) yang diambil pada stage sebelumnya (misal: tampungan awal waduk, ketersediaan dana proyek),
4. *State return* ($r_n$) : ukuran dari efektifitas penentuan keputusan optimum pada setiap stage yang secara umum merupakan fungsi dari state awal, state akhir dan nilai keputusan variabel terpilih.

Hal dasar yang mencirikan semua masalah teknik optimasi dengan metode Richard Bellman (Mays, 1992) adalah :

1. Masalah dibagi menjadi beberapa tahap, dengan variabel keputusan pada setiap tahap
2. Setiap tahap memiliki sejumlah keadaan yang saling terkait dengannya
3. Pengaruh keputusan pada setiap tahap adalah menghasilkan pengembalian, berdasarkan pada fungsi pengembalian tahap, dan untuk mengubah variabel keadaan saat ini menjadi variabel keadaan untuk tahap berikutnya. Mengingat kondisi saat ini, sebuah kebijakan optimal untuk tahapan yang tersisa tidak tergantung dari kebijakan yang diadopsi pada tahap sebelumnya. Ini disebut prinsip optimalitas Bellman, yang berfungsi sebagai tulang punggung pemrograman dinamis
4. Solusi dimulai dengan menemukan keputusan optimal untuk setiap kemungkinan keadaan pada tahap terakhir (disebut *backward recursive*) atau pada tahap pertama (disebut *forward recursive*).
5. Hubungan rekursif merupakan hubungan antar kebijakan optimal untuk setiap masalah di setiap tahap n dapat dikembangkan, mengingat kebijakan optimal untuk setiap masalah di tahap berikutnya, n +1. Persamaan rekursif untuk setiap kebijakan optimal dapat dirumuskan dengan batasan sebagai berikut :

$$\boldsymbol{r_{t+1}(ST_{t+1}) = \underset{Rt}{Max}[r_t(R_t, ST_{t+1}) + (r_t(ST_t)]} \quad (2.32)$$

dimana :

$r_n(ST_n)$ = Hasil optimal yang diperoleh dari *stage* n, jika pada *stage* n sistem berada pada *state* $s_n$.

$r_n(R_n, ST_n)$ = Hasil yang diperoleh pada *stage* n jika pada *state* $s_n$ dan keputusan diambil adalah $d_n$.

$(r_{n-1}(ST_{n-1})$ = Hasil optimal yang diperoleh dari *stage* n-1, jika pada *stage* n-1 sistem berada pada *state* $s_{n+1}$.

# BAB III
# METODOLOGI

## 3.1 Metodologi

Pembuatan Tugas Akhir Terapan ini dengan tahap-tahap yang disajikan pada **Gambar 3.3** dan diuraikan sebagai berikut :

### 3.1.1 Studi Literatur

Studi Literatur merupakan tahapan untuk menambah wawasan dan masukan terhadap permasalahan yang ada. Sehingga dapat mengambil langkah-langkah yang selanjutnya untuk memecahkan masalah yang ada.

### 3.1.2 Pengumpulan Data

Dalam tahap ini, penulis melakukan pengumpulan data dari berbagai sumber. Data yang dibutuhkan dalam penyelesaian Tugas Akhir Terapan ini adalah:

- Data Topografi
- Data curah hujan
- Data klimatologi
- Data pola tanam
- Data kebutuhan air baku
- Data kebutuhan PLTMH
- Data teknis Waduk Pidekso
- Data jumlah penduduk

### 3.1.3 Analisi Data (Pengelolahan dan Perhitungan Data)

Setelah melakukan pengumpulan data, maka data yang telah didapat dan disiapkan diolah kembali untuk dianalisis. Analisis data yang dilakukan, meliputi:

1. Analisis Hidrologi

Pada tahap analisis hidrologi, dibahas mengenai beberapa analisis, antara lain :

- Analisis curah hujan rata-rata

Analisis curah hujan efektif menggunakan data curah hujan yang mewakili kondisi curah hujan pada wilayah tersebut, yaitu Stasiun Hujan Ngancar dilanjutkan dengan analisis bangkitan curah hujan untuk satu tahun yang akan datang dengan menggunakan metode Thomas-Fiering

- Perhitungan Evapotranspirasi

  Perhitungan evapotranspirasi menggunakan Metode Penman Modifikasi dilanjutkan dengan analisis evapotranspirasi bangkitan untuk satu tahun yang akan datang dengan menggunakan metode Thomas-Fiering.

- Analisis Ketersediaan Debit

  Analisis ketersediaan debit, menggunakan metode FJ Mock. Setelah didapatkan debit dari perhitungan FJ Mock dilanjutkan dengan analisis debit bangkitan untuk satu tahun yang akan datang dengan menggunakan metode Thomas-Fiering.

2. Analisis Kebutuhan Air

Pada analisis kebutuhan air, dibahas mengenai beberapa analisis antara lain :

- Analisis kebutuhan air irigasi.

  Pada analisis ini, kebutuhan air untuk irigasi disesuaikan dengan data pola yang didasrkan pada ketersediaan air waduk. Perhitungan air irigasi berdasarkan Standar Perencanaan Irigasi.

- Analisis kebutuhan air baku.

  Analisis kebutuhan air baku digunakan untuk melayani 3 Kecamatan dan 11 dibagi menjadi kebutuhan sektor domestik dan non domestik. Kebutuhan air baku disesuaikan dengan jumlah penduduk yang diproyeksikan menggunakan metode Geometrik.

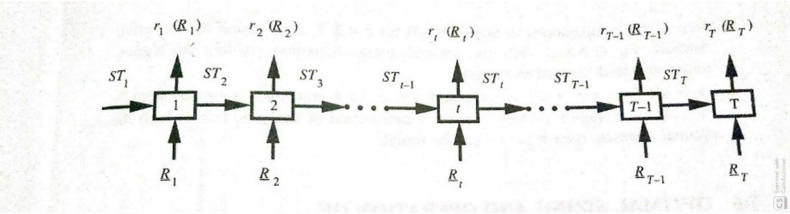
- Analisis Kebutuhan Air Pembangkit Listrik Tenaga Mikro Hidro (PLTMH).

  Kebutuhan air untuk produksi PLTMH ditinjau berdasarkan debit air yang digunakan untuk kebutuhan irigasi

dan air baku. Dalam analisis ini, ketersediaan debit yang ada dan tinggi jatuh air ($H_{eff}$) menentukan besar energi yang dapat dihasilkan

### 3.1.4 Permodelan Teknik Optimasi dengan Metode Richard Bellman

Dalam teknik optimasi dengan metode Richard Bellman variabel keputusan adalah ketersediaan air untuk pasokan air baku, irigasi, pembangkit listrik. Keputusan pada ketersediaan untuk setiap periode harus dibatasi oleh batasan dan ketersediaan air waduk (*variable state*). Dalam **Gambar 3.1** menunjukkan tahap (time period), variabel keadaan (*storage*) dan variabel keputusan (*releases*). Diagram alir permodelan teknik optimasi dengan metode Richard Bellman dapat dilihat pada **Gambar 3.4**.




**Gambar 3. 1.** Prosedur Perhitungan pada Teknik Optimasi dengan Metode Richard Bellman Selama T periode
*(Sumber : Mays, 1992)*

dimana :

$$\underline{\boldsymbol{R_t}} = (\boldsymbol{R_{airbaku,t}}, \boldsymbol{R_{irigasi,t}}, \boldsymbol{R_{PLTM,t}})$$

Secara matematis unsur model untuk menentukan rilis yang optimal pada waduk selama periode T dapat dinyatakan pada persamaan berikut ini (Mays, 1992):

*a. Stage Return Function*

$\mathbf{r_t(R_t) = r_{airbaku}(R_{airbaku,t}) + r_{irigasi}(R_{irigasi,t}) + r_{PLTMH}(R_{PLTMH,t})}$

t = 1, 2, …, T

Dimana, rt(Rt) adalah jumlah kebutuhan air optimal yang dibutuhkan pada periode t yang dihubungkan dengan ketersediaan air waduk.

b. *Stage Transition Function*

$\mathbf{ST_{t+1} = ST_t + QF_t + PP_t - Ev_t - R_t}$

Dimana : t = 1, 2, ..., T

Berdasarkan,

$\mathbf{K_d \leq ST_t \leq K}$

Dimana : t = 1,2, ..., T

c. *Forward recuirsive formula*

$$r_{t+1}(ST_{t+1}) = \underset{Rt}{Max}[r_t(R_t, ST_{t+1}) + (r_t(ST_t)], \quad Untuk\ t = 2, \dots, T$$

$$r_{t+1}(ST_{t+1}) = \underset{Rt}{Max}[r_t(R_t, ST_t)], \quad Untuk\ t = 1$$

Prosedur perhitungan untuk menerapkan algoritma di atas untuk menentukan kebijakan rilis yang optimal selama periode T dengan menggunakan langkah-langkah dasar berikut:

1. Tentukan $ST_1$ volume penyimpanan awal dengan $\mathbf{K_d \leq ST_t \leq K}$
2. Memisahkan ruang penyimpanan untuk setiap periode
3. Mulai dari periode t = 1, menentukan rilis yang optimal selama periode t = 1 untuk semua $J_2$ pada volume penyimpanan yang layak $ST_{2,\,j}$, j = 1,2, .... $J_2$ pada awal periode t = 2; yaitu, melakukan optimasi

$$Max\ r_2 ST_{2,j} = (R_{airbaku,1}, R_{irigasi,1}, R_{PLTM,1})$$

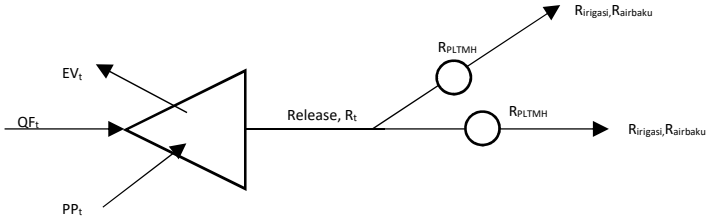
Berdasarkan,

$\mathbf{R_{airbaku,1}, R_{irigasi,1}, R_{PLTM,1} = ST_{t+1} = ST_1 + QF_1 + PP_1 - Ev_1 - ST_{2,j}}$

4. Menyimpan rilis yang optimal dan kembali untuk periode t = 1 yang terkait dengan setiap ruang penyimpanan layak pada awal periode t = 2

5. Ulangi perhitungan langkah 3-4 untuk t = 2,3 ...., T menggunakan rumus rekursif. Hanya transisi penyimpanan yang optimal menghasilkan return tertinggi disimpan untuk analisa lebih lanjut.
6. Setelah tahap t akhir = T dihitung, prosedur *track-back* digunakan untuk mengidentifikasi keputusan penyimpanan yang optimal selama seluruh periode analisis, di mana rilis optimal dalam setiap periode dapat ditemukan.

Model teknik optimasi dengan metode Richard Bellman yang akan disajikan adalah untuk memaksimalkan peran Waduk Pidekso sebagai waduk serbaguna. Sistem pengoperasian air pada Waduk Pidekso dapat dilihat pada **Gambar 3.2.**




**Gambar 3. 2.** Sistem Pengoperasian Air Waduk Pidekso

dimana :

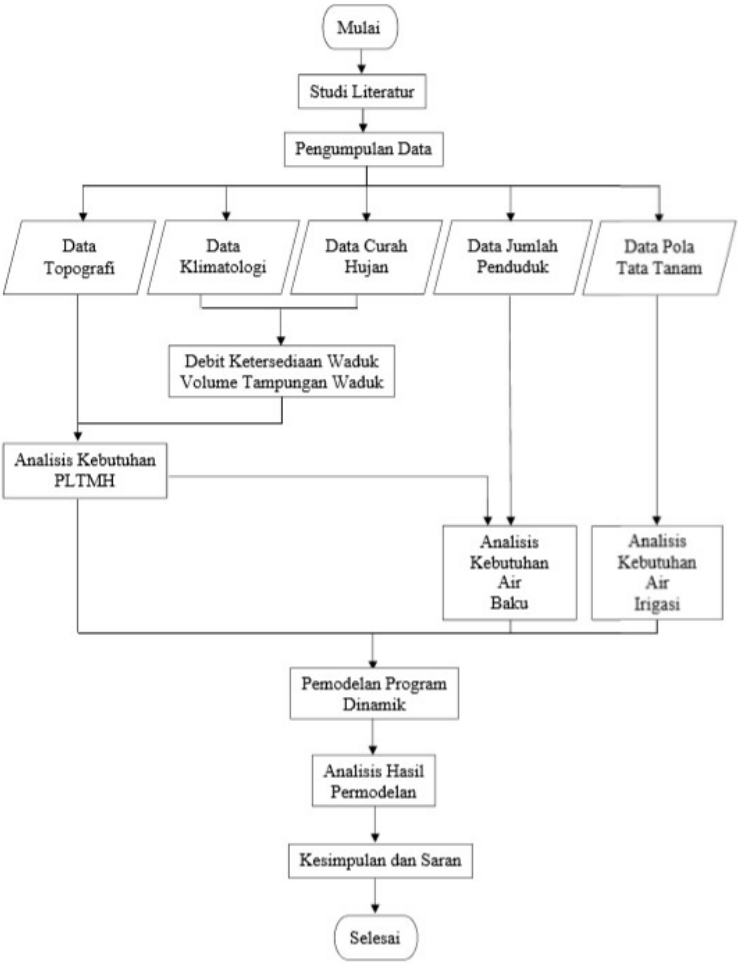
ST = Volume tampungan waduk ($m^3$).
$K_d$ = Kapasitas tampungan mati ($m^3$).
K = Kapasitas waduk ($m^3$).
$EV_t$ = Volume evapotranspirasi pada periode t ($m^3$).
$QF_t$ = Volume *Inflow* waduk pada periode t ($m^3$).
$PP_t$ = Volume presipitasi pada periode t ($m^3$).
$R_t$ = Varibel keputusan.
$R_{air\ baku}$ = Volume air untuk air baku pada periode t ($m^3$).
$R_{irigasi}$ = Volume air untuk irigasi pada periode t ($m^3$).
$R_{PLTMH}$ = Volume air untuk PLTMH pada periode t ($m^3$).

### 3.1.5 Analisis Hasil Permodelan

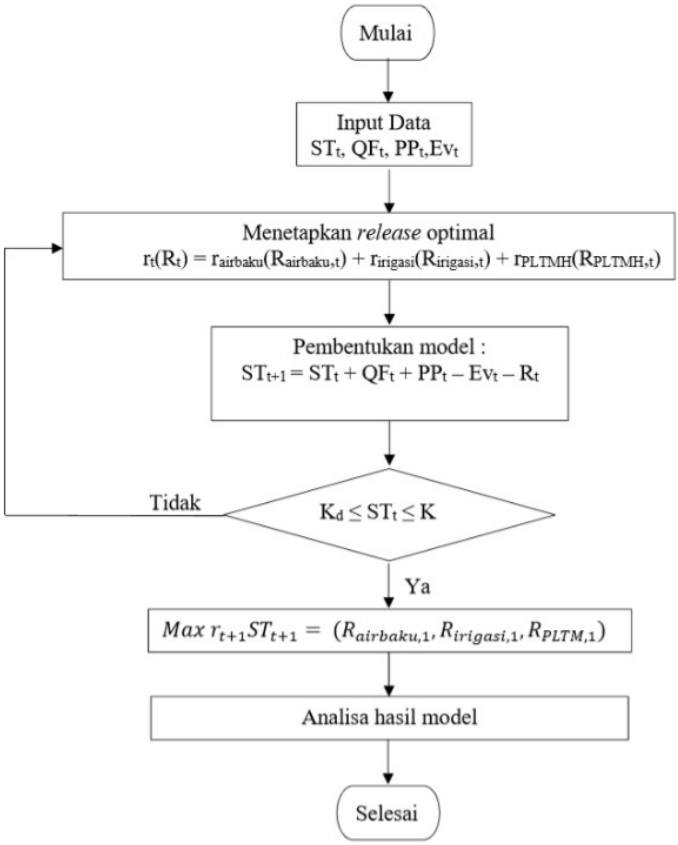
Pada tahap ini dilakukan analisi terhadap hasil simulasi teknik optimasi dengan metode Richard Bellman. Hasil analisi ini menunjukan pola *release* yang optimal untuk fungsi tujuan dengan memaksimalkan nilai rata-rata antara *release* air dengan *demand* mengacu pada jumlah air waduk yang harus release tiap periodenya.

### 3.1.6 Kesimpulan dan Saran

Dari uraian di atas dapat diketahui hasil yang paling optimal untuk pemanfaatan air Waduk Pidekso untuk kebutuhan air baku, irigasi, dan mikrohidro dengan menggunakan teknik optimasi dengan metode Richard Bellman.




**Gambar 3. 3**. Diagram Alir Pengerjaan Tugas Akhir Terapan



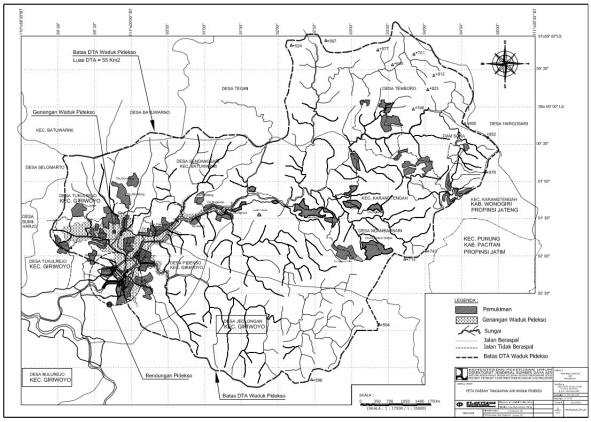

**Gambar 3. 4**. Diagram Alir Permodelan Program Teknik Optimasi dengan Metode Richard Bellman

# BAB IV
# ANALISIS KEBUTUHAN DAN KETERSEDIAAN AIR

## 4.1 Waduk Pidekso

Data teknis Waduk Pidekso pada proyek pembangunan Waduk Pidekso (PT. Mettana, 2011), sebagai berikut :

1. Hidrologi
   - Sungai = Bengawan Solo.
   - Luas DAS = 55 $km^2$.
   - Curah hujan tahunan rata-rata = 1,637 mm.
   - Debit banjir desain Q1.000th = 417 $m^3$/det.
   - Debit banjir PMF = 892 $m^3$/det.
   - Inflow tahunan rerata = 45,24 juta $m^3$.
   - Laju sedimen rerata = 165.000 $m^3$/thn.
2. Daerah Tangkapan Air Waduk Pidekso

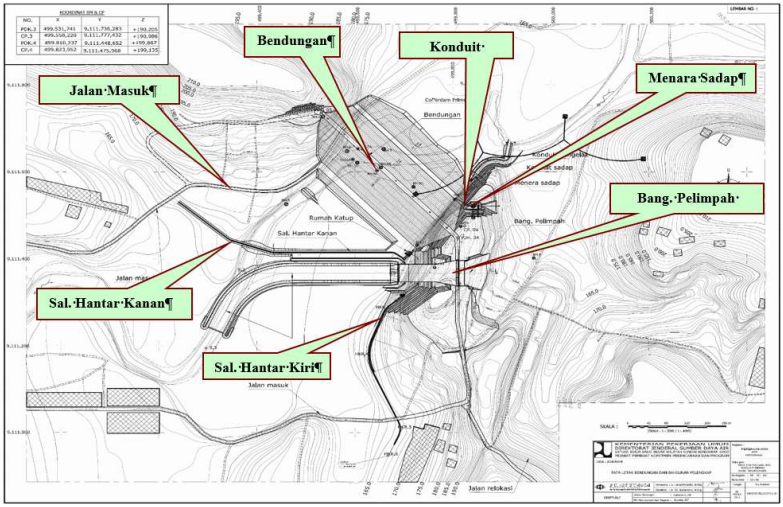



**Gambar 4. 1**. Daerah Tangkapan Air Waduk Pidekso
*(Sumber : PT. Mettana, 2011)*

Daerah tangkapan air area Waduk Pidekso yang disajikan pada **Gambar 4.1**, terdiri dari tegalan, daerah persawahan dan hutan rakyat, sehingga menyebabkan laju sedimentasi yang cukup tinggi.

3. Tata Letak Bendungan dan Bangunan Pelengkap

Tata letak bendungan dan posisi bangunan pelengkap dapat dilihat di **Gambar 4.2**. Saluran hantar kiri melayani daerah irigasi seluas 900 Ha, sedangkan saluran kanan melayani daerah irigasi seluar 600 Ha, air baku sebesar 300 l/dt dan mikro hidro.



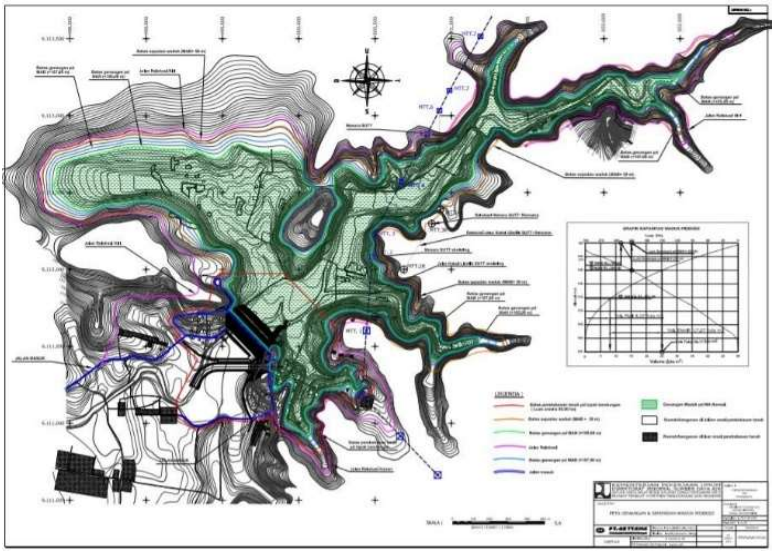

**Gambar 4. 2** Tata Letak Bendungan dan Posisi Bangunan Pelengkap

*(Sumber : PT. Mettana, 2011)*

4. Waduk

Denah genangan pada Waduk Pidekso disajikan pada **Gambar 4.3**.Data teknis pada pembangunan Waduk Pidekso sebagai berikut :

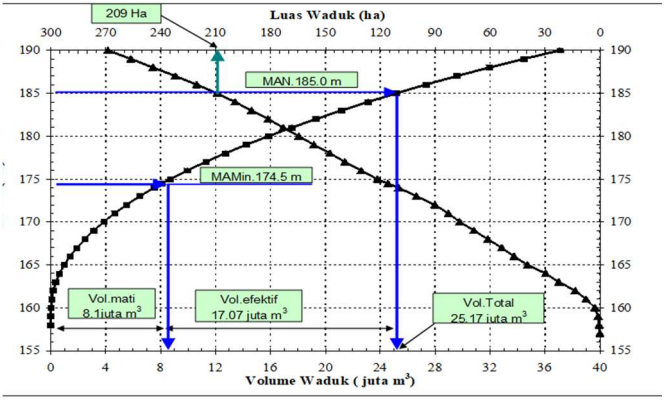
- Elevasi genangan normal (MAN) = + 185,00 m
- Luas genangan MAN = 209 Ha
- Elevasi muka air banjir (MAB) = + 186,60 m
- Luas genangan MAB = 232 Ha
- Luas genangan MAB + Sempadan 50 m = 325 Ha
- Elevasi muka air rendah = + 174.50 m
- Elevasi MAB maks. = + 188,02 m
- Elevasi dasar sungai = + 157,00 m



**Gambar 4. 3** Daerah Genangan Waduk Pidekso
*(Sumber : PT. Mettana, 2011)*

Hubungan antara volume tampungan waduk dan luas genangan terhadap elevasi, disajikan pada **Gambar 4.4**.

- Volume tampungan total = 25 juta $m^3$.
- Volume tampungan efektif = 17 juta $m^3$.
- Volume tampungan mati = 8 juta $m^3$.




**Gambar 4. 4** Volume Tampungan Waduk
*(Sumber : PT. Mettana, 2011)*

## 4.2 Analisis Hidrologi

### 4.2.1 Curah Hujan Rata-Rata

Stasiun curah hujan yang berada dekat dengan DAS Pidekso terdapat 9 stasiun, dari sembilan stasiun hujan data yang ada, sedikitnya 3 stasiun yang berada dekat dengan lokasi kajian, yaitu Stasiun Eromoko, Stasiun B. Ngancar dan Stasiun Giriwoyo. Dari ketiga stasiun tersebut, pencatatan data hujan yang lengkap adalah Stasiun B. Ngancar, sehingga data hujan yang digunakan untuk analisa hidrologi berasal dari Stasiun B. Ngancar dengan pencatatan data hujan harian selama 19 tahun (2001-2019). Letak stasiun B. Ngancar berada di 7°59,24'54" LS, 110°9,58'45" BT, atau dari lokasi pekerjaan stasiun hujan tersebut berjarak sekitar 8 km.

Contoh formulir pencatatan data hujan harian dari Stasiun Curah Hujan B. Ngancar, disajikan pada **Tabel 4.1** pada tahun 2001.

**Tabel 4. 1** Formulir Data Hujan Harian

**DATA CURAH HUJAN HARIAN**

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2001** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 5,0 | 21,0 | 0,0 | 0,0 | 59,0 | 0,0 | 0,0 | ttd | ttd | 29,0 | ttd |
| 2 | 0,0 | 23,0 | 16,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 3 | 9,0 | 55,0 | 25,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 4 | 10,0 | 13,0 | 12,0 | 43,0 | 0,0 | 6,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 5 | 0,0 | 27,0 | 14,0 | 20,0 | 0,0 | 1,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 6 | 0,0 | 43,0 | 24,0 | 10,0 | 0,0 | 11,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 7 | 0,0 | 35,0 | 0,0 | 11,0 | 0,0 | 6,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 8 | 0,0 | 43,0 | 0,0 | 0,0 | 0,0 | 13,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 9 | 0,0 | 10,0 | 0,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 10 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 11 | 5,0 | 0,0 | 23,0 | 21,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 12 | 0,0 | 0,0 | 0,0 | 12,0 | 0,0 | 6,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 13 | 0,0 | 1,0 | 0,0 | 11,0 | 0,0 | 14,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 14 | 3,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 21,0 | - |
| 15 | 4,0 | 0,0 | 0,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 38,0 | - |
| 16 | 32,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 6,0 | - |
| 17 | 19,0 | 5,0 | 47,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 42,0 | - |
| 18 | 9,0 | 7,0 | 2,0 | 0,0 | 20,0 | 0,0 | 0,0 | 0,0 | - | - | 14,0 | - |
| 19 | 0,0 | 0,0 | 2,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | - | - | 39,0 | - |
| 20 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 4,0 | - |
| 21 | 61,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 22 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 | 0,0 | - | - | 0,0 | - |
| 23 | 30,0 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 24 | 0,0 | 0,0 | 5,0 | 23,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 25 | 0,0 | 0,0 | 4,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 26 | 17,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 27 | 13,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 15,0 | - |
| 28 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 29 | 27,0 | | 26,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 6,0 | - |
| 30 | 0,0 | | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 33,0 | - |
| 31 | 15,0 | | 15,0 | | 0,0 | | 0,0 | 0,0 | | - | | - |
| Hujan Maks | 61,0 | 55,0 | 47,0 | 43,0 | 20,0 | 59,0 | 4,0 | 0,0 | - | - | 42,0 | - |
| Jml. Curah Hujan | 248,0 | 307,0 | 274,0 | 211,0 | 23,0 | 116,0 | 4,0 | 0,0 | - | - | 247,0 | - |
| Jml. Hari Hujan | 15 | 15 | 20 | 12 | 2 | 8 | 1 | 0 | - | - | 11 | - |
| Jml. data (1-15) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | - | - | 15 | - |
| Jml. Hujan (1-15) | 31,0 | 268,0 | 135,0 | 179,0 | 0,0 | 116,0 | 0,0 | 0,0 | - | - | 88,0 | - |
| Jml. Data (16-31) | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | - | - | 15 | - |
| Jml. Hujan (16-31) | 217,0 | 39,0 | 139,0 | 32,0 | 23,0 | 0,0 | 4,0 | 0,0 | - | - | 159,0 | - |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | - | - | - | 115 |

*(Sumber : Dinas PU Sumber Daya Air dan Penataan Ruang, 2019)*

Data curah hujan selama satu tahun dibagi menjadi dua periode (15 harian). Sehingga pada setiap bulan terdapat 2 periode. Rekapitulasi curah hujan disajikan pada **Tabel 4.2.**

**Tabel 4. 2** Rekapitulasi Curah Hujan Rata-Rata

| Tahun | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| 2001 | 31 | 217 | 268 | 39 | 135 | 139 | 179 | 32 | 0 | 23 | 116 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 97 | 72 | 0 | 0 | 0 |
| 2003 | 212 | 143 | 248 | 278 | 202 | 95 | 4 | 20 | 37 | 0 | 0 | 7 |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 44 | 0 |
| 2005 | 52 | 239 | 119 | 177 | 138 | 162 | 121 | 23 | 5 | 0 | 4 | 135 |
| 2006 | 0 | 0 | 172 | 181 | 0 | 0 | 206 | 95 | 0 | 0 | 0 | 0 |
| 2007 | 23 | 68 | 140 | 203 | 82 | 270 | 280 | 202 | 14 | 73 | 0 | 0 |
| 2008 | 124 | 148 | 405 | 285 | 204 | 165 | 184 | 54 | 7 | 8 | 0 | 0 |
| 2009 | 116 | 204 | 210 | 103 | 0 | 0 | 0 | 178 | 80 | 100 | 20 | 0 |
| 2010 | 112 | 178 | 167 | 115 | 391 | 184 | 35 | 58 | 230 | 26 | 52 | 0 |
| 2011 | 277 | 194 | 228 | 169 | 87 | 179 | 127 | 32 | 0 | 0 | 0 | 0 |
| 2012 | 273 | 88 | 193 | 212 | 279 | 197 | 0 | 0 | 117 | 59 | 4 | 5 |
| 2013 | 273 | 186 | 145 | 185 | 76 | 135 | 91 | 90 | 34 | 40 | 125 | 124 |
| 2014 | 167 | 309 | 100 | 87 | 114 | 120 | 184 | 7 | 55 | 42 | 0 | 94 |
| 2015 | 139 | 331 | 182 | 63 | 215 | 103 | 55 | 172 | 55 | 0 | 15 | 0 |
| 2016 | 76 | 220 | 239 | 90 | 158 | 172 | 247 | 112 | 86 | 96 | 77 | 24 |
| 2017 | 106 | 200 | 296 | 63 | 134 | 84 | 220 | 124 | 75 | 24 | 13 | 37 |
| 2018 | 245 | 474 | 259.5 | 116 | 62 | 174 | 140 | 61 | 140 | 61 | 0 | 13 |
| 2019 | 0 | 0 | 0 | 0 | 260 | 276 | 49 | 42 | 13 | 0 | 0 | 0 |
| **Rerata** | **117.158** | **168.368** | **177.447** | **124.526** | **133.526** | **129.211** | **118.789** | **73.632** | **53.684** | **32.263** | **24.737** | **23.105** |

| Tahun | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | | Ags | | Sep | | Okt | | Nov | | Des | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| 2001 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 159 | 0 | 0 |
| 2002 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 34 | 108 | 81 | 170 |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 89 | 0 | 0 | 0 | 0 |
| 2004 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2005 | 124 | 10 | 0 | 0 | 0 | 14 | 3 | 41 | 39 | 43 | 261 | 172 |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 319 |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 114 | 344 |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 98 |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 120 | 31 | 100 |
| 2010 | 31 | 34 | 0 | 31 | 218 | 238 | 48 | 195 | 43 | 117 | 261 | 168 |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 75 | 180 |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 18 | 64 | 252 | 171 | 220 |
| 2013 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 101 | 33 | 118 | 386 |
| 2014 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 193 | 180 | 258 |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 103 | 77 | 220 |
| 2016 | 17 | 50 | 110 | 11 | 20 | 284 | 0 | 0 | 178 | 128 | 221 | 113 |
| 2017 | 0 | 24 | 0 | 0 | 0 | 92.5 | 63 | 16 | 35 | 678 | 30 | 217 |
| 2018 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 59 | 70 | 164 |
| 2019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 8 | 62 | 192 |
| **Rerata** | **14.105** | **6.421** | **5.947** | **2.211** | **12.526** | **33.079** | **6.579** | **20.737** | **43.211** | **105.316** | **102.632** | **174.789** |

### 4.2.2 Bangkitan Data Dengan Metode Thomas-Fiering

Dalam pengerjaan Tugas Akhir Terapan ini, bangkitan data untuk curah hujan dilakukan dengan menggunakan metode Thomas-Fiering. Bangkitan data pada Waduk Pidekso dilakukan untuk memperpanjang data yang ada sampai dengan satu tahun ke depan. Bangkitan data curah hujan ini akan digunakan untuk

perhitungan presipitasi pada simulasi teknik optimasi dengan metode Richard Bellman.

Contoh pengerjaan data curah hujan bangkitan metode Thomas-Fiering pada periode 15 harian untuk bulan Januari periode I tahun 2001, sebagai berikut :

1. Mengitung parameter

   a. Nilai rata-rata.(Xrat)
      Menghitung nilai rata-rata data curah hujan pada bulan Januari periode 1 pada tahun 2001-2019.

   b. Standar deviasi (Sd).
      Menghitung standar deviasi data curah hujan pada bulan Januari periode 1 pada tahun 2001-2019.

   c. Koefisien korelasi (rj).
      Menghitung nilai koefisien korelasi (rj) data curah hujan pada bulan Januari periode 1 pada tahun 2001-2019 terhadap bulan sebelumnya (Desember)

$$rj = \frac{\Sigma\{\left(R_{2001,JanI}\, x\, R_{2001,DesII} + \cdots + R_{2019,JanI}\, x\, R_{2019,DesII}\right) - (19 x \overline{\_\_\_\_\_}_{2001,JanI} x \overline{\_\_\_\_\_}_{2001,DesI}}{Sd_{2001,JanI}.x\ Sd_{2001,DesII}.(19-1)}$$

   d. Koefisien regresi (bj)

$$bj = \frac{rj_{JanI} Sd_{JanII}}{Sd_{JanI}}$$

Hasil perhitungan parameter Xrat, Sd, rj, dan bj Tahun 2001-2019 dapat dilihat pada **Tabel 4.3.**

**Tabel 4. 3** Hasil Perhitungan Xrat, Sd, rj, dan bj Tahun 2001-2019

| No | Tahun | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 2001 | 31 | 217 | 268 | 39 | 135 | 139 | 179 | 32 | 0 | 23 | 116 | 0 |
| 2 | 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 97 | 72 | 0 | 0 | 0 |
| 3 | 2003 | 212 | 143 | 248 | 278 | 202 | 95 | 4 | 20 | 37 | 0 | 0 | 7 |
| 4 | 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 44 | 0 |
| 5 | 2005 | 52 | 239 | 119 | 177 | 138 | 162 | 121 | 23 | 5 | 0 | 4 | 135 |
| 6 | 2006 | 0 | 0 | 172 | 181 | 0 | 0 | 206 | 95 | 0 | 0 | 0 | 0 |
| 7 | 2007 | 23 | 68 | 140 | 203 | 82 | 270 | 280 | 202 | 14 | 73 | 0 | 0 |
| 8 | 2008 | 124 | 148 | 405 | 285 | 204 | 165 | 184 | 54 | 7 | 8 | 0 | 0 |
| 9 | 2009 | 116 | 204 | 210 | 103 | 0 | 0 | 0 | 178 | 80 | 100 | 20 | 0 |
| 10 | 2010 | 112 | 178 | 167 | 115 | 391 | 184 | 35 | 58 | 230 | 26 | 52 | 0 |
| 11 | 2011 | 277 | 194 | 228 | 169 | 87 | 179 | 127 | 32 | 0 | 0 | 0 | 0 |
| 12 | 2012 | 273 | 88 | 193 | 212 | 279 | 197 | 0 | 0 | 117 | 59 | 4 | 5 |
| 13 | 2013 | 273 | 186 | 145 | 185 | 76 | 135 | 91 | 90 | 34 | 40 | 125 | 124 |
| 14 | 2014 | 167 | 309 | 100 | 87 | 114 | 120 | 184 | 7 | 55 | 42 | 0 | 94 |
| 15 | 2015 | 139 | 331 | 182 | 63 | 215 | 103 | 55 | 172 | 55 | 0 | 15 | 0 |
| 16 | 2016 | 76 | 220 | 239 | 90 | 158 | 172 | 247 | 112 | 86 | 96 | 77 | 24 |
| 17 | 2017 | 106 | 200 | 296 | 63 | 134 | 84 | 220 | 124 | 75 | 24 | 13 | 37 |
| 18 | 2018 | 245 | 474 | 260 | 116 | 62 | 174 | 140 | 61 | 140 | 61 | 0 | 13 |
| 19 | 2019 | 0 | 0 | 0 | 0 | 260 | 276 | 49 | 42 | 13 | 0 | 0 | 0 |
| **Rerata** | | 117.158 | 168.368 | 177.447 | 124.526 | 133.526 | 129.211 | 118.789 | 73.632 | 53.684 | 32.263 | 24.737 | 23.105 |
| **Sd** | | 99.932 | 125.603 | 105.378 | 87.979 | 106.799 | 84.504 | 89.887 | 61.602 | 60.116 | 34.075 | 40.034 | 43.768 |
| **Koef Korelasi (rj)** | | 0.158 | 0.524 | 0.464 | 0.558 | 0.183 | 0.602 | 0.199 | 0.322 | 0.067 | 0.307 | 0.264 | 0.239 |
| **Koef Regresi (bj)** | | 0.199 | 0.440 | 0.387 | 0.677 | 0.145 | 0.641 | 0.137 | 0.315 | 0.038 | 0.361 | 0.289 | 0.165 |

| No | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 159 | 0 | 0 |
| 2 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 34 | 108 | 81 | 170 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 89 | 0 | 0 | 0 | 0 |
| 4 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 124 | 10 | 0 | 0 | 0 | 14 | 3 | 41 | 39 | 43 | 261 | 172 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 319 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 114 | 344 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 98 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 120 | 31 | 100 |
| 10 | 31 | 34 | 0 | 31 | 218 | 238 | 48 | 195 | 43 | 117 | 261 | 168 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 75 | 180 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 18 | 64 | 252 | 171 | 220 |
| 13 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 101 | 33 | 118 | 386 |
| 14 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 193 | 180 | 258 |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 103 | 77 | 220 |
| 16 | 17 | 50 | 110 | 11 | 20 | 284 | 0 | 0 | 178 | 128 | 221 | 113 |
| 17 | 0 | 24 | 0 | 0 | 0 | 93 | 63 | 16 | 35 | 678 | 30 | 217 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 59 | 70 | 164 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 8 | 62 | 192 |
| **Rerata** | 14.105 | 6.421 | 5.947 | 2.211 | 12.526 | 33.079 | 6.579 | 20.737 | 43.211 | 105.316 | 102.632 | 174.789 |
| **Sd** | 30.243 | 14.072 | 25.207 | 7.413 | 49.968 | 83.421 | 17.608 | 47.878 | 48.131 | 157.799 | 82.271 | 109.115 |
| **oef Korelasi (** | 0.820 | 0.186 | 0.748 | 0.285 | 0.968 | 0.662 | 0.498 | 0.534 | -0.043 | 0.201 | -0.035 | 0.372 |
| **oef Regresi (t** | 0.382 | 0.333 | 0.220 | 1.924 | 1.615 | 0.140 | 1.353 | 0.536 | -0.142 | 0.105 | -0.047 | 0.341 |

2. Mencari nilai bilangan random normal (ti) pada tiap periode satu tahun yang akan datang dengan bantuan *Data Analysis* pada *Microsoft Excel.*

Dengan syarat :

- Standar deviasi bilangan random normal pada tahun ke-n ≈ 1,
- Rata-rata bilangan random normal pada tahun ke n ≈ 0.

Hasil perhitungan bilangan random normal untuk tiap periode untuk satu tahun ke depan dapat dilihat pada **Tabel 4.4.**

**Tabel 4. 4** Bilangan Random (ti) untuk tahun 2020

| **Tahun ke-** | | **1** |
|---|---|---|
| **Bulan** | **Periode** | **2020** |
| Januari | I | -0.911 |
| | II | 0.244 |
| Februari | I | 1.232 |
| | II | 0.811 |
| Maret | I | -1.942 |
| | II | -1.042 |
| April | I | 1.257 |
| | II | -2.083 |
| Mei | I | 1.500 |
| | II | 0.568 |
| Juni | I | -0.980 |
| | II | 0.933 |
| Juli | I | -1.003 |
| | II | 0.529 |
| Agustus | I | -0.105 |
| | II | -0.078 |
| September | I | 0.725 |
| | II | 1.141 |
| Oktober | I | -1.276 |
| | II | 0.361 |
| November | I | -0.734 |
| | II | 0.472 |
| Desember | I | 0.278 |
| | II | 0.432 |
| **Rerata** | | **0.014** |
| **Sd** | | **1.025** |

3. Mencari nilai curah hujan bangkitan pada bulan Januari periode I tahun 1 (2020).

$$R_{2020,Jan1} = \overline{R_{2019JanI}} + bj_{2019JanI}\left(R_{2019DesII} - \overline{R_{2019JanI}}\right) + ti_{2020JanI} Sd_{2019JanI}\left(1 - rj_{2019JanI}\right)^{1/2}$$

Dimana, jika R < 0 maka R = 0.

Hasil perhitungan bangkitan data curah hujan metode Thomas-Fiering untuk tahun ke-1 (2020) dapat dilihat pada **Tabel 4.5**

**Tabel 4. 5** Hasil Perhitungan Curah Hujan Bangkitan Tahun Ke-1 (2020)

| Tahun ke- | Bulan | Periode | Rata-Rata | Sd | Koef Korelasi | Koef Regresi(b | Angka Random | R (mm) | R Pakai (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 1 (2020) | Jan | I | 117.158 | 99.932 | 0.158 | 0.199 | -0.911 | 48.546 | 48.546 |
| | | II | 168.368 | 125.603 | 0.524 | 0.440 | 0.244 | 136.796 | 136.796 |
| | Feb | I | 177.447 | 105.378 | 0.464 | 0.387 | 1.232 | 256.721 | 256.721 |
| | | II | 124.526 | 87.979 | 0.558 | 0.677 | 0.811 | 261.487 | 261.487 |
| | Mar | I | 133.526 | 106.799 | 0.183 | 0.145 | -1.942 | -35.485 | 0 |
| | | II | 129.211 | 84.504 | 0.602 | 0.641 | -1.042 | -31.828 | 0 |
| | Apr | I | 118.789 | 89.887 | 0.199 | 0.137 | 1.257 | 199.340 | 199.340 |
| | | II | 73.632 | 61.602 | 0.322 | 0.315 | -2.083 | 7.592 | 7.592 |
| | Mei | I | 53.684 | 60.116 | 0.067 | 0.038 | 1.500 | 139.073 | 139.073 |
| | | II | 32.263 | 34.075 | 0.307 | 0.361 | 0.568 | 86.906 | 86.906 |
| | Jun | I | 24.737 | 40.034 | 0.264 | 0.289 | -0.980 | 9.005 | 9.005 |
| | | II | 23.105 | 43.768 | 0.239 | 0.165 | 0.933 | 56.403 | 56.403 |
| | Jul | I | 14.105 | 30.243 | 0.820 | 0.382 | -1.003 | 17.372 | 17.372 |
| | | II | 6.421 | 14.072 | 0.186 | 0.333 | 0.529 | 16.782 | 16.782 |
| | Agu | I | 5.947 | 25.207 | 0.748 | 0.220 | -0.105 | 7.000 | 7.000 |
| | | II | 2.211 | 7.413 | 0.285 | 1.924 | -0.078 | 10.941 | 10.941 |
| | Sep | I | 12.526 | 49.968 | 0.968 | 1.615 | 0.725 | 16.482 | 16.482 |
| | | II | 33.079 | 83.421 | 0.662 | 0.140 | 1.141 | 86.075 | 86.075 |
| | Okt | I | 6.579 | 17.608 | 0.498 | 1.353 | -1.276 | 98.235 | 98.235 |
| | | II | 20.737 | 47.878 | 0.534 | 0.536 | 0.361 | 74.128 | 74.128 |
| | Nov | I | 43.211 | 48.131 | -0.043 | -0.142 | -0.734 | 2.719 | 2.719 |
| | | II | 105.316 | 157.799 | 0.201 | 0.105 | 0.472 | 161.121 | 161.121 |
| | Des | I | 102.632 | 82.271 | -0.035 | -0.047 | 0.278 | 123.176 | 123.176 |
| | | II | 174.789 | 109.115 | 0.372 | 0.341 | 0.432 | 194.555 | 194.555 |

## 4.3 Analisis Klimatologi

### 4.3.1 Evapotranspirasi Potensial

Pada analisis klimatologi, perhitungan Evapotranspirasi dengan menggunakan Metode Penman Modifikasi. Unsur-unsur

klimatologi yang digunakan pada perhitungan Evapotranspirasi Metode Penman adalah temperatur udara, kelembaban udara, penyinaran matahari, dan kecepatan angin. Data klimatologi yang didapatkan berasal dari Stasiun Klimatologi W. Ngancar. Pada perhitungan evapotranspirasi data disesuaikan dengan kondisi perhitungan yang ada. Data klimatologi yang digunakan adalah selama 19 tahun (2001 - 2019). Contoh formulir pencatatan data klimatologi disajikan pada **Tabel 4.6** pada bulan Januari tahun 2001.

**Tabel 4. 6** Formulir Data Klimatologi

| | | | |
|---|---|---|---|
| Stasiun | : NGANCAR | Pada DAS | : WADUK NGANCAR |
| Bulan | : JANUARI | No. Stasiun | : |
| Tahun | : 2001 | Lokasi Stasiun | : NGANCAR |
| Kecamatan | : BATU WARNO | Tinggi muka laut | : 19 M |
| Kabupaten | : WONOGIRI | Tahun pendirian | : 1974 |
| Propinsi | : JAWA TENGAH | Dibangun oleh/pemilik | : PROSIDA |

| Tanggal | RH | Temperatur | | | Temperatur air dalam Pan( ° C) | Penguapan dalam Pan "A" ( °C ) | Kecepatan angin dalam Km/hari | Radiasi Matahari | Sinar matahari dalam (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | Max | Min | Rata-rata | | | | | |
| 1 | 0,0 | 31,17 | 24,5 | 27,83 | 0,0 | -28,0 | 291,0 | 0,0 | 0,0 |
| 2 | 0,0 | 31,83 | 27,5 | 29,67 | 0,0 | 3,0 | 458,0 | 0,0 | 0,0 |
| 3 | 0,0 | 31,67 | 27,0 | 29,33 | 0,0 | 3,0 | 421,0 | 0,0 | 0,0 |
| 4 | 0,0 | 32,33 | 26,5 | 29,42 | 0,0 | 2,0 | 312,0 | 0,0 | 0,0 |
| 5 | 0,0 | 30,00 | 27,5 | 28,75 | 0,0 | 4,0 | 87,0 | 0,0 | 0,0 |
| 6 | 0,0 | 31,50 | 26,0 | 28,75 | 0,0 | -5,0 | 975,0 | 0,0 | 0,0 |
| 7 | 0,0 | 31,17 | 28,0 | 29,58 | 0,0 | 5,5 | 128,0 | 0,0 | 0,0 |
| 8 | 0,0 | 31,83 | 27,5 | 29,67 | 0,0 | 7,0 | 1673,0 | 0,0 | 0,0 |
| 9 | 0,0 | 31,33 | 28,0 | 29,67 | 0,0 | 6,0 | 1279,0 | 0,0 | 0,0 |
| 10 | 0,0 | 31,50 | 28,5 | 30,00 | 0,0 | 7,0 | 1380,0 | 0,0 | 0,0 |
| 11 | 0,0 | 32,00 | 27,0 | 29,50 | 0,0 | 6,5 | 1060,0 | 0,0 | 0,0 |
| 12 | 0,0 | 32,00 | 27,0 | 29,50 | 0,0 | 5,0 | 866,0 | 0,0 | 0,0 |
| 13 | 0,0 | 31,83 | 28,0 | 29,92 | 0,0 | 5,0 | 739,0 | 0,0 | 0,0 |
| 14 | 0,0 | 32,17 | 27,0 | 29,58 | 0,0 | -4,0 | 452,0 | 0,0 | 0,0 |
| 15 | 0,0 | 32,83 | 27,5 | 30,17 | 0,0 | -1,0 | 1015,0 | 0,0 | 0,0 |
| 16 | 0,0 | 32,00 | 27,5 | 29,75 | 0,0 | 4,0 | 327,0 | 0,0 | 0,0 |
| 17 | 0,0 | 30,83 | 26,0 | 28,42 | 0,0 | -7,0 | 192,0 | 0,0 | 0,0 |
| 18 | 0,0 | 31,83 | 27,5 | 29,67 | 0,0 | -17,0 | 186,0 | 0,0 | 0,0 |
| 19 | 0,0 | 31,83 | 26,5 | 29,17 | 0,0 | -1,0 | 329,0 | 0,0 | 0,0 |
| 20 | 0,0 | 30,83 | 26,5 | 28,67 | 0,0 | -9,0 | 161,0 | 0,0 | 0,0 |
| 21 | 0,0 | 31,00 | 27,0 | 29,00 | 0,0 | -13,0 | 170,0 | 0,0 | 0,0 |
| 22 | 0,0 | 30,50 | 27,0 | 28,75 | 0,0 | -8,0 | 516,0 | 0,0 | 0,0 |
| 23 | 0,0 | 30,33 | 27,5 | 28,92 | 0,0 | -9,0 | 466,0 | 0,0 | 0,0 |
| 24 | 0,0 | 32,83 | 26,0 | 29,42 | 0,0 | 3,0 | 206,0 | 0,0 | 0,0 |
| 25 | 0,0 | 32,17 | 26,0 | 29,08 | 0,0 | -24,0 | 182,0 | 0,0 | 0,0 |
| 26 | 0,0 | 31,83 | 26,5 | 29,17 | 0,0 | -46,0 | 379,0 | 0,0 | 0,0 |
| 27 | 0,0 | 32,17 | 25,5 | 28,83 | 0,0 | 3,0 | 51,0 | 0,0 | 0,0 |
| 28 | 0,0 | 32,50 | 27,0 | 29,75 | 0,0 | 5,0 | 320,0 | 0,0 | 0,0 |
| 29 | 0,0 | 31,67 | 24,5 | 28,08 | 0,0 | -51,0 | 0,0 | 0,0 | 0,0 |
| 30 | 0,0 | 29,00 | 25,5 | 27,25 | 0,0 | -9,0 | 161,0 | 0,0 | 0,0 |
| 31 | | | | | | | | | |
| Juml : | 0,0 | 946,5 | 804,0 | 875,25 | 0,0 | -163,0 | 14782,0 | 0,0 | 0,0 |
| Rata2 : | 0,0 | 31,6 | 26,8 | 29,2 | 0,0 | -5,4 | 492,7 | 0,0 | 0,0 |
| Max : | 0,0 | 32,8 | 28,5 | 30,17 | 0,0 | 7,0 | 1673,0 | 0,0 | 0,0 |
| Min : | 0,0 | 29,0 | 24,5 | 27,25 | 0,0 | -51,0 | 0,0 | 0,0 | 0,0 |

*(Sumber : Dinas PU Sumber Daya Air dan Penataan Ruang, 2019)*

Contoh perhitungan Evapotranspirasi dengan Metode Penman pada bulan Januari tahun 2018, sebagai berikut :

1. Data klimatologi pada bulan Januari 2018 :

- Temperatur udara rata-rata (T) = 26,70 $^{o}$C.
- Kelembaban relative rata rata (RH) = 95,30 %.
- Kecepatan angin rata-rata (U) =232,70 km/hari.
- Penyinaran matahari (n/N) = 21,60 %.

2. Perhitungan Evapotranspirasi Potensial

**Baris 5** : Mencari tekanan uap jenuh, ea (mbar).
Diketahui, T = 26,70 $^{o}$C,
Maka, ea = 35,07 mbar (tabel lampiran B)

**Baris 6** : Mencari tekanan uap nyata, ed (mbar).
ed = ea x RH/100 = 35,07 x 95,30/100 = 33,42 mbar

**Baris 7** : Mencari perbedaan tekanan uap (ea-ed).
ea-ed = 35,07 – 33,42 = 1,65 mbar

**Baris 8** : Mencari fungsi angin, f(u) (km/hari).
Diketahui, U = 232,70 km/hari,
Maka, f(u) = 0,27 x (1+U/100) = 0,90 km/hari

**Baris 9** : Mencari factor pembobot, 1-W
Diketahui, T = 26,70 $^{o}$C,
Maka, 1-W = 0,24 (tabel lampiran B)

**Baris 10** : Mencari factor pengali, W
Diketahui, T = 26,70 $^{o}$C,
Maka, W = 0,76 (tabel lampiran B)

**Baris 11** : Mencari radiasi ekstra teretrial, Ra (mm/hari)
Diketahui, Lokasi Waduk Pidekso berada di 7$^{o}$ LS,
Maka Ra = 15,95 mm/hari (tabel lampiran B)

**Baris 12** : Mencari nilai maksimum penyinaran, N
Diketahui, Lokasi Waduk Pidekso berada di 7$^{o}$ LS,
Maka, N = 12,42 (tabel lampiran B)

**Baris 13** : Mencari radiasi sinar matahari, Rs (mm/hari)
Rs = (0,25 + 0,5 n/N)Ra = 5,71 mm/hari

**Baris 14** : Mencari radiasi netto gelombang pendek, Rns (mm/hari)
Rns = (1 - α)Rs, α = 0,25
Rns = 4,28 mm/hari

**Baris 15** : Mencari efek radiasi gelombang panjang

b. Mencari fungsi suhu, f(T)
Diketahui, T = 26,70 $^{o}$C,
Maka, f(T) = 16,04 (tabel lampiran B)
c. Mencari fungsi tenanan uap nyata, f(ed)
f(ed) = 0,34 – 0,044 x (ed^0,5) = 0,09
d. Mencari fungsi penyinaran, f(n/N)
f(n/N) = 0,1 + 0,9 x n/N = 0,29

**Baris 16** : Mencari gelombang panjang netto, Rn1 (mm/hari)
Rn1 = f(T) x f(ed) x f(n/N) = 0,40 mm/hari

**Baris 17** : Mencari radiasi netto, Rn (mm/hari)
Rn = Rns - Rn1 = 3,88 mm/hari

**Baris 18** : Mencari factor koreksi, c
c = 1.1 (tabel lampiran B)

**Baris 19** : Mencari Evapotranspirasi Penman Modifikasi
ETo = C.(W.Rn + (1-W).f(u).(ea-ed)) = **3,63 mm/hari = 108,76 mm/bulan.**

Hasil perhitungan evapotranspirasi pada bulan berikutnya disajikan pada **Tabel 4.7.** Hasil perhitungan evapotranspirasi potensial untuk tahun 2001 – 2019 disajikan pada **Tabel 4.8**. Perhitungan evapotranspirasi per tahun dapat dilihat pada lampiran B.

**Tabel 4. 7** Hasil Perhitungan Evapotranspirasi Potensial Tahun 2001-2019

| Tahun | Eto(mm/hari), Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agu | Sep | Okt | Nov | Des |
| 2001 | 18.07 | 11.93 | 15.28 | 16.45 | 18.04 | 33.40 | 31.60 | 47.69 | 65.32 | 64.16 | 22.07 | 21.82 |
| 2002 | 18.07 | 11.93 | 15.28 | 16.45 | 18.04 | 33.40 | 31.60 | 47.69 | 65.32 | 64.16 | 22.07 | 21.82 |
| 2003 | 2.80 | 3.18 | 2.51 | 2.36 | 2.27 | 2.23 | 2.67 | 3.21 | 4.09 | 4.41 | 3.41 | 2.98 |
| 2004 | 18.06 | 2.90 | 12.57 | 17.05 | 19.67 | 19.01 | 19.82 | 28.61 | 2.16 | 2.22 | 2.23 | 2.23 |
| 2005 | 13.00 | 11.59 | 11.87 | 11.32 | 11.91 | 1.59 | 22.50 | 46.27 | 3.76 | 50.47 | 3.79 | 9.46 |
| 2006 | 2.42 | 2.84 | 2.72 | 2.32 | 2.31 | 2.51 | 2.79 | 3.05 | 4.02 | 4.32 | 3.96 | 3.83 |
| 2007 | 2.86 | 3.20 | 3.66 | 2.55 | 2.16 | 2.36 | 2.70 | 3.40 | 4.68 | 4.54 | 3.88 | 3.49 |
| 2008 | 3.02 | 3.15 | 3.37 | 2.52 | 2.52 | 2.38 | 3.01 | 3.39 | 4.53 | 4.15 | 3.12 | 2.89 |
| 2009 | 2.86 | 3.20 | 3.66 | 2.55 | 2.16 | 2.36 | 2.70 | 3.40 | 4.74 | 4.54 | 3.87 | 3.49 |
| 2010 | 2.90 | 3.56 | 3.58 | 2.37 | 2.18 | 2.32 | 2.50 | 3.15 | 3.41 | 3.63 | 3.30 | 2.94 |
| 2011 | 2.77 | 3.42 | 2.55 | 2.24 | 2.45 | 3.59 | 2.55 | 3.16 | 4.29 | 4.31 | 3.43 | 3.04 |
| 2012 | 2.95 | 3.83 | 2.59 | 2.62 | 2.46 | 2.50 | 2.38 | 3.71 | 4.28 | 4.60 | 3.97 | 3.04 |
| 2013 | 3.18 | 6.99 | 4.66 | 2.56 | 2.21 | 2.16 | 2.79 | 3.58 | 4.56 | 4.94 | 3.58 | 3.35 |
| 2014 | 2.96 | 3.50 | 2.36 | 2.44 | 2.29 | 2.19 | 2.59 | 3.45 | 4.51 | 6.56 | 4.31 | 3.04 |
| 2015 | 3.08 | 3.78 | 2.70 | 2.33 | 2.25 | 2.39 | 2.68 | 3.21 | 4.15 | 4.40 | 3.97 | 3.29 |
| 2016 | 5.30 | 4.68 | 4.38 | 4.00 | 3.53 | 3.77 | 3.81 | 5.53 | 6.16 | 5.06 | 5.22 | 3.91 |
| 2017 | 3.94 | 4.82 | 4.38 | 4.17 | 4.44 | 3.76 | 4.44 | 5.95 | 7.15 | 8.22 | 4.26 | 4.12 |
| 2018 | 3.63 | 4.79 | 4.77 | 4.48 | 4.53 | 4.95 | 6.99 | 9.08 | 11.55 | 14.13 | 8.44 | 6.02 |
| 2019 | 4.16 | 5.70 | 2.84 | 4.62 | 5.98 | 5.07 | 6.52 | 8.59 | 8.56 | 14.04 | 40.11 | 43.36 |
| **Rata-rata** | **6.11** | **5.21** | **5.56** | **5.55** | **5.86** | **6.94** | **8.24** | **12.43** | **11.43** | **14.36** | **7.84** | **7.80** |

Hasil perhitungan nilai evapotranspirasi pada tahun 2001-2019 dapat dilihat pada **Tabel 4.8**. Nilai pada perhitungan evapotranspirasi selanjutkan akan digunakan untuk perhitungan analisis ketersediaan debit dan digunakan untuk simulasi dalam teknik optimasi metode Richard Bellman.

### 4.3.1 Bangkitan Data Dengan Metode Thomas-Fiering

Dalam pengerjaan Tugas Akhir Terapan ini, bangkitan data untuk evapotranspirasi dilakukan dengan menggunakan metode Thomas-Fiering. Bangkitan data pada Waduk Pidekso dilakukan untuk memperpanjang data yang ada sampai dengan satu tahun ke depan. Bangkitan data evapotranspirasi hujan ini akan digunakan untuk perhitungan evapotranspirasi pada simulasi teknik optimasi dengan metode Richard Bellman.

Contoh pengerjaan data evapotranspirasi bangkitan metode Thomas-Fiering, sebagai berikut :

**Tabel 4. 8** Hasil Perhitungan Evapotrasnpirasi Metode Penman Tahun 2018

| No | Parameter | Satuan | Tahun 2018/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara (T) | °C | 26.70 | 25.00 | 27.40 | 28.10 | 27.90 | 27.60 | 27.20 | 26.80 | 27.90 | 28.90 | 28.20 | 27.50 |
| 2 | Kelembapan relatif (RH) | % | 95.30 | 88.30 | 94.20 | 93.60 | 93.30 | 92.40 | 89.10 | 88.00 | 86.90 | 83.50 | 88.10 | 91.00 |
| 3 | Kecepatan angin (U) | km/hari | 232.70 | 303.10 | 465.20 | 546.40 | 796.10 | 1152.10 | 1514.50 | 1691.20 | 1872.30 | 1989.00 | 1339.30 | 802.80 |
| 4 | Penyinaran Matahari (n/N) | % | 21.60 | 36.10 | 53.10 | 60.20 | 62.10 | 58.40 | 72.80 | 78.50 | 72.40 | 68.00 | 40.30 | 39.20 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 35.07 | 31.70 | 36.54 | 38.03 | 37.59 | 36.96 | 36.12 | 35.28 | 37.59 | 39.87 | 38.26 | 36.75 |
| 6 | Tekanan uap nyata (ed), ed = ea x RH/100 | mbar | 33.42 | 27.99 | 34.42 | 35.60 | 35.07 | 34.15 | 32.18 | 31.05 | 32.67 | 33.29 | 33.71 | 33.44 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 1.65 | 3.71 | 2.12 | 2.43 | 2.52 | 2.81 | 3.94 | 4.23 | 4.92 | 6.58 | 4.55 | 3.31 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 0.90 | 1.09 | 1.53 | 1.75 | 2.42 | 3.38 | 4.36 | 4.84 | 5.33 | 5.64 | 3.89 | 2.44 |
| 9 | Faktor pembobot (1-W) | | 0.24 | 0.26 | 0.24 | 0.23 | 0.23 | 0.23 | 0.24 | 0.24 | 0.23 | 0.22 | 0.23 | 0.24 |
| 10 | Faktor pengali (W) | | 0.76 | 0.74 | 0.76 | 0.77 | 0.77 | 0.77 | 0.76 | 0.76 | 0.77 | 0.78 | 0.77 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 5.71 | 6.91 | 8.02 | 8.02 | 7.43 | 6.83 | 7.92 | 8.90 | 9.15 | 9.29 | 7.13 | 7.07 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - $\alpha$)Rs | mm/hari | 4.28 | 5.18 | 6.01 | 6.01 | 5.57 | 5.12 | 5.94 | 6.67 | 6.86 | 6.97 | 5.35 | 5.30 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.04 | 15.65 | 16.18 | 16.32 | 16.28 | 16.22 | 16.14 | 16.06 | 16.28 | 16.48 | 16.34 | 16.20 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.09 | 0.11 | 0.08 | 0.08 | 0.08 | 0.08 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 | 0.09 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.29 | 0.42 | 0.58 | 0.64 | 0.66 | 0.63 | 0.76 | 0.81 | 0.75 | 0.71 | 0.46 | 0.45 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.40 | 0.71 | 0.77 | 0.81 | 0.85 | 0.84 | 1.10 | 1.23 | 1.08 | 1.01 | 0.64 | 0.63 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.88 | 4.47 | 5.25 | 5.20 | 4.72 | 4.28 | 4.84 | 5.45 | 5.78 | 5.96 | 4.71 | 4.67 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 3.63 | 4.79 | 4.77 | 4.48 | 4.53 | 4.95 | 6.99 | 9.08 | 11.55 | 14.13 | 8.44 | 6.02 |
| | | mm/bulan | 108.76 | 143.77 | 143.15 | 134.54 | 135.96 | 148.54 | 209.84 | 272.48 | 346.55 | 423.79 | 253.14 | 180.52 |

1. Mengitung parameter

   a. Nilai rata-rata.(Xrat)
      Menghitung nilai rata-rata data evapotranspirasi pada bulan Januari pada tahun 2001-2019.

   b. Standar deviasi (Sd).
      Menghitung standar deviasi data evapotranspirasi pada bulan Januari pada tahun 2001-2019.

   c. Koefisien korelasi (rj).
      Menghitung nilai koefisien korelasi (rj) data evapotranspirasi pada bulan Januari pada tahun 2001-2019 terhadap bulan sebelumnya (Desember)

$$rj = \frac{\Sigma\{(Ev_{2001,Jan}\, x\, Ev_{2001,Des} + \cdots + Ev_{2019,Jan}\, x\, Ev_{2019,Des}) - (19 x \overline{Ev}_{2001,Jan} x \overline{Ev}_{2001,Des}}{Sd_{2001,Jan} x\, Sd_{2001,Des} \cdot (19-1)}$$

   e. Koefisien regresi (bj)

$$bj = \frac{rj_{Jan} Sd_{Feb}}{Sd_{Jan}}$$

Hasil perhitungan parameter untuk bangkitan evapotranspirasi tahun 2020 dapat dilihat pada **Tabel 4.9**

**Tabel 4. 9** Hasil Perhitungan Xrat, Sd, rj, dan bj Tahun 2001-2019

| No | Tahun | Eto(mm/hari), Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agu | Sep | Okt | Nov | Des |
| 1 | 2001 | 18.07 | 11.93 | 15.28 | 16.45 | 18.04 | 33.40 | 31.60 | 47.69 | 65.32 | 64.16 | 22.07 | 21.82 |
| 2 | 2002 | 18.07 | 11.93 | 15.28 | 16.45 | 18.04 | 33.40 | 31.60 | 47.69 | 65.32 | 64.16 | 22.07 | 21.82 |
| 3 | 2003 | 2.80 | 3.18 | 2.51 | 2.36 | 2.27 | 2.23 | 2.67 | 3.21 | 4.09 | 4.41 | 3.41 | 2.98 |
| 4 | 2004 | 18.06 | 2.90 | 12.57 | 17.05 | 19.67 | 19.01 | 19.82 | 28.61 | 2.16 | 2.22 | 2.23 | 2.23 |
| 5 | 2005 | 13.00 | 11.59 | 11.87 | 11.32 | 11.91 | 1.59 | 22.50 | 46.27 | 3.76 | 50.47 | 3.79 | 9.46 |
| 6 | 2006 | 2.42 | 2.84 | 2.72 | 2.32 | 2.31 | 2.51 | 2.79 | 3.05 | 4.02 | 4.32 | 3.96 | 3.83 |
| 7 | 2007 | 2.86 | 3.20 | 3.66 | 2.55 | 2.16 | 2.36 | 2.70 | 3.40 | 4.68 | 4.54 | 3.88 | 3.49 |
| 8 | 2008 | 3.02 | 3.15 | 3.37 | 2.52 | 2.52 | 2.38 | 3.01 | 3.39 | 4.53 | 4.15 | 3.12 | 2.89 |
| 9 | 2009 | 2.86 | 3.20 | 3.66 | 2.55 | 2.16 | 2.36 | 2.70 | 3.40 | 4.74 | 4.54 | 3.87 | 3.49 |
| 10 | 2010 | 2.90 | 3.56 | 3.58 | 2.37 | 2.18 | 2.32 | 2.50 | 3.15 | 3.41 | 3.63 | 3.30 | 2.94 |
| 11 | 2011 | 2.77 | 3.42 | 2.55 | 2.24 | 2.45 | 3.59 | 2.55 | 3.16 | 4.29 | 4.31 | 3.43 | 3.04 |
| 12 | 2012 | 2.95 | 3.83 | 2.59 | 2.62 | 2.46 | 2.50 | 2.38 | 3.71 | 4.28 | 4.60 | 3.97 | 3.04 |
| 13 | 2013 | 3.18 | 6.99 | 4.66 | 2.56 | 2.21 | 2.16 | 2.79 | 3.58 | 4.56 | 4.94 | 3.58 | 3.35 |
| 14 | 2014 | 2.96 | 3.50 | 2.36 | 2.44 | 2.29 | 2.19 | 2.59 | 3.45 | 4.51 | 6.56 | 4.31 | 3.04 |
| 15 | 2015 | 3.08 | 3.78 | 2.70 | 2.33 | 2.25 | 2.39 | 2.68 | 3.21 | 4.15 | 4.40 | 3.97 | 3.29 |
| 16 | 2016 | 5.30 | 4.68 | 4.38 | 4.00 | 3.53 | 3.77 | 3.81 | 5.53 | 6.16 | 5.06 | 5.22 | 3.91 |
| 17 | 2017 | 3.94 | 4.82 | 4.38 | 4.17 | 4.44 | 3.76 | 4.44 | 5.95 | 7.15 | 8.22 | 4.26 | 4.12 |
| 18 | 2018 | 3.63 | 4.79 | 4.77 | 4.48 | 4.53 | 4.95 | 6.99 | 9.08 | 11.55 | 14.13 | 8.44 | 6.02 |
| 19 | 2019 | 4.16 | 5.70 | 2.84 | 4.62 | 5.98 | 5.07 | 6.52 | 8.59 | 8.56 | 14.04 | 40.11 | 43.36 |
| **Rerata** | | 6.107 | 5.210 | 5.565 | 5.548 | 5.863 | 6.943 | 8.244 | 12.428 | 11.433 | 14.360 | 7.841 | 7.796 |
| **Sd** | | 5.801 | 3.121 | 4.467 | 5.354 | 6.116 | 10.070 | 10.025 | 16.530 | 19.103 | 20.538 | 9.729 | 10.423 |
| **Koef Korelasi (rj)** | | 0.357 | 0.717 | 0.800 | 0.975 | 0.998 | 0.875 | 0.884 | 0.986 | 0.735 | 0.856 | 0.507 | 0.988 |
| **Koef Regresi (bj)** | | 0.192 | 1.026 | 0.959 | 1.113 | 1.643 | 0.871 | 1.458 | 1.139 | 0.790 | 0.406 | 0.543 | 0.550 |

2. Mencari nilai bilangan random normal (ti) pada tiap periode satu tahun yang akan datang dengan bantuan *Data Analysis* pada *Microsoft Excel.* Hasil Perhitungan bilangan random normal untuk tiap periode satu tahun ke depan dapat dilihat pada **Tabel 4.10.**

   Dengan syarat :
   - Standar deviasi bilangan random normal pada tahun ke-n ≈ 1,
   - Rata-rata bilangan random normal pada tahun ke n ≈ 0.

3. Mencari nilai evapotranpirasi bangkitan pada bulan Januari tahun 1 (2020).

$$Ev_{2020,Jan} = \overline{Ev_{2019Jan}} + bj_{2019Jan}\left(Ev_{2019Des} - \overline{Ev_{2019Jan}}\right) + ti_{2020Jan} Sd_{2019Jan}\left(1 - rj_{2019Jan}\right)^{1/2}$$

   Dimana, jika Ev < 0 maka Ev= 0.

**Tabel 4. 10** Bilangan Random (ti) untuk tahun 2020

| **Tahun ke-** | **1** |
|---|---|
| Bulan | **2020** |
| Januari | -0.060 |
| Februari | 0.182 |
| Maret | -0.541 |
| April | 1.001 |
| Mei | -0.442 |
| Juni | -0.956 |
| Juli | -0.995 |
| Agustus | 1.233 |
| September | -0.296 |
| Oktober | 1.879 |
| November | -1.020 |
| Desember | 1.149 |
| **Rerata** | **0.095** |
| **Sd** | **0.992** |

Hasil perhitungan bangkitan data evapotranspirasi metode Thomas-Fiering untuk tahun ke-1 (2020) dapat dilihat pada **Tabel 4.11.**

**Tabel 4. 11** Hasil Perhitungan Data Evapotranspirasi Bangkitan Tahun Ke-1 (2020)

| **Tahun ke-** | **Bulan** | **Rata-Rata** | **Sd** | **Koef Korelasi** | **Koef Regresi(b** | **Angka Random** | **Ev (mm/hari** | **Ev Pakai (mm/hari)** |
|---|---|---|---|---|---|---|---|---|
| 1 (2020) | Januari | 6.107 | 5.801 | 0.357 | 0.192 | -0.060 | 12.982 | 12.982 |
| | Februari | 5.210 | 3.121 | 0.717 | 1.026 | 0.182 | 13.484 | 13.484 |
| | Maret | 5.565 | 4.467 | 0.800 | 0.959 | -0.541 | 12.074 | 12.074 |
| | April | 5.548 | 5.354 | 0.975 | 1.113 | 1.001 | 13.668 | 13.668 |
| | Mei | 5.863 | 6.116 | 0.998 | 1.643 | -0.442 | 18.557 | 18.557 |
| | Juni | 6.943 | 10.070 | 0.875 | 0.871 | -0.956 | 13.647 | 13.647 |
| | Juli | 8.244 | 10.025 | 0.884 | 1.458 | -0.995 | 12.721 | 12.721 |
| | Agustus | 12.428 | 16.530 | 0.986 | 1.139 | 1.233 | 15.200 | 15.200 |
| | September | 11.433 | 19.103 | 0.735 | 0.790 | -0.296 | 11.496 | 11.496 |
| | Oktober | 14.360 | 20.538 | 0.856 | 0.406 | 1.879 | 27.828 | 27.828 |
| | November | 7.841 | 9.729 | 0.507 | 0.543 | -1.020 | 11.719 | 11.719 |
| | Desember | 7.796 | 10.423 | 0.988 | 0.550 | 1.149 | 11.290 | 11.290 |

## 4.4 Analisis Ketersediaan Debit

### 4.4.1 Debit FJ Mock

Perhitungan debit metode FJ Mock dihitung berdasarkan curah hujan, iklim, dan kondisi tanah yang ada pada lokasi studi. Hasil yang didapat dari perhitungan debit metode FJ Mock adalah debit aliran sungai pada tahun 2001-2019.

Contoh perhitungan debit metode FJ Mock pada bulan Januari tahun 2018 periode 1 :

1. Data Meteorologi pada bulan Januari tahun 2018 periode 1 :
   **Baris 1** : Curah hujan (P), jumlah hujan pada satu periode (15 hari) = 245 mm/15 hari.

   **Baris 2** : Jumlah hari (h), jumlah hari hujan pada satu periode (15 hari) = 9 hari.

2. Evapotranspirasi Terbatas (Et)
   **Baris 3** : Evapotrasnpirasi potensial (ETo), didapat dari hasil perhitungan evapotranspirasi metode Penman bulan januari tahun 2018 = 54,378 mm/15 hari. (tabel 4.10)

   **Baris 4** : Permukaan lahan terbuka (m), menurut KP 01 – Jaringan Irigasi ditetapkan 30% yang merupakan daerah lahan pertanian yang diolah dan lahan tererosi.

   **Baris 5** : Mencari banyaknya hari hujan.
   (m/20) x ( 18-h) = (0,3/20) x (18-9) = 0,135.

   **Baris 6** : Mencari beda antara evapotrasnpirasi potensial dengan evapotranspirasi terbatas, E (mm)
   E = ETo x (baris 5) = 54,378 x 0,135
   = 7,341 mm/15hari.

**Baris 7** : Mencari evapotranspirasi terbatas, Et (mm/15hari).
Et = ETo – E = 54,378 – 7,341 = 47,037 mm/15hari.

3. Keseimbangan Air di Permukaan Tanah
**Baris 8** : Mencari kandungan air tanah ΔS, (mm/15hari).
ΔS = P – Et = 245 – 47,037 = 197,96 mm/15hari.
Jika, P < Et maka nilai ΔS = 0

**Baris 9** : Mencari aliran permukaan (hujan lebat)
PF X P = 0,45 x 245 = 122,5 mm/15hari.
PF = Faktor aliran hujan lebat, PF = 45%.

**Baris 10** : Mencari kandungan air tanah, SS (mm/15hari).
SS = ΔS – (baris 9) = 197,96 – 122,5
= 75,46 mm/15hari.

**Baris 11** : Mencari kapasitas kelembaban air tanah (SMC).
SMC + SS = 200 + 75,46 = 275,46 mm/15hari.
Nilai 200 mm/15hari didapatkan dari data dilapangan lokasi Waduk Pidekso.

**Baris 12** : Mencari kelebihan air, WS (mm.15hari)
WS = ΔS – SS = 197,96 – 75,46 = 122,5 mm/15hari.

4. Limpasan dan Penyimpanan Air Tanah.
**Baris 13** : Koefisien infiltrasi (i), ditetapkan 0.4 berdasarkan data lapangan Waduk Pidekso.

**Baris 14** : Mencari infiltrasi (I)
I = WS X i = 122,5 x 0,4 = 49 mm/15hari.

**Baris 15** : 0,5 x (1+k) x I = 0,5 x (1+0,6) x 49 = 39,2.

k = Koefisien resesi aliran

**Baris 16** : k x V(n-1) = 0,6 x 79,732 = 47,839.
V(n-1) = Volume tampungan pada bulan sebelumnya (mm/15hari)

**Baris 17** : Mencari volume penyimpanan, Vn (mm/15hari).
Vn = (baris 15) + (baris 16) = 39,2 + 47,839
= 87,039 mm/15hari.

**Baris 18** : Mencari perubahan volume, DVn, (mm/15hari).
DVn = Vn – V(n-1) = 87,039 – 79,732 = 7,307 mm/15hari.

**Baris 19** : Mencari aliran dasar (*Base Flow*) (mm/15hari).
BF = I – DVn = 49 – 7,307 = 41,693 mm/15hari
Jika, nilai I-DVn < 0 maka BF = 0.

**Baris 20** : Mencari aliran langsung (*Direct Run-Off*).
DRO = WS – I = 122,5 – 49 = 73,5 mm/15hari.

**Baris 21** : Mencari Aliran *Run Off.*
RO = BF + DRO = 41,693 + 73,5 = 115,193 mm/15hari.

Baris 22 : Luas daerah tangkapan, A ($km^2$). Didapat dari data dilapangan, A = 55 $km^2$.

Baris 23 : Debit aliran sungai ($m^3$/dtk).
Debit aliran sungai = (A x RO) / (15 x 86.400) x 1.000
= (55 x 115,193) / (15 x 86.400) x 1.000
= **4,889 $m^3$/dtk**

Hasil perhitungan debit metode FJ Mock pada tahun 2018 dapat dilihat pada **Tabel 4.12** dan **Tabel 4.13** Untuk hasil perhitungan debit FJ Mock pada tahun 2001-2019 dapat dilihat pada lampiran C. Sedangkan untuk rekapitulasi hasil perhitungan debit Metode FJ Mock tahun 2001-2019 dapat dilihat pada **Tabel. 4.14**. Debit FJ Mock yang telah didapatkan kemudian di bangkitkan untuk satu tahun ke depan dengan menggunakan metode Thomas-Fiering.

**Tabel 4. 12** Rekapitulasi debit Metode FJ Mock Tahun 2001-2019

| No | Tahun | Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 2001 | 2.145 | 4.234 | 5.118 | 2.041 | 2.941 | 2.968 | 3.538 | 1.521 | 0.722 | 0.765 | 1.996 | 0.509 |
| 2 | 2002 | 0.208 | 0.125 | 0.075 | 0.045 | 0.027 | 0.016 | 1.958 | 1.772 | 1.526 | 0.488 | 0.293 | 0.176 |
| 3 | 2003 | 3.779 | 3.071 | 4.571 | 5.281 | 4.431 | 2.829 | 1.191 | 0.979 | 1.003 | 0.382 | 0.229 | 0.238 |
| 4 | 2004 | 0.032 | 0.019 | 0.011 | 0.007 | 0.004 | 0.002 | 0.001 | 0.001 | 0.001 | 0.880 | 0.801 | 0.219 |
| 5 | 2005 | 0.751 | 3.590 | 2.451 | 3.318 | 2.930 | 3.276 | 2.749 | 1.262 | 0.693 | 0.386 | 0.289 | 2.098 |
| 6 | 2006 | 0.977 | 0.586 | 2.833 | 3.290 | 0.898 | 0.539 | 3.296 | 2.124 | 0.710 | 0.426 | 0.256 | 0.153 |
| 7 | 2007 | 1.360 | 1.660 | 2.612 | 3.665 | 2.176 | 4.714 | 5.264 | 4.410 | 1.648 | 1.959 | 0.742 | 0.445 |
| 8 | 2008 | 2.910 | 3.145 | 6.851 | 5.817 | 4.740 | 4.013 | 4.082 | 2.135 | 1.061 | 0.711 | 0.379 | 0.227 |
| 9 | 2009 | 2.102 | 3.515 | 3.927 | 2.595 | 0.945 | 0.567 | 0.340 | 2.772 | 1.760 | 2.024 | 0.909 | 0.426 |
| 10 | 2010 | 2.088 | 3.156 | 3.246 | 2.615 | 6.527 | 4.248 | 1.961 | 1.805 | 4.057 | 1.443 | 1.462 | 0.568 |
| 11 | 2011 | 5.147 | 4.241 | 4.682 | 3.893 | 2.587 | 3.618 | 2.940 | 1.471 | 0.693 | 0.416 | 0.249 | 0.150 |
| 12 | 2012 | 4.550 | 2.378 | 3.689 | 4.126 | 5.241 | 4.330 | 1.427 | 0.856 | 2.202 | 1.477 | 0.594 | 0.405 |
| 13 | 2013 | 5.108 | 4.127 | 3.463 | 3.886 | 2.329 | 2.894 | 2.247 | 2.106 | 1.220 | 1.107 | 2.230 | 2.385 |
| 14 | 2014 | 3.756 | 5.720 | 3.039 | 2.485 | 2.619 | 2.625 | 3.517 | 1.118 | 1.423 | 1.133 | 0.430 | 1.614 |
| 15 | 2015 | 3.198 | 5.869 | 4.181 | 2.336 | 4.130 | 2.687 | 1.794 | 3.231 | 1.710 | 0.699 | 0.636 | 0.293 |
| 16 | 2016 | 1.981 | 3.912 | 4.488 | 2.572 | 3.288 | 3.516 | 4.652 | 2.939 | 2.339 | 2.278 | 1.907 | 1.033 |
| 17 | 2017 | 2.469 | 3.738 | 5.325 | 2.346 | 2.966 | 2.196 | 3.993 | 2.878 | 2.072 | 1.144 | 0.731 | 0.895 |
| 18 | 2018 | 4.889 | 8.317 | 5.918 | 3.683 | 2.415 | 3.591 | 3.141 | 1.933 | 2.817 | 1.739 | 0.681 | 0.596 |
| 19 | 2019 | 0.654 | 0.393 | 0.236 | 0.141 | 3.836 | 4.739 | 1.911 | 1.461 | 0.815 | 0.412 | 0.247 | 0.148 |

| No | Tahun | Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 2001 | 0.305 | 0.241 | 0.121 | 0.072 | 0.043 | 0.026 | 0.016 | 0.009 | 1.275 | 2.537 | 0.577 | 0.346 |
| 2 | 2002 | 0.105 | 0.063 | 0.081 | 0.031 | 0.019 | 0.011 | 0.007 | 0.004 | 0.493 | 1.652 | 1.518 | 2.883 |
| 3 | 2003 | 0.101 | 0.061 | 0.037 | 0.022 | 0.013 | 0.008 | 0.005 | 1.287 | 0.243 | 0.146 | 0.088 | 0.053 |
| 4 | 2004 | 0.434 | 0.136 | 0.082 | 0.049 | 0.029 | 0.018 | 0.011 | 0.006 | 0.004 | 0.002 | 0.001 | 0.001 |
| 5 | 2005 | 2.246 | 0.755 | 0.394 | 0.236 | 0.142 | 0.287 | 0.132 | 0.653 | 0.711 | 0.815 | 4.000 | 3.331 |
| 6 | 2006 | 0.092 | 0.055 | 0.033 | 0.020 | 0.012 | 0.007 | 0.004 | 0.003 | 0.002 | 0.001 | 1.429 | 4.872 |
| 7 | 2007 | 0.267 | 0.160 | 0.096 | 0.058 | 0.035 | 0.021 | 0.012 | 0.007 | 0.004 | 0.003 | 1.647 | 5.274 |
| 8 | 2008 | 0.136 | 0.082 | 0.049 | 0.029 | 0.018 | 0.011 | 0.006 | 0.004 | 0.002 | 0.001 | 1.429 | 1.683 |
| 9 | 2009 | 0.256 | 0.153 | 0.092 | 0.055 | 0.033 | 0.020 | 0.012 | 0.007 | 0.798 | 1.883 | 0.864 | 1.777 |
| 10 | 2010 | 0.788 | 0.779 | 0.266 | 0.607 | 3.325 | 4.134 | 1.759 | 3.584 | 1.612 | 2.400 | 4.511 | 3.580 |
| 11 | 2011 | 0.090 | 0.054 | 0.032 | 0.019 | 0.012 | 0.007 | 0.004 | 0.003 | 0.002 | 0.001 | 1.083 | 2.801 |
| 12 | 2012 | 0.213 | 0.128 | 0.077 | 0.046 | 0.028 | 0.017 | 0.169 | 0.296 | 0.994 | 3.852 | 3.281 | 4.127 |
| 13 | 2013 | 1.430 | 0.555 | 0.333 | 0.200 | 0.120 | 0.072 | 0.043 | 0.531 | 1.568 | 0.817 | 1.997 | 6.067 |
| 14 | 2014 | 0.756 | 0.311 | 0.187 | 0.112 | 0.067 | 0.040 | 0.024 | 0.015 | 0.211 | 2.828 | 3.147 | 4.542 |
| 15 | 2015 | 0.176 | 0.105 | 0.063 | 0.038 | 0.023 | 0.014 | 0.008 | 0.005 | 1.489 | 1.768 | 1.560 | 3.653 |
| 16 | 2016 | 0.723 | 1.054 | 1.923 | 0.659 | 0.618 | 4.350 | 0.923 | 0.554 | 2.901 | 2.530 | 3.946 | 2.685 |
| 17 | 2017 | 0.317 | 0.537 | 0.179 | 0.108 | 0.065 | 1.373 | 1.184 | 0.567 | 0.750 | 10.025 | 2.420 | 4.405 |
| 18 | 2018 | 0.280 | 0.168 | 0.101 | 0.061 | 0.036 | 0.022 | 0.013 | 0.008 | 0.899 | 1.023 | 1.273 | 2.714 |
| 19 | 2019 | 0.089 | 0.053 | 0.032 | 0.019 | 0.012 | 0.007 | 0.004 | 0.002 | 0.074 | 0.130 | 0.925 | 2.957 |

**Tabel 4. 13** Hasil Perhitungan Debit Metode FJ Mock Tahun 2018

| No | Uraian | Satuan | Hitungan | Tahun 2018/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 245 | 474 | 259.5 | 116 | 62 | 174 | 140 | 61 | 140 | 61 | 0 | 13 |
| | 2. Jumlah Hari (h) | hari | data | 9 | 15 | 13 | 7 | 6 | 9 | 5 | 6 | 0 | 9 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 54.378 | 54.378 | 71.886 | 71.886 | 548.744 | 548.744 | 67.269 | 67.269 | 67.982 | 67.982 | 74.268 | 74.268 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.135 | 0.045 | 0.075 | 0.165 | 0.18 | 0.135 | 0.195 | 0.18 | 0.27 | 0.135 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 7.341 | 2.447 | 5.391 | 11.861 | 98.774 | 74.080 | 13.117 | 12.108 | 18.355 | 9.178 | 20.052 | 20.052 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 47.037 | 51.931 | 66.495 | 60.025 | 449.970 | 474.664 | 54.151 | 55.161 | 49.627 | 58.805 | 54.216 | 54.216 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 197.96 | 422.07 | 193.00 | 55.97 | 0 | 0 | 85.85 | 5.84 | 90.37 | 2.20 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | PF X (1) | 122.5 | 237 | 129.75 | 58 | 31 | 87 | 70 | 30.5 | 70 | 30.5 | 0 | 6.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 75.46 | 185.069 | 63.255 | -2.025 | -31.000 | -87.000 | 15.849 | -24.661 | 20.373 | -28.305 | 0.000 | -6.500 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 275.46 | 385.069 | 263.255 | 197.975 | 169.000 | 113.000 | 215.849 | 175.339 | 220.373 | 171.695 | 200.000 | 193.500 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 122.50 | 237.000 | 129.750 | 58.000 | 31.000 | 87.000 | 70.000 | 30.500 | 70.000 | 30.500 | 0.000 | 6.500 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | i = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 49 | 94.8 | 51.9 | 23.2 | 12.4 | 34.8 | 28 | 12.2 | 28 | 12.2 | 0 | 2.6 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 39.2 | 75.84 | 41.52 | 18.56 | 9.92 | 27.84 | 22.4 | 9.76 | 22.4 | 9.76 | 0 | 2.08 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 47.839 | 52.224 | 76.838 | 71.015 | 53.745 | 38.199 | 39.623 | 37.214 | 28.184 | 30.351 | 24.066 | 14.440 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 87.039 | 128.064 | 118.358 | 89.575 | 63.665 | 66.039 | 62.023 | 46.974 | 50.584 | 40.111 | 24.066 | 16.520 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 7.307 | 41.024 | -9.705 | -28.783 | -25.910 | 2.374 | -4.016 | -15.049 | 3.610 | -10.474 | -16.044 | -7.547 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 41.693 | 53.776 | 61.605 | 51.983 | 38.310 | 32.426 | 32.016 | 27.249 | 24.390 | 22.674 | 16.044 | 10.147 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 73.500 | 142.200 | 77.850 | 34.800 | 18.600 | 52.200 | 42.000 | 18.300 | 42.000 | 18.300 | 0.000 | 3.900 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 115.193 | 195.976 | 139.455 | 86.783 | 56.910 | 84.626 | 74.016 | 45.549 | 66.390 | 40.974 | 16.044 | 14.047 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 4.889 | 8.317 | 5.918 | 3.683 | 2.415 | 3.591 | 3.141 | 1.933 | 2.817 | 1.739 | 0.681 | 0.596 |

**Tabel 4. 14** Hasil Perhitungan Debit Metode FJ Mock Tahun 2018

| No | Uraian | Satuan | Hitungan | Tahun 2018/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 59 | 70 | 164 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 3 | 5 | 8 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 104.918 | 104.918 | 136.240 | 136.240 | 173.274 | 173.274 | 211.895 | 211.895 | 126.571 | 126.571 | 90.262 | 90.262 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.165 | 0.225 | 0.195 | 0.15 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 28.328 | 28.328 | 36.785 | 36.785 | 46.784 | 46.784 | 57.212 | 57.212 | 20.88 | 28.48 | 17.601 | 13.539 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 76.590 | 76.590 | 99.455 | 99.455 | 126.490 | 126.490 | 154.683 | 154.683 | 105.687 | 98.093 | 72.661 | 76.723 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 87.28 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | PF X (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 31 | 29.5 | 35 | 82 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | -31.000 | -29.500 | -35.000 | 5.277 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 200.000 | 169.000 | 170.500 | 165.000 | 205.277 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 31.000 | 29.500 | 35.000 | 82.000 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | i = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.4 | 11.8 | 14 | 32.8 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.92 | 9.44 | 11.2 | 26.24 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 9.912 | 5.947 | 3.568 | 2.141 | 1.285 | 0.771 | 0.462 | 0.277 | 0.166 | 6.052 | 9.295 | 12.297 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 9.912 | 5.947 | 3.568 | 2.141 | 1.285 | 0.771 | 0.462 | 0.277 | 10.086 | 15.492 | 20.495 | 38.537 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -6.608 | -3.965 | -2.379 | -1.427 | -0.856 | -0.514 | -0.308 | -0.185 | 9.809 | 5.405 | 5.003 | 18.042 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 6.608 | 3.965 | 2.379 | 1.427 | 0.856 | 0.514 | 0.308 | 0.185 | 2.591 | 6.395 | 8.997 | 14.758 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 18.600 | 17.700 | 21.000 | 49.200 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 6.608 | 3.965 | 2.379 | 1.427 | 0.856 | 0.514 | 0.308 | 0.185 | 21.191 | 24.095 | 29.997 | 63.958 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.280 | 0.168 | 0.101 | 0.061 | 0.036 | 0.022 | 0.013 | 0.008 | 0.899 | 1.023 | 1.273 | 2.714 |

### 4.4.2 Analisis Debit *Inflow* Bangkitan Metode Thomas-Fiering

Dalam pengerjaan Tugas Akhir Terapan ini, bangkitan data debit *inflow* dilakukan dengan menggunakan metode Thomas-Fiering. Bangkitan data pada Waduk Pidekso dilakukan untuk memperpanjang data yang ada sampai dengan satu tahun ke depan.

Contoh pengerjaan debit *inflow* bangkitan metode Thomas-Fiering pada periode 15 harian, sebagai berikut :

1. Mengitung parameter

   a. Nilai rata-rata.(Xrat)
      Menghitung nilai rata-rata debit *inflow* pada bulan Januari periode 1 pada tahun 2001-2019.

   b. Standar deviasi (Sd).
      Menghitung standar deviasi debit *inflow* pada bulan Januari periode 1 pada tahun 2001-2019.

   c. Koefisien korelasi (rj).
      Menghitung nilai koefisien korelasi (rj) debit *inflow* pada bulan Januari periode 1 pada tahun 2001-2019 terhadap bulan sebelumnya (Desember)

$$rj = \frac{\Sigma\{(Q_{2001,JanI}\ x\ Q_{2001,DesII} + \cdots + Q_{2019,JanI}\ x\ Q_{2019,DesII}) - (19x\overline{Q_{2001,JanI}}x\overline{Q_{2001,DesII}}}{Sd_{2001,JanI}.x\ Sd_{2001,DesII}.(19-1)}$$

   d. Koefisien regresi (bj)

$$bj = \frac{rj_{JanI}Sd_{JanII}}{Sd_{JanI}}$$

Hasil perhitungan parameter untuk bangkitan debit *inflow* FJ Mock dapat dilihat pada **Tabel 4.15**

**Tabel 4. 15** Hasil Perhitungan Xrat, Sd, rj, dan bj Tahun 2001-2019

| No | Tahun | Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 2001 | 2.145 | 4.234 | 5.118 | 2.041 | 2.941 | 2.968 | 3.538 | 1.521 | 0.722 | 0.765 | 1.996 | 0.509 |
| 2 | 2002 | 0.208 | 0.125 | 0.075 | 0.045 | 0.027 | 0.016 | 1.958 | 1.772 | 1.526 | 0.488 | 0.293 | 0.176 |
| 3 | 2003 | 3.779 | 3.071 | 4.571 | 5.281 | 4.431 | 2.829 | 1.191 | 0.979 | 1.003 | 0.382 | 0.229 | 0.238 |
| 4 | 2004 | 0.032 | 0.019 | 0.011 | 0.007 | 0.004 | 0.002 | 0.001 | 0.001 | 0.001 | 0.880 | 0.801 | 0.219 |
| 5 | 2005 | 0.751 | 3.590 | 2.451 | 3.318 | 2.930 | 3.276 | 2.749 | 1.262 | 0.693 | 0.386 | 0.289 | 2.098 |
| 6 | 2006 | 0.977 | 0.586 | 2.833 | 3.290 | 0.898 | 0.539 | 3.296 | 2.124 | 0.710 | 0.426 | 0.256 | 0.153 |
| 7 | 2007 | 1.360 | 1.660 | 2.612 | 3.665 | 2.176 | 4.714 | 5.264 | 4.410 | 1.648 | 1.959 | 0.742 | 0.445 |
| 8 | 2008 | 2.910 | 3.145 | 6.851 | 5.817 | 4.740 | 4.013 | 4.082 | 2.135 | 1.061 | 0.711 | 0.379 | 0.227 |
| 9 | 2009 | 2.102 | 3.515 | 3.927 | 2.595 | 0.945 | 0.567 | 0.340 | 2.772 | 1.760 | 2.024 | 0.909 | 0.426 |
| 10 | 2010 | 2.088 | 3.156 | 3.246 | 2.615 | 6.527 | 4.248 | 1.961 | 1.805 | 4.057 | 1.443 | 1.462 | 0.568 |
| 11 | 2011 | 5.147 | 4.241 | 4.682 | 3.893 | 2.587 | 3.618 | 2.940 | 1.471 | 0.693 | 0.416 | 0.249 | 0.150 |
| 12 | 2012 | 4.550 | 2.378 | 3.689 | 4.126 | 5.241 | 4.330 | 1.427 | 0.856 | 2.202 | 1.477 | 0.594 | 0.405 |
| 13 | 2013 | 5.108 | 4.127 | 3.463 | 3.886 | 2.329 | 2.894 | 2.247 | 2.106 | 1.220 | 1.107 | 2.230 | 2.385 |
| 14 | 2014 | 3.756 | 5.720 | 3.039 | 2.485 | 2.619 | 2.625 | 3.517 | 1.118 | 1.423 | 1.133 | 0.430 | 1.614 |
| 15 | 2015 | 3.198 | 5.869 | 4.181 | 2.336 | 4.130 | 2.687 | 1.794 | 3.231 | 1.710 | 0.699 | 0.636 | 0.293 |
| 16 | 2016 | 1.981 | 3.912 | 4.488 | 2.572 | 3.288 | 3.516 | 4.652 | 2.939 | 2.339 | 2.278 | 1.907 | 1.033 |
| 17 | 2017 | 2.469 | 3.738 | 5.325 | 2.346 | 2.966 | 2.196 | 3.993 | 2.878 | 2.072 | 1.144 | 0.731 | 0.895 |
| 18 | 2018 | 4.889 | 8.317 | 5.918 | 3.683 | 2.415 | 3.591 | 3.141 | 1.933 | 2.817 | 1.739 | 0.681 | 0.596 |
| 19 | 2019 | 0.654 | 0.393 | 0.236 | 0.141 | 3.836 | 4.739 | 1.911 | 1.461 | 0.815 | 0.412 | 0.247 | 0.148 |
| **Rerata** | | 2.532 | 3.252 | 3.511 | 2.849 | 2.896 | 2.809 | 2.632 | 1.936 | 1.499 | 1.046 | 0.793 | 0.662 |
| **Sd** | | 1.662 | 2.122 | 1.891 | 1.582 | 1.710 | 1.518 | 1.401 | 1.003 | 0.934 | 0.617 | 0.637 | 0.669 |
| **Koef Korelasi (rj)** | | 0.199 | 0.706 | 0.702 | 0.745 | 0.453 | 0.770 | 0.438 | 0.559 | 0.348 | 0.627 | 0.488 | 0.411 |
| **Koef Regresi (bj)** | | 0.254 | 0.629 | 0.588 | 0.805 | 0.403 | 0.711 | 0.314 | 0.521 | 0.230 | 0.647 | 0.512 | 0.338 |

| No | Tahun | Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 2001 | 0.305 | 0.241 | 0.121 | 0.072 | 0.043 | 0.026 | 0.016 | 0.009 | 1.275 | 2.537 | 0.577 | 0.346 |
| 2 | 2002 | 0.105 | 0.063 | 0.081 | 0.031 | 0.019 | 0.011 | 0.007 | 0.004 | 0.493 | 1.652 | 1.518 | 2.883 |
| 3 | 2003 | 0.101 | 0.061 | 0.037 | 0.022 | 0.013 | 0.008 | 0.005 | 1.287 | 0.243 | 0.146 | 0.088 | 0.053 |
| 4 | 2004 | 0.434 | 0.136 | 0.082 | 0.049 | 0.029 | 0.018 | 0.011 | 0.006 | 0.004 | 0.002 | 0.001 | 0.001 |
| 5 | 2005 | 2.246 | 0.755 | 0.394 | 0.236 | 0.142 | 0.287 | 0.132 | 0.653 | 0.711 | 0.815 | 4.000 | 3.331 |
| 6 | 2006 | 0.092 | 0.055 | 0.033 | 0.020 | 0.012 | 0.007 | 0.004 | 0.003 | 0.002 | 0.001 | 1.429 | 4.872 |
| 7 | 2007 | 0.267 | 0.160 | 0.096 | 0.058 | 0.035 | 0.021 | 0.012 | 0.007 | 0.004 | 0.003 | 1.647 | 5.274 |
| 8 | 2008 | 0.136 | 0.082 | 0.049 | 0.029 | 0.018 | 0.011 | 0.006 | 0.004 | 0.002 | 0.001 | 1.429 | 1.683 |
| 9 | 2009 | 0.256 | 0.153 | 0.092 | 0.055 | 0.033 | 0.020 | 0.012 | 0.007 | 0.798 | 1.883 | 0.864 | 1.777 |
| 10 | 2010 | 0.788 | 0.779 | 0.266 | 0.607 | 3.325 | 4.134 | 1.759 | 3.584 | 1.612 | 2.400 | 4.511 | 3.580 |
| 11 | 2011 | 0.090 | 0.054 | 0.032 | 0.019 | 0.012 | 0.007 | 0.004 | 0.003 | 0.002 | 0.001 | 1.083 | 2.801 |
| 12 | 2012 | 0.213 | 0.128 | 0.077 | 0.046 | 0.028 | 0.017 | 0.169 | 0.296 | 0.994 | 3.852 | 3.281 | 4.127 |
| 13 | 2013 | 1.430 | 0.555 | 0.333 | 0.200 | 0.120 | 0.072 | 0.043 | 0.531 | 1.568 | 0.817 | 1.997 | 6.067 |
| 14 | 2014 | 0.756 | 0.311 | 0.187 | 0.112 | 0.067 | 0.040 | 0.024 | 0.015 | 0.211 | 2.828 | 3.147 | 4.542 |
| 15 | 2015 | 0.176 | 0.105 | 0.063 | 0.038 | 0.023 | 0.014 | 0.008 | 0.005 | 1.489 | 1.768 | 1.560 | 3.653 |
| 16 | 2016 | 0.723 | 1.054 | 1.923 | 0.659 | 0.618 | 4.350 | 0.923 | 0.554 | 2.901 | 2.530 | 3.946 | 2.685 |
| 17 | 2017 | 0.317 | 0.537 | 0.179 | 0.108 | 0.065 | 1.373 | 1.184 | 0.567 | 0.750 | 10.025 | 2.420 | 4.405 |
| 18 | 2018 | 0.280 | 0.168 | 0.101 | 0.061 | 0.036 | 0.022 | 0.013 | 0.008 | 0.899 | 1.023 | 1.273 | 2.714 |
| 19 | 2019 | 0.089 | 0.053 | 0.032 | 0.019 | 0.012 | 0.007 | 0.004 | 0.002 | 0.074 | 0.130 | 0.925 | 2.957 |
| **Rerata** | | 0.463 | 0.287 | 0.220 | 0.128 | 0.245 | 0.550 | 0.228 | 0.397 | 0.739 | 1.706 | 1.879 | 3.040 |
| **Sd** | | 0.551 | 0.300 | 0.425 | 0.188 | 0.758 | 1.339 | 0.495 | 0.848 | 0.775 | 2.339 | 1.326 | 1.712 |
| **Koef Korelasi (rj)** | | 0.888 | 0.702 | 0.780 | 0.789 | 0.748 | 0.768 | 0.887 | 0.786 | 0.354 | 0.313 | 0.366 | 0.521 |
| **Koef Regresi (bj)** | | 0.484 | 0.995 | 0.344 | 3.193 | 1.320 | 0.284 | 1.520 | 0.718 | 1.067 | 0.178 | 0.472 | 0.506 |

d. Mencari nilai bilangan random normal (ti) pada tiap periode untuk satu tahun yang akan datang dengan bantuan *Data Analysis* pada *Microsoft Excel.*

Hasil Perhitungan bilangan random untuk satu tahun ke depan dapat dilihat pada **Tabel 4.16**.

**Tabel 4. 16** Bilangan Random (ti) untuk tahun 2020

| **Tahun ke-** | | **1** |
|---|---|---|
| **Bulan** | **Periode** | **2020** |
| Januari | I | -0.911 |
| | II | 0.244 |
| Februari | I | 1.232 |
| | II | 0.811 |
| Maret | I | -1.942 |
| | II | -1.042 |
| April | I | 1.257 |
| | II | -2.083 |
| Mei | I | 1.500 |
| | II | 0.568 |
| Juni | I | -0.980 |
| | II | 0.933 |
| Juli | I | -1.003 |
| | II | 0.529 |
| Agustus | I | -0.105 |
| | II | -0.078 |
| September | I | 0.725 |
| | II | 1.141 |
| Oktober | I | -1.276 |
| | II | 0.361 |
| November | I | -0.734 |
| | II | 0.472 |
| Desember | I | 0.278 |
| | II | 0.432 |
| **Rerata** | | **0.014** |
| **Sd** | | **1.025** |

*(Sumber : Hasil Perhitungan, 2020)*

e. Mencari nilai debit bangkitan pada bulan Januari periode I tahun 1 (2020).

$$Q_{2020,Jan1} = \overline{Q_{2019JanI}} + bj_{2019JanI}\left(Q_{2019DesII} - \overline{Q_{2019JanI}}\right) + ti_{2020JanI} Sd_{2019JanI}\left(1 - rj_{2019JanI}\right)^{1/2}$$

Dimana, jika Q inflow < 0 maka Q inflow = 0.

Hasil perhitungan debit *inflow* metode Thomas-Fiering untuk tahun ke-1 (2020) dapat dilihat pada **Tabel 4.17**. Sedangkan untuk hasil perhitungan debit *inflow* ditahun berikutnya terdapat pada lampiran D.

**Tabel 4. 17** Hasil Perhitungan Debit *Inflow* Bangkitan Tahun Ke-1 (2020)

| Tahun ke- | Bulan | Periode | Rata-Rata | Sd | Koef Korelasi (rj) | Koef Regresi(bj) | Angka Random (ti) | Q Inflow | Inflow Pakai ($m^3$/dtk) |
|---|---|---|---|---|---|---|---|---|---|
| 1 (2020) | Jan | I | 2.532 | 1.662 | 0.199 | 0.254 | -0.911 | 1.285 | 1.285 |
| | | II | 3.252 | 2.122 | 0.706 | 0.629 | 0.244 | 2.295 | 2.295 |
| | Feb | I | 3.511 | 1.891 | 0.702 | 0.588 | 1.232 | 4.068 | 4.068 |
| | | II | 2.849 | 1.582 | 0.745 | 0.805 | 0.811 | 4.478 | 4.478 |
| | Mar | I | 2.896 | 1.710 | 0.453 | 0.403 | -1.942 | 1.078 | 1.078 |
| | | II | 2.809 | 1.518 | 0.770 | 0.711 | -1.042 | 0.820 | 0.820 |
| | Apr | I | 2.632 | 1.401 | 0.438 | 0.314 | 1.257 | 3.384 | 3.384 |
| | | II | 1.936 | 1.003 | 0.559 | 0.521 | -2.083 | 1.304 | 1.304 |
| | Mei | I | 1.499 | 0.934 | 0.348 | 0.230 | 1.500 | 2.586 | 2.586 |
| | | II | 1.046 | 0.617 | 0.627 | 0.647 | 0.568 | 2.256 | 2.256 |
| | Jun | I | 0.793 | 0.637 | 0.488 | 0.512 | -0.980 | 1.095 | 1.095 |
| | | II | 0.662 | 0.669 | 0.411 | 0.338 | 0.933 | 1.288 | 1.288 |
| | Jul | I | 0.463 | 0.551 | 0.888 | 0.484 | -1.003 | 0.677 | 0.677 |
| | | II | 0.287 | 0.300 | 0.702 | 0.995 | 0.529 | 0.762 | 0.762 |
| | Agu | I | 0.220 | 0.425 | 0.780 | 0.344 | -0.105 | 0.385 | 0.385 |
| | | II | 0.128 | 0.188 | 0.789 | 3.193 | -0.078 | 0.942 | 0.942 |
| | Sep | I | 0.245 | 0.758 | 0.748 | 1.320 | 0.725 | 1.441 | 1.441 |
| | | II | 0.550 | 1.339 | 0.768 | 0.284 | 1.141 | 1.539 | 1.539 |
| | Okt | I | 0.228 | 0.495 | 0.887 | 1.520 | -1.276 | 2.007 | 2.007 |
| | | II | 0.397 | 0.848 | 0.786 | 0.718 | 0.361 | 1.696 | 1.696 |
| | Nov | I | 0.739 | 0.775 | 0.354 | 1.067 | -0.734 | 1.302 | 1.302 |
| | | II | 1.706 | 2.339 | 0.313 | 0.178 | 0.472 | 2.549 | 2.549 |
| | Des | I | 1.879 | 1.326 | 0.366 | 0.472 | 0.278 | 2.489 | 2.489 |
| | | II | 3.040 | 1.712 | 0.521 | 0.506 | 0.432 | 3.273 | 3.273 |

## 4.5 Analisis Kebutuhan Air

### 4.5.1 Analisis Kebutuhan Air Baku

Analisis kebutuhan air baku merupakan prioritas utama dari rencana operasi Waduk Pidekso. Pelayanan air baku diperkirakan dapat melayani 10 desa yang ada pada hilir bendungan. Menurut Badan Pusat Statistik Kabupaten Wonogiri (2020) , Kabupaten Wonogiri mempunyai pertumbuhan penduduk rata-rata sebesar 0.5%. Untuk saat ini instalasi untuk kebutuhan air baku belum terpasang pada lokasi studi.

Contoh perhitungan kebutuhan air baku untuk proyeksi tahun ke-1, tahun 2020 disajikan pada **Tabel 4.18** :

1. Perhitungan Proyeksi Jumlah Penduduk
   Perhitungan proyeksi jumlah penduduk untuk daerah yang terlayani menggunakan Metode Geometrik, sebagai berikut :

   $Pn = Po \times (1 + r)^t$
   $= 27.881 \times (1 + 0.005)^3$
   $= 28.302$ jiwa
   $Po = 27.881$ jiwa (tahun 2017)

   Dari hasil perhitungan proyeksi jumlah penduduk untuk satu tahun yang akan datang adalah 28302 jiwa. Menurut Tabel 2.1 Kriteria Perencanaan, kisaran angka berada pada kategori IV (**Kota Kecil**), dimana berada diantara 20.000 – 100.000 jiwa.

2. Parameter yang Ditetapkan

   **Nomor 1** : Tingkat pelayanan, menetapkan jumlah jiwa untuk masing-masing Sambungan Rumah (SR) sebanyak 5

jiwa dan Hidran Umum (HU) sebanyak 200 jiwa (Tabel 2.1).

**Nomor 2** : Konsumsi air rata-rata, ditetapkan untuk masing-masing Sambungan Rumah (SR) sebanyak 60 lt/orang/hari dan Hidran Umum (HU) sebanyak 30 lt/orang/hari (Tabel 2.1).

**Nomor 3** : Tingkat kehilangan air akibat kebocoran, ditetapkan sebesar 20% (Tabel 2.1).

**Nomor 4** : Faktor pemakaian, ditetapkan untuk factor hari maksimum sebesar 1.15 dan factor jam puncak sebesar 1.75 (Tabel 2.1).

**Nomor 5** : Prosentase pelayanan, ditetapkan untuk masing-masing Sambungan Rumah (SR) sebesar 70 % dan Hidran Umum (HU) sebesar 30% (tabel T.1).

3. Jumlah Penduduk dan Tingkat Pelayanan

**Nomor 6** : Selisih antara tahun proyeksi dengan tahun dasar (t)

$t_{2020} = 2020 – 2017 = 3$

**Nomor 7** : Proyeksi jumlah penduduk, Pn (jiwa).

$Pn = Po \times (1+r)^t = 27.881 \times (1 + 0{,}005)^3 = 28.302$ jiwa.

**Nomor 8** : Jumlah penduduk terlayani untuk Sambungan Rumah (SR) dan Hidran Umum (HU).

a. SR = (nomor 5a) x Pn = 0.7 x 28.302
   = 19.812 jiwa.
b. HU = (nomor 5b) x Pn = 0.3 x 28.302
   = 8.491 jiwa.

**Nomor 9** : Jumlah unit untuk Sambungan Rumah (SR) dan Hidran Umum (HU).

a. SR = (nomor 8a) / (nomor 1a) = 19.812 / 5
   = 3963 unit
b. HU = (nomor 8b) / (nomor 1a) = 8.491 jiwa / 200
   = 43 unit

4. Kebutuhan Air Baku

**Nomor 10** : Kebutuhan domestik untuk masing-masing Sambungan Rumah (SR) dan Hidran Umum (HU).

a. SR = (nomor 2a) x (nomor 8a) = 60 x 19.812
   = 13,758 lt/dtk.
b. HU = (nomor 2b) x (nomor 8b) = 30 x 8.491
   = 2,934 lt/dtk.

**Nomor 11** : Kebutuhan air non domestik.

Kebutuhan air non domestik = 20% x kebutuhan domestik = 0,2 x (13,758 + 2,934) = 3,341 lt/dtk.

Kebutuhan air non domestik sebesar 20%, berdasarkan data dari lokasi studi.

**Nomor 12** : Kebutuhan air akibat kebocoran

Kebutuhan air akibat kebocoran = 15% x (kebutuhan air domestik + kebutuhan air non domestik) = 0,15 x (13,758 + 2,934 + 3,341) = 3,007 lt/dtk.

Kebutuhan air akibat kebocoran sebesar 15%, berdasarkan data dari lokasi studi.

**Nomer 13** : Kebutuhan harian (kebutuhan normal)

Kebutuhan harian = kebutuhan domestik + kebutuhan non domestik + kebutuhan air akibat kebocoran = 13,758 + 2,934 + 3,341 + 3,007 = 23,055 lt/dtk.

**Nomer 14** : Kebutuhan harian maksimum (FHM)

FHM = (nomor 4a) x kebutuhan harian

= 1,15 x 23,055 = 26,513 lt/dtk.

**Nomer 15** : Kebutuhan jam puncak (FJP)

FJP = (nomor 4b) x kebutuhan harian

= 1,75 x 23,055 = 40,346 lt/dtk.

= **0,040 $m^3$/dtk.**

**Tabel 4. 18** Hasil Perhitungan Kebutuhan Air Baku Tahun Ke- 1

| No | Uraian | Satuan | Hitungan | Tahun | | | |
|---|---|---|---|---|---|---|---|
| | | | | 2017 | 2018 | 2019 | 2020 |
| **I** | **Parameter yang Ditetapkan** | | | | | | |
| 1 | Tingkat Pelayanan | | | | | | |
| | a. Sambungan Rumah (SR) | jiwa | | 5 | 5 | 5 | 5 |
| | b. Hidran Umum (HU) | jiwa | | 200 | 200 | 200 | 200 |
| 2 | Konsumsi Air Rata-Rata | | | | | | |
| | a. Sambungan Rumah (SR) | lt/orang/hari | | 60 | 60 | 60 | 60 |
| | b. Hidran Umum (HU) | lt/orang/hari | | 30 | 30 | 30 | 30 |
| 3 | Tingkat Kehilangan Air Akibat Kebocoran | % | | 15 | 15 | 15 | 15 |
| 4 | Faktor Pemakaian | | | | | | |
| | a. Faktor hari maksimum | | | 1.15 | 1.15 | 1.15 | 1.15 |
| | b. Faktor Jam Puncak | | | 1.75 | 1.75 | 1.75 | 1.75 |
| 5 | Prosentase Pelayanan | | | | | | |
| | a. Sambungan Rumah (SR) | % | | 70 | 70 | 70 | 70 |
| | b. Hidran Umum (HU) | % | | 30 | 30 | 30 | 30 |
| **II** | **Jumlah Penduduk dan Tingkat Pelayanan** | | | | | | |
| 6 | Selisih antara tahun proyeksi dengan tahun dasar (t) | | | 0 | 1 | 2 | 3 |
| 7 | Proyeksi Jumlah Penduduk (Pn) | jiwa | $Po\ (1+r)^n$ | 27881 | 28021 | 28161 | 28302 |
| 8 | Jumlah Penduduk Terlayani | | | | | | |
| | a. Sambungan Rumah (SR) | jiwa | (5a) x (7) | 19517 | 19615 | 19713 | 19812 |
| | b. Hidran Umum (HU) | jiwa | (5b) x (7) | 8365 | 8407 | 8449 | 8491 |
| 9 | Jumlah Unit | | | | | | |
| | a. Sambungan Rumah (SR) | unit | (8a) / (1a) | 3904 | 3923 | 3943 | 3963 |
| | b. Hidran Umum (HU) | unit | (8b) / (1b) | 42 | 43 | 43 | 43 |
| **III** | **Kebutuhan Air Baku** | | | | | | |
| 10 | Kebutuhan Domestik | | | | | | |
| | a. Sambungan Rumah (SR) | lt/dtk | (2a) x (8a) | 13.553 | 13.622 | 13.690 | 13.758 |
| | b. Hidran Umum (HU) | lt/dtk | (2b) x (8b) | 2.905 | 2.919 | 2.934 | 2.948 |
| 11 | Kebutuhan Non Domestik (20 %) | lt/dtk | 20% x (10) | 3.292 | 3.308 | 3.325 | 3.341 |
| 12 | Kebutuhan Air Akibat Kebocoran | lt/dtk | 15% x ((10) + (11)) | 2.962 | 2.977 | 2.992 | 3.007 |
| 13 | Kebutuhan Harian | lt/dtk | (10)+(11)+(12) | 22.712 | 22.826 | 22.940 | 23.055 |
| 14 | Kebutuhan Harian Maksumum | lt/dtk | (4a) x (13) | 26.119 | 26.250 | 26.381 | 26.513 |
| 15 | Kebutuhan Jam Puncak | lt/dtk | (4b) x (13) | 39.746 | 39.946 | 40.145 | 40.346 |
| | | $m^3$/dtk | | 0.040 | 0.040 | 0.040 | 0.040 |

### 4.5.2 Analisis Kebutuhan Air Irigasi

Analisis kebutuhan air irigasi dihitung berdasarkan pola tanam yang telah ditetapkan dilokasi studi. Jenis tanaman yang ditanam adalah padi dan palawija dengan pola tanam padi-padi-palawija. Luas daerah irigasi adalah 1500 ha, dengan curah hujan efektif dengan tingkat keandalan 80%. Perhitungan kebutuhan air dilakukan dengan waktu awal tanam yang berbeda-beda sebagai alternatif untuk simulasi teknik optimasi dengan metode Richard Bellman.

#### 4.5.2.1 Perhitungan Curah Hujan Efektif

Perhitungan curah hujan efektif dilakukan dengan tingkat keandalan 80%, yang kemudian dihitung curah hujan efektif untuk kebutuhan tanaman padi dan palawija.

Contoh perhitungan curah hujan efektif, sebagai berikut :

1. Curah hujan yang digunakan adalah curah hujan dari Analisis Hidrologi dengan periode 15 harian dari tahun 2001-2019 (**Tabel 4.19**)

**Tabel 4. 19** Curah Hujan Rata-Rata Tahun 2001-2019

| Tahun | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| 2001 | 31 | 217 | 268 | 39 | 135 | 139 | 179 | 32 | 0 | 23 | 116 | 0 |
| 2002 | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 97 | 72 | 0 | 0 | 0 |
| 2003 | 212 | 143 | 248 | 278 | 202 | 95 | 4 | 20 | 37 | 0 | 0 | 7 |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 44 | 0 |
| 2005 | 52 | 239 | 119 | 177 | 138 | 162 | 121 | 23 | 5 | 0 | 4 | 135 |
| 2006 | 0 | 0 | 172 | 181 | 0 | 0 | 206 | 95 | 0 | 0 | 0 | 0 |
| 2007 | 23 | 68 | 140 | 203 | 82 | 270 | 280 | 202 | 14 | 73 | 0 | 0 |
| 2008 | 124 | 148 | 405 | 285 | 204 | 165 | 184 | 54 | 7 | 8 | 0 | 0 |
| 2009 | 116 | 204 | 210 | 103 | 0 | 0 | 0 | 178 | 80 | 100 | 20 | 0 |
| 2010 | 112 | 178 | 167 | 115 | 391 | 184 | 35 | 58 | 230 | 26 | 52 | 0 |
| 2011 | 277 | 194 | 228 | 169 | 87 | 179 | 127 | 32 | 0 | 0 | 0 | 0 |
| 2012 | 273 | 88 | 193 | 212 | 279 | 197 | 0 | 0 | 117 | 59 | 4 | 5 |
| 2013 | 273 | 186 | 145 | 185 | 76 | 135 | 91 | 90 | 34 | 40 | 125 | 124 |
| 2014 | 167 | 309 | 100 | 87 | 114 | 120 | 184 | 7 | 55 | 42 | 0 | 94 |
| 2015 | 139 | 331 | 182 | 63 | 215 | 103 | 55 | 172 | 55 | 0 | 15 | 0 |
| 2016 | 76 | 220 | 239 | 90 | 158 | 172 | 247 | 112 | 86 | 96 | 77 | 24 |
| 2017 | 106 | 200 | 296 | 63 | 134 | 84 | 220 | 124 | 75 | 24 | 13 | 37 |
| 2018 | 245 | 474 | 259.5 | 116 | 62 | 174 | 140 | 61 | 140 | 61 | 0 | 13 |
| 2019 | 0 | 0 | 0 | 0 | 260 | 276 | 49 | 42 | 13 | 0 | 0 | 0 |

| Tahun | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | | Ags | | Sep | | Okt | | Nov | | Des | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| 2001 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 159 | 0 | 0 |
| 2002 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 34 | 108 | 81 | 170 |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 89 | 0 | 0 | 0 | 0 |
| 2004 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2005 | 124 | 10 | 0 | 0 | 0 | 14 | 3 | 41 | 39 | 43 | 261 | 172 |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 319 |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 114 | 344 |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 98 |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 120 | 31 | 100 |
| 2010 | 31 | 34 | 0 | 31 | 218 | 238 | 48 | 195 | 43 | 117 | 261 | 168 |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 75 | 180 |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 18 | 64 | 252 | 171 | 220 |
| 2013 | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 101 | 33 | 118 | 386 |
| 2014 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 193 | 180 | 258 |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 103 | 77 | 220 |
| 2016 | 17 | 50 | 110 | 11 | 20 | 284 | 0 | 0 | 178 | 128 | 221 | 113 |
| 2017 | 0 | 24 | 0 | 0 | 0 | 92.5 | 63 | 16 | 35 | 678 | 30 | 217 |
| 2018 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 59 | 70 | 164 |
| 2019 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 8 | 62 | 192 |

2. Mengurutkan data curah hujan dari urutan yang terbesar ke terkecil (**Tabel 4.20**)

3. Menghitung curah hujan efektif dengan keandalan 80%.

$R_{80} = (n/5) + 1$

$= (19/5) + 1 = 4,8$

Dari hasil perhitungan curah hujan efektif dengan keandalan 80% seperti pembahasan sebelumnya didapatkan bahwa $R_{80}$ bernilai 4,8 yang artinya nilai curahh hujan efektif dengan keandalan 80% berada diantara rangking ke empat dan ke lima dihitung dari rangking paling bawah. Urutan perhitungan curah hujan efektif disajikan pada **Tabel 4.20**, yang kemudian dilakukan interpolas untuk mendapatkan nilai $R_{80}$.

**Tabel 4. 20** Urutan Data Curah Hujan Efektif

| Rangking | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 277 | 474 | 405 | 285 | 391 | 276 | 280 | 202 | 230 | 100 | 125 | 135 |
| 2 | 273 | 331 | 296 | 278 | 279 | 270 | 247 | 178 | 140 | 96 | 116 | 124 |
| 3 | 273 | 309 | 268 | 212 | 260 | 197 | 220 | 172 | 117 | 73 | 77 | 94 |
| 4 | 245 | 239 | 259.5 | 203 | 215 | 184 | 206 | 124 | 86 | 61 | 52 | 37 |
| 5 | 212 | 220 | 248 | 185 | 204 | 179 | 184 | 112 | 80 | 61 | 44 | 24 |
| 6 | 167 | 217 | 239 | 181 | 202 | 174 | 184 | 97 | 75 | 59 | 20 | 13 |
| 7 | 139 | 204 | 228 | 177 | 158 | 172 | 179 | 95 | 72 | 42 | 15 | 7 |
| 8 | 124 | 200 | 210 | 169 | 138 | 165 | 140 | 90 | 55 | 40 | 13 | 5 |
| 9 | 116 | 194 | 193 | 116 | 135 | 162 | 135 | 61 | 55 | 26 | 4 | 0 |
| 10 | 112 | 186 | 182 | 115 | 134 | 139 | 127 | 58 | 37 | 24 | 4 | 0 |
| 11 | 106 | 178 | 172 | 103 | 114 | 135 | 121 | 54 | 34 | 23 | 0 | 0 |
| 12 | 76 | 148 | 167 | 90 | 87 | 120 | 91 | 42 | 14 | 8 | 0 | 0 |
| 13 | 52 | 143 | 145 | 87 | 82 | 103 | 55 | 32 | 13 | 0 | 0 | 0 |
| 14 | 31 | 88 | 140 | 63 | 76 | 95 | 49 | 32 | 7 | 0 | 0 | 0 |
| **15** | **23** | **68** | **119** | **63** | **62** | **84** | **35** | **23** | **5** | **0** | **0** | **0** |
| **16** | **0** | **0** | **100** | **39** | **0** | **0** | **4** | **20** | **0** | **0** | **0** | **0** |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Rangking | Curah Hujan Bulanan (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | | Ags | | Sep | | Okt | | Nov | | Des | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| 1 | 124 | 50 | 110 | 31 | 218 | 284 | 63 | 195 | 178 | 678 | 261 | 386 |
| 2 | 51 | 34 | 3 | 11 | 20 | 238 | 48 | 89 | 103 | 252 | 261 | 344 |
| 3 | 31 | 24 | 0 | 0 | 0 | 92.5 | 11 | 41 | 101 | 193 | 221 | 319 |
| 4 | 24 | 10 | 0 | 0 | 0 | 14 | 3 | 35 | 88 | 159 | 180 | 258 |
| 5 | 21 | 4 | 0 | 0 | 0 | 0 | 0 | 18 | 64 | 128 | 171 | 220 |
| 6 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 62 | 120 | 118 | 220 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 117 | 114 | 217 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 108 | 99 | 192 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39 | 103 | 99 | 180 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 59 | 81 | 172 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 43 | 77 | 170 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 33 | 75 | 168 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 8 | 70 | 164 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62 | 113 |
| **15** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **31** | **100** |
| **16** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **30** | **98** |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

4. Menginterpolasi nilai $R_{80}$ pada rangking ke empat dan ke lima (**Tabel 4.21**)

**Tabel 4. 21** Nilai Interpolasi Curah Hujan Efektif

| Uraian | Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| $R_{80}$ | 18.4 | 54.4 | 115.2 | 58.2 | 49.6 | 67.2 | 28.8 | 22.4 | 4 | 0 | 0 | 0 |

| Uraian | Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | | Ags | | Sep | | Okt | | Nov | | Des | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| $R_{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30.8 | 99.6 |

5. Menghitung curah hujan efektif dengan keandalan 80% untuk tanaman padi dan palawija.
   a. Curah hujan efektif tanaman padi
      Perhitungan curah hujan efektif untuk tanaman padi ditentukan sebesar 70% dari curah hujan efektif dengan keandalan 80%. Contoh perhitungan pada bulan Januari periode I, sebagai berikut :

      $Re_{padi} = (0,7 \times R_{80})/15 = (0,7 \times 18,4)/15 = 0,859$ mm/hari.

      Hasil perhitungan curah hujan efektif untuk tanaman padi dapat dilihat pada **Tabel 4.22**.

**Tabel 4. 22** Hasil Perhitungan Curah Hujan Efektif untuk Tanaman Padi

| Uraian | Curah Hujan Efektif Padi (mm/hari) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| $R_{80}$ | 18.4 | 54.4 | 115.2 | 58.2 | 49.6 | 67.2 | 28.8 | 22.4 | 4 | 0 | 0 | 0 |
| $Re_{Padi}$ | 0.859 | 2.539 | 5.376 | 2.716 | 2.315 | 3.136 | 1.344 | 1.045 | 0.187 | 0.000 | 0.000 | 0.000 |

| Uraian | Curah Hujan Efektif Padi (mm/hari) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | | Ags | | Sep | | Okt | | Nov | | Des | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| $R_{80}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30.8 | 99.6 |
| $Re_{Padi}$ | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.437 | 4.648 |

   b. Curah hujan efektif tanaman palawija
      Perhitungan curah hujan efektif untuk tanaman palawija ditentukan sebesar 50% dari curah hujan efektif dengan keandalan 80%. Contoh perhitungan pada bulan Januari, sebagai berikut :

      $Re_{pal} = 0,5 \times R_{80} = 0,5 \times 18,4 = 9,2$ mm/15hari.
      Re =9,2 +27,2 = 36,4 mm/bln.
      ETo = 183,206 mm/bln.
      $fD = 0,53 + (0.00016 \times 10^{-5} \times 0^2) + (2.32 \times 10^{-7} \times D^3)$

$fD = 0,53 + (0,00016 \times 10^{-5} \times 0^2) + (2,32 \times 10^{-7} \times 100^3)$
$= 0,762$
$Re_{pal} = fD \times (1,25 \times R_{50}^{0,824} - 2,93) \times 10^{0,00095 \times ETo}$
$Re_{pal} = 0,762 \times (1,25 \times 36,4^{0,824} - 2,93) \times 10^{0,00095 \times ETo}$
$Re_{pal} = 24,162$ mm/blm = **0,805 mm/hari**.

Hasil perhitungan curah hujan efektif untuk tanaman padi dapat dilihat pada **Tabel 4.23**

**Tabel 4. 23** Hasil Perhitungan Curah Hujan Efektif untuk Tanaman Palawija

| Hitungan | Curah Hujan Efektif Palawija (mm/hari) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| R80 | 18.400 | 54.400 | 115.200 | 58.200 | 49.600 | 67.200 | 28.800 | 22.400 | 4.000 | 0.000 | 0.000 | 0.000 |
| Re 50% | 9.200 | 27.200 | 57.600 | 29.100 | 24.800 | 33.600 | 14.400 | 11.200 | 2.000 | 0.000 | 0.000 | 0.000 |
| Re (mm/bln) | 36.400 | | 86.700 | | 58.400 | | 25.600 | | 2.000 | | 0.000 | |
| ETo (mm/bln) | 183.206 | | 156.313 | | 166.944 | | 166.435 | | 175.901 | | 208.303 | |
| fD | 0.762 | | 0.762 | | 0.762 | | 0.762 | | 0.762 | | 0.762 | |
| Re Palawija (mm/bln) | 24.162 | | 49.859 | | 35.956 | | 16.619 | | 0 | | 0 | |
| Re Palawija (mm/hari) | 0.805 | | 1.662 | | 1.199 | | 0.554 | | 0.000 | | 0.000 | |

| Hitungan | Curah Hujan Efektif Palawija (mm/hari) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | | Ags | | Sep | | Okt | | Nov | | Des | |
| | I | II | I | II | I | II | I | II | I | II | I | II |
| R80 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 30.800 | 99.600 |
| Re 50% | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 15.400 | 49.800 |
| Re (mm/bln) | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 65.200 | |
| ETo (mm/bln) | 247.315 | | 372.833 | | 342.996 | | 430.814 | | 235.240 | | 233.869 | |
| fD | 0.762 | | 0.762 | | 0.762 | | 0.762 | | 0.762 | | 0.762 | |
| Re Palawija (mm/bln) | 0 | | 0 | | 0 | | 0 | | 0 | | 45.933 | |
| Re Palawija (mm/hari) | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 0.000 | | 1.531 | |

### 4.5.2.2 Kebutuhan Air Untuk Penyiapan Lahan

Perhitungan kebutuhan air untuk penyiapan lahan menggunakan metode yang dikembangkan oleh *Van de Goor* dan *Zijlstra* (1968) (KP-01, 2013)

Contoh perhitungan kebutuhan air untuk penyiapan lahan pada bulan Januari, sebagai berikut :

1. Evapotranspirasi Potensial, didapatkan dari analisis klimatologi dengan Metode Penman. ETo = 6,107 mm/hari.
2. Eo, Evaporasi air terbuka.
   Eo = 1,1 x ETo = 1,1 x 6,107 = 6,718 mm/hari.
3. Perkolasi, P = 2 mm/hari.
4. M, Kebutuhan air untuk mengganti/mengkompensasi kehilangan air akibat evaporasi dan perkolasi di sawah yang sudah dijenuhkan.
   M = Eo + P = 6,718 + 2 = 8,718 mm/hari.
5. T, Jangka waktu penyiapan lahan. T = 31 hari.
6. S, Kebutuhan air untuk penjenuhan ditambah dengan lapiran air 50 mm, yaitu 200 + 50 = 250 mm.
7. k = M(T/S) = 8,718 x (31/250) = 1,081.
8. IR, Kebutuhan air irigasi di tingkat persawahan
   $IR = M \times e^k/(e^k-1) = 8{,}718 \times e^{1{,}081} / (e^{1{,}081} - 1)$
   IR = 13,194 mm/hari.

Hasil perhitungan kebutuhan air untuk penyiapan lahan dapat dilihat pada **Tabel 4.24**.

**Tabel 4. 24** Perhitungan Kebutuhan Air Untuk Penyiapan Lahan

| No | Uraian | Satuan | Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agu | Sep | Okt | Nov | Des |
| 1 | Eto | mm/hari | 6.107 | 5.210 | 5.565 | 5.548 | 5.863 | 6.943 | 8.244 | 12.428 | 11.433 | 14.360 | 7.841 | 7.796 |
| 2 | Eo = 1.1xEto | mm/hari | 6.718 | 5.731 | 6.121 | 6.103 | 6.450 | 7.638 | 9.068 | 13.671 | 12.577 | 15.796 | 8.625 | 8.575 |
| 3 | Perkolasi | mm/hari | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 |
| 4 | M = Eo + P | mm/hari | 8.718 | 7.731 | 8.121 | 8.103 | 8.450 | 9.638 | 11.068 | 15.671 | 14.577 | 17.796 | 10.625 | 10.575 |
| 5 | T | hari | 31.000 | 29.000 | 31.000 | 30.000 | 31.000 | 30.000 | 31.000 | 31.000 | 30.000 | 31.000 | 30.000 | 31.000 |
| 6 | S | mm/hari | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 | 250.000 |
| 7 | k = M(T/S) | | 1.081 | 0.897 | 1.007 | 0.972 | 1.048 | 1.157 | 1.372 | 1.943 | 1.749 | 2.207 | 1.275 | 1.311 |
| 8 | IR | mm/hari | 13.194 | 13.057 | 12.796 | 13.032 | 13.015 | 14.062 | 14.827 | 18.291 | 17.646 | 19.998 | 14.746 | 14.477 |

### 4.5.2.3 Kebutuhan Air untuk Tanaman

Perhitungan kebutuhan air untuk tanaman di sawah diperlukan untuk mengetahui berapa kebutuhan air yang dibutuhkan untuk suatu jenis tanaman. Pemberian air yang baik dan tepat akan mempengaruhi hasil panen. Dalam Tugas Akhir

Terapan ini perhitungan dilakukan untuk mencari kebutuhan air untuk tanaman padi dan palawija dengan waktu awal tanam yang berbeda-beda.

Contoh perhitungan kebutuhan air untuk tanaman padi, dengan waktu awal tanam pada bulan November Periode I, sebagai berikut :

**Kolom 1** : Bulan

**Kolom 2** : Periode (15 harian)

**Kolom 3** : ETo, Evapotranspirasi potensial yang didapatkan dari perhitungan analisis klimatologi (Tabel 4.9) (mm/hari).

**Kolom 4** : $Re_{padi}$, Curah hujan efektif padi dengan keandalan 80% (Tabel 4.22) (mm/hari).

**Kolom 5** : Perkolasi, ditetapkan P = 2 mm/hari.

**Kolom 6** : WLR, Penggantian lapisan air (*Water Layer Requirement).*

**Kolom 7** : Area tanam, luas daerah yang akan ditanami (ha).

**Kolom 8, 9, 10** : Koefisien tanaman padi c1, c2, c3.

**Kolom 11** : c, rata-rata koefisien tanaman padi.

**Kolom 12** : Etc, Kebutuhan air konsumtif. Etc = ETo x c (mm/hari).

**Kolom 13** : NFR, Kebutuhan air di sawah untuk tanaman padi. NFR = Etc + P + WLR – $Re_{padi}$ (mm/hari)

**Kolom 14** : NFR dalam lt/dt/ha. NFR/8,64.

**Kolom 15** : DR, Kebutuhan air per ha(*Divertion Requirement*). DR = NFR / e (lt/dt/ha).

e = Efisiensi irigasi = 65%.

**Kolom 16** : Kebutuhan air untuk tanaman padi = DR x Luas area tanam (lt/dtk).

Hasil perhitungan kebutuhan air untuk tanaman padi dengan waktu awal tanam pada Bulan November Periode I dapat dilihat pada **Tabel 4.25**. Perhitungan ini berdasarkan pola tanam dan luas yang ditetapkan pada lokasi studi.

**Tabel 4. 25** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan November Periode I

| Mulai Tanam Bulan November Periode I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 1490.953 |
| Des | I | 7.796 | 1.437 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.477 | 15.039 | 1.741 | 2.678 | 2677.941 |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.445 | 6.897 | 0.798 | 1.228 | 1842.221 |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.514 | 8.755 | 1.013 | 1.559 | 2338.498 |
| | II | 6.107 | 2.539 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 6.209 | 7.870 | 0.911 | 1.401 | 2102.028 |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.474 | 1.198 | 0.139 | 0.213 | 213.251 |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.650 | 2.034 | 0.235 | 0.362 | 181.087 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 |
| | II | 5.565 | 3.136 | 2.00 | | 500 | LP | LP | LP | LP | 12.796 | 11.660 | 1.350 | 2.076 | 1038.125 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.032 | 13.688 | 1.584 | 2.437 | 2437.295 |
| | II | 5.548 | 1.045 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.032 | 13.987 | 1.619 | 2.490 | 3735.714 |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.352 | 9.265 | 1.072 | 1.650 | 2474.706 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.254 | 9.354 | 1.083 | 1.666 | 2498.463 |
| Jun | I | 6.943 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.059 | 11.259 | 1.303 | 2.005 | 3007.255 |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.629 | 7.729 | 0.895 | 1.376 | 1376.239 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.611 | 5.711 | 0.661 | 1.017 | 508.418 |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

Contoh Perhitungan kebutuhan air untuk tanaman palawija dengan waktu awal tanam pada Bulan November Periode I, sebagai berikut :

**Kolom 1** : Bulan

**Kolom 2** : Periode (15 harian)

**Kolom 3** : ETo, Evapotranspirasi potensial yang didapatkan dari perhitungan analisis klimatologi (Tabel 4.8) (mm/hari).

**Kolom 4** : $Re_{padi}$, Curah hujan efektif palawija dengan keandalan 80% (Tabel 4.24) (mm/hari).

**Kolom 5** : Perkolasi, ditetapkan P = 2 mm/hari.

**Kolom 6** : Area tanam, luas daerah yang akan ditanami (ha).

**Kolom 7, 8, 9** : Koefisien tanaman palawija c1, c2, c3.

**Kolom 10** : c, rata-rata koefisien tanaman palawija.

**Kolom 11** : Etc, Kebutuhan air konsumtif. Etc = ETo x c (mm/hari).

**Kolom 12** : NFR, Kebutuhan air di sawah untuk tanaman palawija. NFR = Etc + P $- Re_{palawija}$ (mm/hari)

**Kolom 13** : NFR dalam lt/dt/ha. NFR/8,64.

**Kolom 14** : DR, Kebutuhan air per ha (*Divertion Requirement*).
DR = NFR / e (lt/dt/ha).
e = Efisiensi irigasi = 65%.

**Kolom 15** : Kebutuhan air untuk tanaman palawija = DR x Luas area tanam (lt/dtk).

Hasil perhitungan kebutuhan air untuk tanaman palawija dengan waktu awal tanam pada bulan November periode I dapat dilihat pada **Tabel 4.26**. Perhitungan total kebutuhan air untuk tanaman padi dan tanaman palawija dengan waktu awal tanam pada Bulan November Periode I dapat dilihat pada **Tabel 4.27.** Hasil perhitungan kebutuhan air dengan waktu awal tanam untuk tanaman padi dan palawija dengan waktu yang berbeda-beda dapat dilihat pada lampiran D.

**Tabel 4. 26** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan November Periode I

| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 1.374 | 3.374 | 0.391 | 0.601 | 300.389 |
| | II | 8.244 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 3.435 | 5.435 | 0.629 | 0.968 | 967.759 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 9.321 | 11.321 | 1.310 | 2.016 | 3023.724 |
| | II | 12.428 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 11.392 | 13.392 | 1.550 | 2.385 | 3576.954 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 10.747 | 12.747 | 1.475 | 2.270 | 3404.705 |
| | II | 11.433 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 8.651 | 10.651 | 1.233 | 1.897 | 2844.852 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 6.079 | 8.079 | 0.935 | 1.439 | 1438.614 |
| | II | 14.360 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 2.154 | 4.154 | 0.481 | 0.740 | 369.842 |

**Tabel 4. 27** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan November Periode I

| Mulai Tanam Bulan November Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Nov | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1490.953 | 0.000 | 1490.953 | 1.491 |
| Des | I | 2677.941 | 0.000 | 2677.941 | 2.678 |
| | II | 1842.221 | 0.000 | 1842.221 | 1.842 |
| Jan | I | 2338.498 | 0.000 | 2338.498 | 2.338 |
| | II | 2102.028 | 0.000 | 2102.028 | 2.102 |
| Feb | I | 213.251 | 0.000 | 213.251 | 0.213 |
| | II | 181.087 | 0.000 | 181.087 | 0.181 |
| Mar | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1038.125 | 0.000 | 1038.125 | 1.038 |
| Apr | I | 2437.295 | 0.000 | 2437.295 | 2.437 |
| | II | 3735.714 | 0.000 | 3735.714 | 3.736 |
| Mei | I | 2474.706 | 0.000 | 2474.706 | 2.475 |
| | II | 2498.463 | 0.000 | 2498.463 | 2.498 |
| Jun | I | 3007.255 | 0.000 | 3007.255 | 3.007 |
| | II | 1376.239 | 0.000 | 1376.239 | 1.376 |
| Jul | I | 508.418 | 300.389 | 808.807 | 0.809 |
| | II | 0.000 | 967.759 | 967.759 | 0.968 |
| Agu | I | 0.000 | 3023.724 | 3023.724 | 3.024 |
| | II | 0.000 | 3576.954 | 3576.954 | 3.577 |
| Sep | I | 0.000 | 3404.705 | 3404.705 | 3.405 |
| | II | 0.000 | 2844.852 | 2844.852 | 2.845 |
| Okt | I | 0.000 | 1438.614 | 1438.614 | 1.439 |
| | II | 0.000 | 369.842 | 369.842 | 0.370 |

### 4.5.3 Analisis Kebutuhan Air Pembangkit Listrik Tenaga Mikro Hidro (PLTMH)

Dalam rencana operasi Waduk Pidekso, PLTMH menjadi salah satu manfaat untuk operasi waduk. Perencanaan PLTMH sebagai ouflow dari waduk sebelum dimanfaatkan untuk kebutuhan air baku maupun irigasi. Untuk saat ini PLTMH masih dalam tahap perencanaan. Terdapat dua PLTMH yang direncanakan yang terletak pada saluran hantar kiri dan kanan. Dalam pengerjaan Tugas Akhri Terapan ini debit andalan yang digunakan adalah 95%.

Perhitungan kebutuhan air untuk PLTMH adalah sebagai berikut :

1. Menentukan debit PLTMH dengan keandalan 95% ($Q_{95}$) (**Tabel 4.28**)

   **Kolom 1** : Mencari debit interval

   R = Qmax – Qmin = 10,025 – 0,00053
   = 10.024 $m^3$/dtk.

   K = 1 + 3,3322 log n
   = 1 + 3,3322 log 456 = 10

   n = jumlah data (19 tahun = 228 bulan = 456 periode)

   Interval = R/K = 10,024 / 10 = 2

   **Kolom 2** : Titik tengah interval.

   **Kolom 3** : Frekuensi banyaknya data

   **Kolom 4** : Jumlah data = n - 3

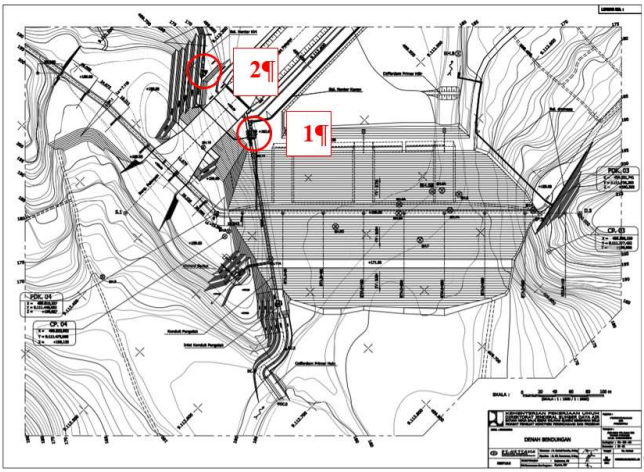
   **Kolom 5** : Prosentase debit.

**Tabel 4. 28** Prosentase Frekuensi Kumulatif dari Data Debit

| Interval | | | Titik Tengah | Frekuensi | Jumlah Data | Prosentase (%) |
|---|---|---|---|---|---|---|
| 1 | | | 2 | 3 | 4 | 5 |
| 0.001 | - | 2.001 | 1.001 | 286 | 432 | 100 |
| 2.001 | - | 4.001 | 3.001 | 101 | 146 | 33.796 |
| 4.001 | - | 6.001 | 5.001 | 40 | 45 | 10.417 |
| 6.001 | - | 8.001 | 7.001 | 3 | 5 | 1.157 |
| 8.001 | - | 10.001 | 9.001 | 1 | 2 | 0.463 |
| 10.001 | - | 12.001 | 11.001 | 1 | 1 | 0.231 |

Dari tabel 4.23 diatas didapat debit dengan keandalan 95%, $Q_{95}$ adalah 1,152 $m^3$/dtk.

2. Mencari tinggi jatuh efektif
   Mencari tinggi jatuh efektif untuk masing-masing PLTMH. Tinggi jatuh efektif didapatkan dari selisih antara elevasi di *upstream* dan di *downstream*




**Gambar 4. 5** Letak Perencanaan PLTMH
*(Sumber : PT. Mettana, 2011)*

a. PLTMH 1
Perencanaan PLTMH terletak pada saluran hantar kanan.

Dari **Gambar 4.5** didapatkan :
Elevasi upstream : +178,00
Elevasi downstream : +162,00

Menghitung tinggi efektif (*Heff)*

*Heff* bruto = Elevasi upstream – elevasi downstream

= + 178,00 – (+162,00) = 16 m

*Heff loses* = 10% x *Heff* bruto = 0.1 x 15.2 = 1,6 m

*Heff* = *Heff* bruto – *Heff loses* = 16 – 1.6 = 14,4 m

b. PLTMH 2
Perencanaan PLTMH terletak pada saluran hantar kiri.

Dari **Gambar 4.5** didapatkan :
Elevasi upstream : +178,00
Elevasi downstream : +165,50

Menghitung tinggi efektif (*Heff)*

*Heff* bruto = Elevasi upstream – elevasi downstream

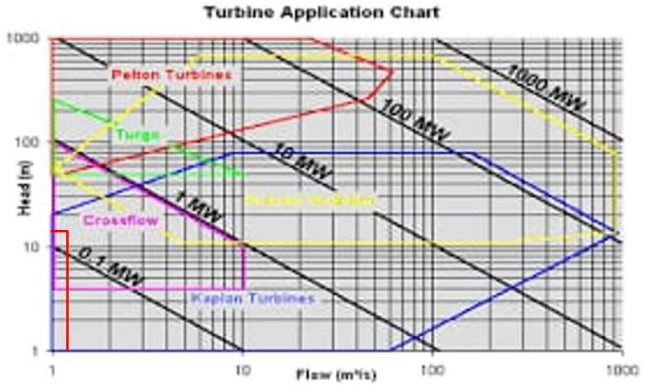
= + 178,00 – (+165,50) = 12,5 m

*Heff loses* = 10% x *Heff* bruto = 0.1 x 12.5 = 1,25 m

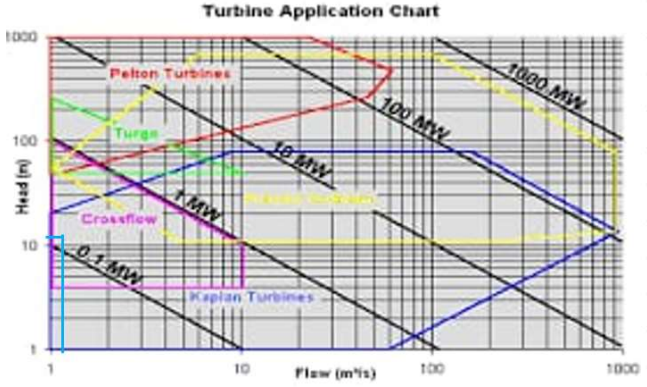
*Heff* = *Heff* bruto – *Heff loses* = 12.5 – 1.25 = 11,25 m

3. Pemilihan jenis turbin
Pemilihan jenis turbin menggunakan gratik hubungan antara *Heff* dan debit andalan 95%, Grafik pemilihan jenis turbin dapat dilihat pada **Gambar 4.6** untuk PLTMH 1 dan **Gambar 4.7**

untuk PLTMH 2. Berdasarkan grafik, jenis turbin yang dipilih adalah jenis **Turbin Kaplan Propeller.** Turbin ini mempunyai efisiensi (η) sebesar 85%.




**Gambar 4. 6** Grafik Pemilihan Jenis Turbin untuk PLTMH 1 (Garis Merah)




**Gambar 4. 7** Grafik Pemilihan Jenis Turbin untuk PLTMH 2 (Garis Biru)

4. Menghitung daya listrik yang dihasilkan

   **PLTMH 1**

   $P_{95} = \eta \times \rho \times g \times H_{eff} \times Q$

   $= 0,85 \times 0,85 \times 9,8 \times 14,4 \times 0,576 = 58,707$ kW.

   **PLTMH 2**

   $P_{95} = \eta \times \rho \times g \times H_{eff} \times Q$

   $= 0,85 \times 0,85 \times 9,8 \times 11,25 \times 0,576 = 45,865$ kW.

5. Menghitung energi listrik yang dihasilkan

   **PLTMH 1**

   $E = P \times t = 58,707 \times 365 \times 24 = 514.273,9$ kWh $= 514,273$ MWh.

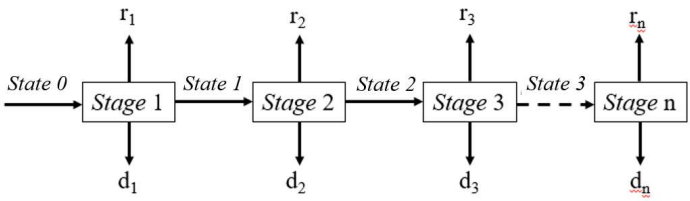
   **PLTMH 2**

   $E = P \times t = 45,865 \times 365 \times 24 = 401.776,5$ kWh $= 401,776$ MWh.

# BAB V
# PERMODELAN DAN
# SIMULASI TEKNIK OPTIMASI

## 5.1 Permodelan Teknik Optimasi dengan Metode Richard Bellman

Permodelan teknik optimasi dengan metode Richard Bellman digunakan untuk menentukan keputusan optimal suatu tindakan berdasarkan faktor penentu (*state*). Skema rangkaian keputusan dapat dilihat pada **Gambar 5.1** untuk permodelan teknik optimasi pada Waduk Pidekso.




**Gambar 5. 1** Skema Rangkaian Keputusan Waduk Pidekso

Rumusan teknik optimasi dengan metode Richard Bellman untuk Waduk Pidekso dilakukan dengan menggunakan elemen-elemen sebagai berikut :

1. *Stage*

   *Stage* (tahap) adalah periode yang ditinjau. Dalam satu tahun terdapat 24 *stage*, yang terdiri dari 12 bulan dan dua periode (15 harian).

2. *State*

*State* adalah tampungan waduk pada *stage* ke i,j. Pada perhitungan awal periode tampungan awal waduk yang digunakan adalah tampungan penuh yaitu 25.165 juta $m^3$.

3. *Decision Variable*

   *Decision Variable* adalah *release* yang diperlukan untuk kebutuhan air baku dan irigasi, sedangkan untuk PLTMH *release* bergantung pada *release* air baku ditambah irigasi untuk masing-masing periode.

4. *Return*

   *Return* adalah nilai rasio antara *release* dan *demand* terhadap kebutuhan air baku, irigasi, dan PLTMH pada masing-masing periode, yang dinyatakan sebagai nilai faktor k, dengan kisaran nilai 0 sampai 1 :

$$\boldsymbol{k_i = \frac{R_{i,j}}{D_{i,j}}}$$

5. Fungsi Tujuan (*Objective Function*)

   Fungsi tujuan pada studi ini adalah untuk mencari nilai rerata dari faktor k dalam satu siklus.

$$\boldsymbol{OF = \frac{1}{n}\sum_{i=1}^{n} k}$$

6. Fungsi transformasi keadaan (*State Transformation Function*)

   Fungsi ini digunakan untuk mengetahui kondisi waduk yang menghubungkan satu tahap dengan tahap selanjutnya, dengan persamaan berikut :

$$\mathbf{ST_{t+1} = ST_1 + Q_t + PP_t - EV_t - R_t}$$

7. *Forward recuirsive formula*

   Persamaan ini merupakan hubungan antar kebijakan optimal untuk setiap masalah di setiap tahap n dengan tahap sebelumnya, hal ini menunjukan bahwa keputusan yang diambil, memperhatikan keadaan yang dihasilkan oleh keputusan sebelumnya

$$r_{t+1}(ST_{t+1}) = \max_{Rt}[r_t(R_t, ST_{t+1}) + (r_t(ST_t)], \quad Untuk\ t = 2, \dots, T$$

$$r_{t+1}(ST_{t+1}) = \max_{Rt}[r_t(R_t, ST_t)], \quad Untuk\ t = 1$$

8. Batasan (*Constraint*)
   a. Tampungan Waduk

      Waduk memiliki kapasitas minimum yang harus dipenuhi (*dead storage*), maka pada setiap stage (tahap) volume tampungan akhri waduk tidak boleh kurang dari kapasitas minimumnya, yaitu 8.095 juta $m^3$. Dari penjelasan di atas maka *constraint* dapat ditulis :

      $\mathbf{K_d \leq ST_t \leq K}$

## 5.2 Simulasi Program Teknik Optimasi

Simulasi teknik optimasi dengan metode Richard Bellman untuk Waduk Pidekso dilakukan dengan menggunakan beberapa alternatif, yaitu perhitungan kebutuhan irigasi dengan waktu awal tanam yang berbeda-beda. Dengan menggunakan waktu awal tanam yang berbeda-beda maka dilakukan teknik optimasi untuk mencari hasil yang paling optimum untuk memenuhi kebutuhan air baku, irigasi, dan PLTMH. Dalam pengerjaan Tugas Akhir Terapan ini terdapat 24 simulasi teknik optimasi dengan parameternya adalah waktu awal tanam untuk pola tanam padi-padi palawija dengan periode 15 harian.

Model optimasi metode Richard Bellman diselesaikan secara tahap per tahap. Langkah langkah untuk menyelesaikan proses optimasi adalah sebagai berikut:

1. Menghitung dan meninjau data *inflow* waduk, kehilangan air akibat evapotranspirasi potensial, presipitasi, dan kebutuhan air (*demand*) pada masing-masing periode.
2. Menetapkan ST volume penyimpanan awal dengan $K_d \leq ST_t \leq K$ dan pada periode-periode berikutnya
3. Menetapkan nilai faktor k yang optimal untuk suatu kebutuhan
4. Menghitung volume tampungan akhir dengan fungsi transformasi status yang telah ditetapkan. Jika volume tampungan tidak memenuhi, maka ulangi langkah ke 3 dengan menggunakan nilai k dengan persamaan rekursif yang ditetapkan sehingga volume tampungan akhir memenuhi batasan (*constraint*). Tampungan akhir pada *stage* 1 digunakan untuk tampungan awal pada *stage* 2.
5. Mengulangi langkah 3,4 untuk seluruh *stage*.
6. Setelah stage akhir dihitung, maka menghitung nilai rerata faktor k untuk mengetahui hasil yang optimum pada setiap kebutuhan dalam satu simulasi.

Jumlah perhitungan untuk menyelesaikan simulasi ini cukup banyak, sehingga dalam perhitungannya digunakan bantuan bahasa pemograman *Visual Basic for Application (VBA)* pada *Microsoft Excel*.

Perhitungan permodelan teknik optimasi dilakukan dengan menggunakan waktu awal tanam yang berbeda-beda, dimana tiap tahunnya terdapat 24 *stage.* Contoh perhitungan teknik optimasi untuk tahun ke-1 dengan waktu awal tanam Bulan November periode I dapat dilihat pada **Tabel 5.1**. Sedangkan untuk waktu awal tanam yang lain dapat dilihat pada lampiran E.

Perhitungan teknik optimasi dengan metode Richard Bellman untuk waktu awal tanam Bulan November Periode I pada *stage* 1 (bulan November, periode I), sebagai berikut :

**Kolom 1** : Waktu awal tanam = November Periode I.

**Kolom 2** : *Stage* (Tahap).

**Kolom 3** : Bulan.

**Kolom 4** : Periode (15 harian).

**Kolom 5** : Jumlah hari pada satu periode.

**Kolom 6** :STt, volume tampungan waduk. Pada awal perhitungan dimulai dari volume tampungan waduk penuh, yaitu 25,165 juta $m^3$.

**Kolom 7** : Qt, Debit inflow bangkitan dalam $m^3$/dtk (Tabel 4.17)

**Kolom 8** : Volume inflow bangkitan dalam juta $m^3$ = (7) x jumlah hari x 24 x 3.600/1.000.000.

**Kolom 9** : PPt (Presipitasi) seluas genangan waduk dalam juta $m^3$ = R x A.

**Kolom 10** : EVt, Evapotranspirasi bangkitan dalam mm/hari (Tabel 4.11)

**Kolom 11** : Volume evapotranspirasi seluas genangan waduk dalam juta $m^3$ = (10) x jumlah hari x 24 x 3.600 x 1.000.000.

**Kolom 12** : STt + Qt + PPt – EVt.

**Kolom 13** : Kebutuhan air baku dalam $m^3$/dtk (Tabel 4.18).

**Kolom 14** : Kebutuhan air baku dalam juta $m^3$ = (13) x jumlah hari x 24 x 3.600/1.000.000.

**Kolom 15** : Demand, kebutuhan air baku yang diminta dalam juta $m^3$.

**Kolom 16** : Faktor k, nilai rasio antara *release* dan *demand* terhadap kebutuhan air baku. Faktor k bernilai 1, karena prioritas utama.

**Kolom 17** : *Release* air baku dalam juta $m^3$ = (15) x (16).

**Kolom 18** : Kebutuhan air irigasi dalam $m^3$/dtk (Tabel 4.27).

**Kolom 19** : Kebutuhan air irigasi dalam juta $m^3$ = (18) x jumlah hari x 24 x 3.600/1.000.000.

**Kolom 20** : Demand, kebutuhan air irigasi yang diminta dalam juta $m^3$.

**Kolom 21** : Faktor k, nilai rasio antara *release* dan *demand* terhadap kebutuhan air irigasi (*VBA*)

***Visual Basic for Application***

```
Sub Irigasi ()

Dim x As Integer
For x = 9 To 32
If ThisWorkbook.Sheets("DP").Cells(x, 21) = 1 Then
ThisWorkbook.Sheets("DP").Cells(x, 21) = "1"
If ThisWorkbook.Sheets("DP").Cells(x, 35) >= 8,095 Then
ThisWorkbook.Sheets("DP").Cells(x, 21) = "1"
Else
ThisWorkbook.Sheets("DP").Cells(x, 35).GoalSeek Goal:=8,095,
        ChangingCell:=Sheets("DP").Cells(x, 21)
If ThisWorkbook.Sheets("DP").Cells(x, 21) < 0 Then
ThisWorkbook.Sheets("DP").Cells(x, 21) = "0"
End If
End If
End If
Next x
End Sub
```

**Kolom 22** : *Release* air irigasi dalam juta $m^3$ = (20) x (21).

**Kolom 23** : *Release* air baku dan air irigasi dalam juta $m^3$ = (17) + (22).

**Kolom 24** : Kebutuhan air PLTMH 1 dalam $m^3$/dtk = 0,576 $m^3$/dtk.

**Kolom 25** : Kebutuhan air PLTMH 1 dalam juta $m^3$ = (24) x jumlah hari x 24 x 3.600/1.000.000.

**Kolom 26** : Demand, kebutuhan air PLTMH 1 yang diminta dalam juta $m^3$

**Kolom 27** : Faktor k, nilai rasio antara *release* dan *demand* terhadap kebutuhan air PLTMH 1 (*VBA*).

***Visual Basic for Application***

```
Sub Pltmhsatu()

Dim x As Integer
For x = 9 To 32
If ThisWorkbook.Sheets("DP").Cells(x, 27) = 0 Then
ThisWorkbook.Sheets("DP").Cells(x, 27) = "1"
If ThisWorkbook.Sheets("DP").Cells(x,23) >=
            ThisWorkbook.Sheets("DP").Cells(x, 26) Then
ThisWorkbook.Sheets("DP").Cells(x, 27) = "1"
Else
ThisWorkbook.Sheets("DP").Cells(x,27)
=ThisWorkbook.Sheets("DP").Cells(x, 23) /
ThisWorkbook.Sheets("DP").Cells(x, 26)
If ThisWorkbook.Sheets("DP").Cells(x, 27) < 0 Then
ThisWorkbook.Sheets("DP").Cells(x, 27) = "0"
End If
End If
```

```
End If
Next x

End Sub
```

**Kolom 28** : *Release* air PLTMH 1 dalam juta $m^3$ = (26) x (27).

**Kolom 29** : *Release* air baku, air irigasi, dan PLTMH 1 dalam juta $m^3$ = (17) + (22) + (28)

**Kolom 30** :. Kebutuhan air PLTMH 2 dalam $m^3$/dtk = 0,576 $m^3$/dtk.

**Kolom 31** : Kebutuhan air PLTMH 2 dalam juta $m^3$ = (30) x jumlah hari x 24 x 3.600/1.000.000.

**Kolom 32** : Demand, kebutuhan air PLTMH 2 yang diminta dalam juta $m^3$.

**Kolom 33** : Faktor k, nilai rasio antara *release* dan *demand* terhadap kebutuhan air PLTMH 2 (*VBA*).

***Visual Basic for Application***

```
Sub Pltmhdua ()

Dim x As Integer
For x = 9 To 32
If ThisWorkbook.Sheets("DP").Cells(x, 33) = 0 Then
ThisWorkbook.Sheets("DP").Cells(x, 33) = "1"
If ThisWorkbook.Sheets("DP").Cells(x, 29) >=
        ThisWorkbook.Sheets("DP").Cells(x, 32) Then
ThisWorkbook.Sheets("DP").Cells(x, 33) = "1"
Else
ThisWorkbook.Sheets("DP").Cells(x, 33) =
        ThisWorkbook.Sheets("DP").Cells(x, 29) /
        ThisWorkbook.Sheets("DP").Cells(x, 32)
```

```
If ThisWorkbook.Sheets("DP").Cells(x, 33) < 0 Then
ThisWorkbook.Sheets("DP").Cells(x, 33) = "0"
End If
End If
End If
Next x

End Sub
```

**Kolom 34** : *Release* air PLTMH 2 dalam juta $m^3$ = (33) x (34).

**Kolom 35** : $ST_{t+1}$, volume tampungan akhir dalam = (12) – (23). juta $m^3$

**Kolom 36** : Defisit, nilai (35) < 8,095, dalam juta $m^3$.

**Kolom 37** : Excess, nilai (35) > 25,165, dalam juta $m^3$.

**Kolom 38** : $ST_{pakai}$, tampungan pakai dalam juta $m^3$ = (35) + (36) – (37).

**Kolom 39** : Elevasi muka air

**Kolom 40** : Rata-rata nilai faktor k terhadap air baku, irigasi, PLTMH 1, dan PLTMH 2.

**Kolom 41** : *Constraint* = $K_d \leq ST_t \leq K$

**Kolom 42** : Keterangan = nilai (35) > 25,165; maka "MELIMPAS".

Hasil simulasi teknik optimasi dengan metode Richard Bellman untuk waktu awal tanam Bulan November Periode I dapat dilihat pada **Tabel 5.1** dan **Tabel 5.2**. Sedangkan simulasi teknik optimasi dengan metode Richard Bellman untuk waktu awal tanam yang lain disajikan pada lampiran E.

**Tabel 5. 1** Hasil Perhitungan Simulasi Teknik Optimasi dengan Metode Richard Bellman untuk Waktu Awal Tanam Bulan November Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | Release AB + IR |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Nov | I | 15 | 25.165 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 26.290 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 15 | 25.165 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 28.421 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.491 | 1.932 | 1.932 | 1.000 | 1.932 | 1.985 |
| | 3 | Des | I | 15 | 25.165 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 28.240 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.678 | 3.471 | 3.471 | 1.000 | 3.471 | 3.523 |
| | 4 | | II | 16 | 24.718 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 29.288 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.842 | 2.547 | 2.547 | 1.000 | 2.547 | 2.602 |
| | 5 | Jan | I | 15 | 25.165 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 26.356 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.338 | 3.031 | 3.031 | 1.000 | 3.031 | 3.083 |
| | 6 | | II | 16 | 23.273 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 26.215 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.102 | 2.906 | 2.906 | 1.000 | 2.906 | 2.962 |
| | 7 | Feb | I | 15 | 23.253 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 28.702 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.213 | 0.276 | 0.276 | 1.000 | 0.276 | 0.329 |
| | 8 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.181 | 0.219 | 0.219 | 1.000 | 0.219 | 0.268 |
| | 9 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 16 | 25.165 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 25.671 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.038 | 1.435 | 1.435 | 1.000 | 1.435 | 1.491 |
| | 11 | Apr | I | 15 | 24.180 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 28.547 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.437 | 3.159 | 3.159 | 1.000 | 3.159 | 3.211 |
| November | 12 | | II | 15 | 25.165 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.736 | 4.841 | 4.841 | 1.000 | 4.841 | 4.894 |
| Periode I | 13 | Mei | I | 15 | 21.320 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 24.219 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.475 | 3.207 | 3.207 | 1.000 | 3.207 | 3.260 |
| | 14 | | II | 16 | 20.960 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 23.396 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.498 | 3.454 | 3.454 | 1.000 | 3.454 | 3.510 |
| | 15 | Jun | I | 15 | 19.887 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 20.670 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.007 | 3.897 | 3.897 | 1.000 | 3.897 | 3.950 |
| | 16 | | II | 15 | 16.720 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 17.907 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.376 | 1.784 | 1.784 | 1.000 | 1.784 | 1.836 |
| | 17 | Jul | I | 15 | 16.071 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 16.385 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.809 | 1.048 | 1.048 | 1.000 | 1.048 | 1.101 |
| | 18 | | II | 16 | 15.285 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 15.731 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.968 | 1.338 | 1.338 | 1.000 | 1.338 | 1.394 |
| | 19 | Agu | I | 15 | 14.337 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 14.118 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.024 | 3.919 | 3.919 | 1.000 | 3.919 | 3.971 |
| | 20 | | II | 16 | 10.147 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 10.694 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.577 | 4.945 | 4.945 | 0.514 | 2.543 | 2.599 |
| | 21 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.405 | 4.412 | 4.412 | 0.296 | 1.308 | 1.360 |
| | 22 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.845 | 3.687 | 3.687 | 0.451 | 1.661 | 1.713 |
| | 23 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.439 | 1.864 | 1.864 | 0.811 | 1.512 | 1.564 |
| | 24 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.370 | 0.511 | 0.511 | 1.000 | 0.511 | 0.567 |

**Tabel 5. 2** Hasil Perhitungan Simulasi Teknik Optimasi dengan Metode Richard Bellman untuk Waktu Awal Tanam Bulan November Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Nov | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.238 | 0 | 1.073 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.238 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 26.436 | 0 | 1.271 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 3 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.777 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.718 | 0 | 0 | 24.718 | 184.82 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.806 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 26.685 | 0 | 1.520 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 5 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.337 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.273 | 0 | 0 | 23.273 | 184.13 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.166 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 23.253 | 0 | 0 | 23.253 | 184.12 | 1.000 | OK | - |
| | 7 | Feb | I | 0.576 | 0.746 | 0.746 | 0.440 | 0.329 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 28.373 | 0 | 3.208 | 25.165 | 185.02 | 0.610 | OK | MELIMPAS |
| | 8 | | II | 0.576 | 0.696 | 0.696 | 0.385 | 0.268 | 0.000 | 0.576 | 0.696 | 0.696 | 0.000 | 0.000 | | 30.550 | 0 | 5.385 | 25.165 | 185.02 | 0.596 | OK | MELIMPAS |
| | 9 | Mar | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 25.921 | 0 | 0.756 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 10 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.695 | 0.576 | 0.796 | 0.796 | 0.873 | 0.695 | | 24.180 | 0 | 0 | 24.180 | 184.57 | 0.968 | OK | - |
| | 11 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.465 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 25.336 | 0 | 0.171 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| November Periode I | 12 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.148 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.320 | 0 | 0 | 21.320 | 183.14 | 1.000 | OK | - |
| | 13 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.513 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.960 | 0 | 0 | 20.960 | 182.95 | 1.000 | OK | - |
| | 14 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.714 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.887 | 0 | 0 | 19.887 | 182.37 | 1.000 | OK | - |
| | 15 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.203 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.720 | 0 | 0 | 16.720 | 180.53 | 1.000 | OK | - |
| | 16 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.090 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.071 | 0 | 0 | 16.071 | 180.13 | 1.000 | OK | - |
| | 17 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.354 | 0.576 | 0.746 | 0.746 | 0.475 | 0.354 | | 15.285 | 0 | 0 | 15.285 | 179.63 | 0.869 | OK | - |
| | 18 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.598 | 0.576 | 0.796 | 0.796 | 0.751 | 0.598 | | 14.337 | 0 | 0 | 14.337 | 179.02 | 0.938 | OK | - |
| | 19 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.225 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 10.147 | 0 | 0 | 10.147 | 176.12 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.803 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.879 | OK | - |
| | 21 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.780 | OK | - |
| | 22 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.863 | OK | - |
| | 23 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.953 | OK | - |
| | 24 | | II | 0.576 | 0.796 | 0.796 | 0.712 | 0.567 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 8.666 | 0 | 0 | 8.666 | 175.01 | 0.678 | OK | - |

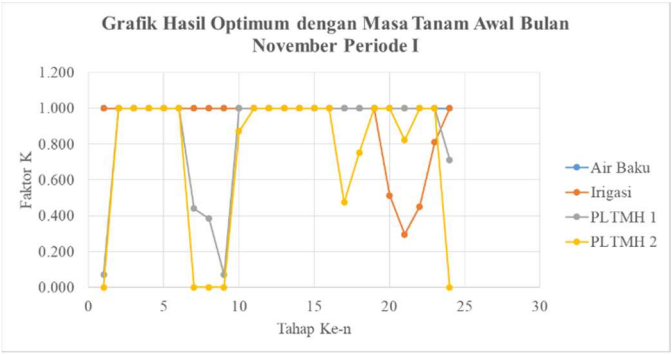
## 5.3 Hasil Optimum Simulasi Teknik Optimasi dengan Metode Richard Bellman

Hasil Optimum dari simulasi teknik optimasi dengan metode Richard Bellman untuk kebutuhan air baku, irigasi, dan PLTMH untuk waktu awal tanam Bulan November Periode I disajikan pada **Tabel 5.3**, sedangkan untuk waktu tanam yang lain selanjutnya disajikan pada lampiran E.

**Tabel 5. 3** Hasil Optimum Simulasi Teknik Optimasi dengan Metode Richard Bellman Waktu Awal Tanam Bulan November Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| November Periode I | 1 | Nov | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | Des | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 5 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 7 | Feb | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.440 | 9308.36 | 0.000 | 0.00 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.385 | 7585.93 | 0.000 | 0.00 |
| | 9 | Mar | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 0.873 | 15375.91 |
| | 11 | Apr | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 15 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | Jul | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.475 | 7838.99 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.751 | 13223.57 |
| | 19 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 0.514 | 771.371 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 21 | Sep | I | 1.000 | 0.040 | 0.296 | 444.568 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 22 | | II | 1.000 | 0.040 | 0.451 | 675.839 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | Okt | I | 1.000 | 0.040 | 0.811 | 810.904 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.712 | 16059.84 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.920** | | **0.862** | | **0.747** | |

Grafik hasil optimum dari simulasi teknik optimasi dengan metode Richard Bellman diinterpretasikan merupakan grafik hubungan faktor k pada tiap-tiap tahap (*stage*) untuk tiap-tiap kebutuhannya. Grafik hasil disajikan pada **Gambar 5.2** untuk waktu awal tanam Bulan November Periode I**.**




**Gambar 5. 2** Grafik Hasil Untuk Waktu Awal Tanam Bulan November Periode I**.**

## 5.4 Analisis Hasil Simulasi Teknik Optimasi dengan Metode Richard Bellman

Perhitungam simulasi teknik optimasi metode Richard Bellman menggunakan varibel-variabel, seperti volume tampungan, pola tanam, dan luas tanam irigasi yang sesuai dengan perencanaan yang sudah ditentukan oleh pihak perencana pada lokasi studi. Hasil simulasi teknik optimasi dari pembahasan sebelumnya didapatkan nilai rata-rata faktor k untuk setiap kebutuhan dengan setiap waktu awal tanam yang berbeda-beda. Penetapan hasil optimum untuk masing-masing kebutuhan adalah dengan menggunakan skala prioritas dengan urutan, yaitu kebutuhan air baku, irigasi, PLTMH 1, dan PLTMH 2.

Pada **Tabel 5.4** dan **Gambar 5.3**, dapat dilihat bahwa pada Bulan September kebutuhan air baku dan irigasi memiliki nilai rata-rata faktor k paling optimum yaitu bernilai 1, sedangkan untuk nilai faktor k kumulatif selama satu tahun bernilai 24. Hal tersebut menunjukan bahwa Waduk Pidekso mampu memenuhi kebutuhan air baku dan irigasi di daerah layanan dengan baik dalam satu tahun. Sedangkan dari 2 periode di bulan September dipilih hasil paling optimum untuk PLTMH 1 dengan rata-rata nilai faktor k

sebesar 0,89 pada Periode II, diikuti dengan nilai rata-rata faktor k untuk PLTMH 2 sebesar 0,74 pada bulan September Periode II.

**Tabel 5. 4** Nilai Rata-Rata Faktor K untuk Setiap Waktu Awal Tanam

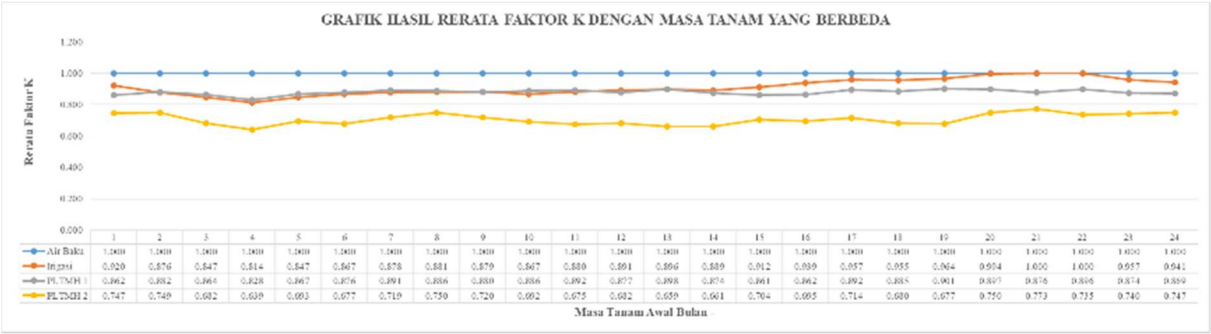
| | | Faktor K Rerata | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Masa Tanam Awal** | **Bulan** | **November I** | **November II** | **Desember I** | **Desember II** | **Januari I** | **Januari II** | **Februari I** | **Februari II** |
| **Kebutuhan** | **Air Baku** | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | **Irigasi** | 0.920 | 0.876 | 0.847 | 0.814 | 0.847 | 0.867 | 0.878 | 0.881 |
| | **PLTMH 1** | 0.862 | 0.882 | 0.864 | 0.828 | 0.867 | 0.876 | 0.891 | 0.886 |
| | **PLTMH 2** | 0.747 | 0.749 | 0.682 | 0.639 | 0.693 | 0.677 | 0.719 | 0.750 |

| | | Faktor K Rerata | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Masa Tanam Awal** | **Bulan** | **Maret I** | **Maret II** | **April I** | **April II** | **Mei I** | **Mei II** | **Juni I** | **Juni II** |
| **Kebutuhan** | **Air Baku** | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | **Irigasi** | 0.879 | 0.867 | 0.880 | 0.891 | 0.896 | 0.889 | 0.912 | 0.939 |
| | **PLTMH 1** | 0.880 | 0.886 | 0.892 | 0.877 | 0.898 | 0.874 | 0.861 | 0.862 |
| | **PLTMH 2** | 0.720 | 0.692 | 0.675 | 0.682 | 0.659 | 0.661 | 0.704 | 0.695 |

| | | Faktor K Rerata | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Masa Tanam Awal** | **Bulan** | **Juli I** | **Juli II** | **Agustus I** | **Agustus II** | **September I** | **September II** | **Oktober I** | **Oktober II** |
| **Kebutuhan** | **Air Baku** | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| | **Irigasi** | 0.957 | 0.955 | 0.964 | 0.994 | 1.000 | 1.000 | 0.957 | 0.941 |
| | **PLTMH 1** | 0.892 | 0.885 | 0.901 | 0.897 | 0.876 | 0.896 | 0.874 | 0.869 |
| | **PLTMH 2** | 0.714 | 0.680 | 0.677 | 0.750 | 0.773 | 0.735 | 0.740 | 0.747 |

Berdasarkan hasil simulasi dari pembahasan sebelumnya, dibuat grafik komulatif antara *inflow* dan *outflow* untuk mengetahui apakah air yang tersedia dalam tampungan waduk dapat memenuhi kebutuhan air selama satu tahun di daerah layanan. Penggambaran grafik kumulatif *inflow* dan *outflow* dilakukan pada bulan September periode II dengan nilai rerata faktor k paling besar (optimum). Hasil rekapitulasi *inflow* dan *outflow* disajikan pada **Tabel 5.5.** Sedangkan untuk grafik kumulatif *inflow* dan *outflow* disajikan pada **Gambar 5.4**

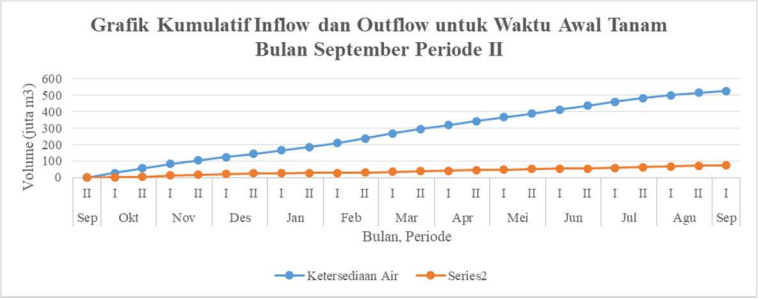
Berdasarkan **Gambar 5.4**, grafik kumulatif *inflow* dan *outflow* pada bulan September periode II, dapat diketahui bahwa ketersediaan air dalam tampungan Waduk Pidekso masih tersedia cukup banyak sehingga perlu solusi untuk optimalisasi pemakaian air yang tersedia dalam waduk tersebut. Solusi tersebut dilakukan dengan cara optimalisasi luas tanam irigasi. Dengan demikian ketersediaan air dalam tampungan efektif Waduk Pidekso bisa dimanfaatkan semua.




**Gambar 5. 3** Grafik Hasil Rerata Faktor K dengan Waktu Awal Tanam yang Berbeda

**Tabel 5. 5** Hasil Rekapitulasi *Inflow* dan *Outflow* untuk Waktu Awal Tanam Bulan September Periode II

| Waktu awal tanam | Bulan | Periode | Jumlah hari | ΔS | Inflow | | | | Outflow | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Qt | PPt | Total Inflow | Inflow Kumulatif | EVt | Air Baku | Irigasi | Total Outflow | Outflow Kumulatif |
| | | | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| September Periode II | Sep | II | 15 | 25.165 | 1.994 | 0.280 | 27.439 | 0.000 | 0.560 | 0.052 | 0.000 | 0.613 | 0.000 |
| | Okt | I | 15 | 25.165 | 2.602 | 0.319 | 28.086 | 27.439 | 1.357 | 0.052 | 2.538 | 3.947 | 0.613 |
| | | II | 16 | 24.139 | 2.344 | 0.241 | 26.724 | 55.525 | 1.447 | 0.056 | 5.415 | 6.918 | 4.560 |
| | Nov | I | 15 | 19.806 | 1.688 | 0.009 | 21.503 | 82.249 | 0.571 | 0.052 | 4.014 | 4.637 | 11.478 |
| | | II | 15 | 16.865 | 3.303 | 0.524 | 20.692 | 103.751 | 0.571 | 0.052 | 3.968 | 4.592 | 16.115 |
| | Des | I | 15 | 16.100 | 3.225 | 0.400 | 19.726 | 124.444 | 0.550 | 0.052 | 3.700 | 4.302 | 20.707 |
| | | II | 16 | 15.423 | 4.525 | 0.632 | 20.581 | 144.169 | 0.587 | 0.056 | 0.898 | 1.541 | 25.009 |
| | Jan | I | 15 | 19.040 | 1.665 | 0.158 | 20.863 | 164.750 | 0.633 | 0.052 | 0.482 | 1.167 | 26.550 |
| | | II | 16 | 19.696 | 3.172 | 0.445 | 23.313 | 185.613 | 0.675 | 0.056 | 0.000 | 0.731 | 27.717 |
| | Feb | I | 15 | 22.582 | 5.272 | 0.834 | 28.688 | 208.926 | 0.657 | 0.052 | 1.117 | 1.827 | 28.448 |
| | | II | 14 | 25.165 | 5.417 | 0.850 | 31.432 | 237.614 | 0.614 | 0.049 | 2.658 | 3.320 | 30.275 |
| | Mar | I | 15 | 25.165 | 1.397 | 0.000 | 26.562 | 269.046 | 0.589 | 0.052 | 4.321 | 4.961 | 33.595 |
| | | II | 16 | 21.601 | 1.133 | 0.000 | 22.734 | 295.608 | 0.628 | 0.056 | 2.213 | 2.896 | 38.556 |
| | Apr | I | 15 | 19.838 | 4.386 | 0.648 | 24.871 | 318.342 | 0.666 | 0.052 | 2.656 | 3.375 | 41.453 |
| | | II | 15 | 21.496 | 1.690 | 0.025 | 23.211 | 343.213 | 0.666 | 0.052 | 3.044 | 3.763 | 44.828 |
| | Mei | I | 15 | 19.448 | 3.351 | 0.452 | 23.252 | 366.424 | 0.905 | 0.052 | 1.574 | 2.531 | 48.591 |
| | | II | 16 | 20.720 | 3.119 | 0.282 | 24.122 | 389.676 | 0.965 | 0.056 | 0.976 | 1.997 | 51.122 |
| | Jun | I | 15 | 22.125 | 1.419 | 0.029 | 23.574 | 413.798 | 0.665 | 0.052 | 1.129 | 1.847 | 53.119 |
| | | II | 15 | 21.727 | 1.669 | 0.183 | 23.579 | 437.372 | 0.665 | 0.052 | 2.495 | 3.213 | 54.966 |
| | Jul | I | 15 | 20.366 | 0.877 | 0.056 | 21.300 | 460.950 | 0.620 | 0.052 | 3.308 | 3.981 | 58.178 |
| | | II | 16 | 17.320 | 1.053 | 0.055 | 18.427 | 482.251 | 0.661 | 0.056 | 3.600 | 4.317 | 62.159 |
| | Agu | I | 15 | 14.110 | 0.499 | 0.023 | 14.632 | 500.678 | 0.741 | 0.052 | 3.947 | 4.741 | 66.476 |
| | | II | 16 | 9.892 | 1.302 | 0.036 | 11.229 | 515.310 | 0.790 | 0.056 | 1.787 | 2.634 | 71.217 |
| | Sep | I | 15 | 8.595 | 1.867 | 0.054 | 10.516 | 526.539 | 0.560 | 0.052 | 0.429 | 1.041 | 73.850 |



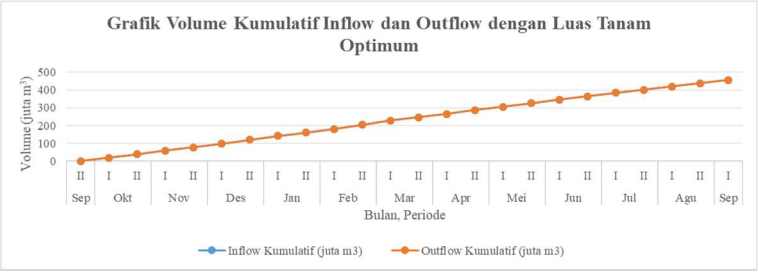

**Gambar 5. 4** Grafik Kumulatif *Inflow* dan *Outflow* untuk Waktu Awal Tanam Bulan September Periode II

Perhitungan awal dilakukan dengan cara memaksimalkan pemakaian air yang ada pada tampungan efektif Waduk Pidekso dengan menggunakan Metode Richard Bellman. Dari perhitungan tersebut, dapat diketahui luas tanam irigasi optimum yang dapat

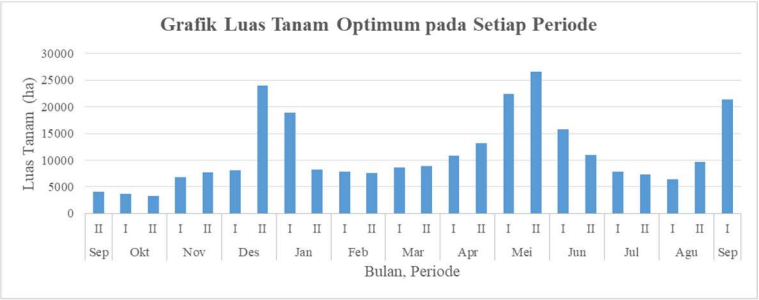
terairi dari masing-masing periode. Hasil perhitungan dapat dilihat pada **Tabel 5.6**, sedangkan untuk grafik volume kumulatif *inflow* dan *outflow* dapat dilihat pada **Gambar 5.5**. Grafik untuk luas tanam optimum pada tiap periodenya dapat dilihat pada **Gambar 5.6**.

**Tabel 5. 6** Hasil Perhitungan dengan Luas Tanam Optimum

| Waktu awal tanam | Bulan | Periode | Jumlah hari | ΔS | Inflow | | | | Outflow | | | | | Irigasi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Qt | PPt | Total Inflow | Inflow Kumulatif | EVt | Air Baku | Irigasi | Total Outflow | Outflow Kumulatif | |
| | | | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | Ha |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 15 | 16 |
| September Periode II | Sep | II | 15 | 17.070 | 1.994 | 0.280 | 19.344 | 0.000 | 0.560 | 0.052 | 18.732 | 19.344 | 0.000 | 4132 |
| | Okt | I | 15 | 17.070 | 2.602 | 0.319 | 19.991 | 19.344 | 1.357 | 0.052 | 18.582 | 19.991 | 19.344 | 3661 |
| | | II | 16 | 17.070 | 2.344 | 0.241 | 19.655 | 39.335 | 1.447 | 0.056 | 18.152 | 19.655 | 39.336 | 3352 |
| | Nov | I | 15 | 17.070 | 1.688 | 0.009 | 18.767 | 58.990 | 0.571 | 0.052 | 18.143 | 18.767 | 58.991 | 6781 |
| | | II | 15 | 17.070 | 3.303 | 0.524 | 20.897 | 77.757 | 0.571 | 0.052 | 20.274 | 20.897 | 77.758 | 7663 |
| | Des | I | 15 | 17.070 | 3.225 | 0.400 | 20.696 | 98.654 | 0.550 | 0.052 | 20.093 | 20.696 | 98.655 | 8146 |
| | | II | 16 | 17.070 | 4.525 | 0.632 | 22.228 | 119.350 | 0.587 | 0.056 | 21.585 | 22.228 | 119.351 | 24030 |
| | Jan | I | 15 | 17.070 | 1.665 | 0.158 | 18.894 | 141.578 | 0.633 | 0.052 | 18.209 | 18.894 | 141.579 | 18898 |
| | Feb | II | 16 | 17.070 | 3.172 | 0.445 | 20.687 | 160.471 | 0.675 | 0.056 | 19.957 | 20.688 | 160.473 | 8257 |
| | | I | 15 | 17.070 | 5.272 | 0.834 | 23.176 | 181.158 | 0.657 | 0.052 | 22.467 | 23.176 | 181.160 | 7889 |
| | | II | 14 | 17.070 | 5.417 | 0.850 | 23.337 | 204.335 | 0.614 | 0.049 | 22.675 | 23.337 | 204.337 | 7605 |
| | Mar | I | 15 | 17.070 | 1.397 | 0.000 | 18.467 | 227.671 | 0.589 | 0.052 | 17.826 | 18.467 | 227.674 | 8695 |
| | | II | 16 | 17.070 | 1.133 | 0.000 | 18.204 | 246.138 | 0.628 | 0.056 | 17.520 | 18.204 | 246.141 | 8928 |
| | Apr | I | 15 | 17.070 | 4.386 | 0.648 | 22.104 | 264.342 | 0.666 | 0.052 | 21.385 | 22.104 | 264.345 | 10834 |
| | | II | 15 | 17.070 | 1.690 | 0.025 | 18.785 | 286.446 | 0.666 | 0.052 | 18.067 | 18.786 | 286.449 | 13250 |
| | Mei | I | 15 | 17.070 | 3.351 | 0.452 | 20.874 | 305.231 | 0.905 | 0.052 | 19.917 | 20.874 | 305.234 | 22378 |
| | | II | 16 | 17.070 | 3.119 | 0.282 | 20.472 | 326.105 | 0.965 | 0.056 | 19.451 | 20.472 | 326.108 | 26542 |
| | Jun | I | 15 | 17.070 | 1.419 | 0.029 | 18.519 | 346.577 | 0.665 | 0.052 | 17.802 | 18.519 | 346.581 | 15765 |
| | | II | 15 | 17.070 | 1.669 | 0.183 | 18.922 | 365.096 | 0.665 | 0.052 | 18.205 | 18.923 | 365.100 | 10945 |
| | Jul | I | 15 | 17.070 | 0.877 | 0.056 | 18.004 | 384.018 | 0.620 | 0.052 | 17.332 | 18.004 | 384.022 | 7859 |
| | | II | 16 | 17.070 | 1.053 | 0.055 | 18.178 | 402.022 | 0.661 | 0.056 | 17.461 | 18.178 | 402.027 | 7276 |
| | Agu | I | 15 | 17.070 | 0.499 | 0.023 | 17.592 | 420.200 | 0.741 | 0.052 | 16.799 | 17.592 | 420.205 | 6384 |
| | | II | 16 | 17.070 | 1.302 | 0.036 | 18.407 | 437.792 | 0.790 | 0.056 | 17.290 | 18.136 | 437.797 | 9674 |
| | Sep | I | 15 | 17.070 | 1.867 | 0.054 | 18.991 | 456.199 | 0.560 | 0.052 | 18.378 | 18.991 | 455.933 | 21437 |




**Gambar 5. 5** Grafik Volume Kumulatif *Inflow* dan *Outflow* dengan Luas Tanam Optimum




**Gambar 5. 6** Grafik Luas Tanam Optimum untuk Setiap Periode

Dari **Gambar 5.5**, dapat diketahui bahwa pemakaian air pada tampungan efektif waduk sudah maksimal, ditandai dengan garis grafik volume kumulatif *inflow* dan *outflow* adalah dua garis yang berimpit. Dari dua garis yang berimpit tersebut didapatkan luas tanam irigasi optimum terbesar untuk musim tanam padi 1 seluas 24.030 ha, musim tanam padi 2 seluas 22.378 ha, dan musim tanam palawija seluas 26.542 ha, sedangkan untuk luas tanam irigasi optimum terkecil untuk musim tanam padi 1 seluas 3.352 ha, musim tanam padi 2 seluas 7.605 ha, dan musim tanam palawija seluas 7.276 ha.

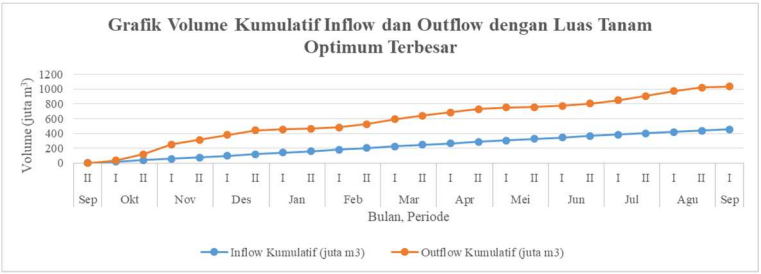
Luas tanam irigasi optimum tersebut diharapkan dapat digunakan sebagai acuan untuk memaksimalkan pemakaian air pada tampungan Waduk Pidekso.

Perhitungan pertama dilakukan dengan menggunakan luas tanam optimum terbesar untuk mengetahui apakah dengan menggunakan luas tanam optimum terbesar, tampungan efektif waduk dapat memenuhi kebutuhan air yang diperlukan. Hasil perhitungan *inflow* dan *outflow* berdasarkan luas tanam optimum terbesar dapat dilihat pada **Tabel 5.7**, sedangkan untuk grafik volume kumulatif *inflow* dan *outflow* dapat dilihat pada **Gambar 5.7** dan untuk grafik volume *inflow* dan *outflow* dapat dilihat pada **Gambar 5.8**.

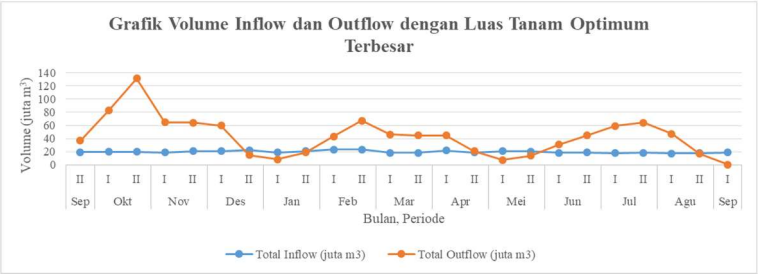
Berdasarkan **Gambar 5.7**, dapat diketahui bahwa dengan menggunakan luas tanam optimum terbesar, volume kumulatif *outflow* yang dikeluarkan lebih besar dibandingkan volume kumulatif *inflow*, serta kondisi tampungan yang kurang dari tampungan mati (*dead storage*).

**Tabel 5. 7** Hasil Perhitungan *Inflow* dan *Outflow* dengan Luas Tanam Optimum Terbesar

| Waktu awal tanam | Bulan | Periode | Jumlah hari | ΔS | Inflow | | | | Outflow | | | | | Sisa Tampungan | Kondisi Tampungan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Qt | PPt | Total Inflow | Inflow Kumulatif (juta $m^3$) | EVt | Air Baku | Irigasi | Total Outflow | Outflow Kumulatif | (8) - (14) | |
| | | | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | $K_d \leq ST_t \leq K$ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 15 | 16 | 17 |
| | Sep | II | 15 | 17.070 | 1.994 | 0.280 | 19.344 | 0.000 | 0.560 | 0.052 | 36.315 | 36.928 | 0.000 | -17.584 | NOT OK |
| | Okt | I | 15 | 17.070 | 2.602 | 0.319 | 19.991 | 19.344 | 1.357 | 0.052 | 81.326 | 82.734 | 36.928 | -62.743 | NOT OK |
| | | II | 16 | 17.070 | 2.344 | 0.241 | 19.655 | 39.335 | 1.447 | 0.056 | 130.121 | 131.624 | 119.662 | -111.969 | NOT OK |
| | Nov | I | 15 | 17.070 | 1.688 | 0.009 | 18.767 | 58.990 | 0.571 | 0.052 | 64.298 | 64.922 | 251.286 | -46.155 | NOT OK |
| | | II | 15 | 17.070 | 3.303 | 0.524 | 20.897 | 77.757 | 0.571 | 0.052 | 63.574 | 64.197 | 316.208 | -43.300 | NOT OK |
| | Des | I | 15 | 17.070 | 3.225 | 0.400 | 20.696 | 98.654 | 0.550 | 0.052 | 59.271 | 59.874 | 380.405 | -39.178 | NOT OK |
| | | II | 16 | 17.070 | 4.525 | 0.632 | 22.228 | 119.350 | 0.587 | 0.056 | 14.390 | 15.033 | 440.279 | 7.195 | NOT OK |
| | Jan | I | 15 | 17.070 | 1.665 | 0.158 | 18.894 | 141.578 | 0.633 | 0.052 | 7.718 | 8.403 | 455.312 | 10.491 | OK |
| | | II | 16 | 17.070 | 3.172 | 0.445 | 20.687 | 160.471 | 0.675 | 0.056 | 18.028 | 18.759 | 463.715 | 1.928 | NOT OK |
| | Feb | I | 15 | 17.070 | 5.272 | 0.834 | 23.176 | 181.158 | 0.657 | 0.052 | 42.489 | 43.199 | 482.474 | -20.023 | NOT OK |
| | | II | 14 | 17.070 | 5.417 | 0.850 | 23.337 | 204.335 | 0.614 | 0.049 | 66.722 | 67.384 | 525.673 | -44.047 | NOT OK |
| September Periode II | Mar | I | 15 | 17.070 | 1.397 | 0.000 | 18.467 | 227.671 | 0.589 | 0.052 | 45.882 | 46.523 | 593.057 | -28.056 | NOT OK |
| | | II | 16 | 17.070 | 1.133 | 0.000 | 18.204 | 246.138 | 0.628 | 0.056 | 43.916 | 44.599 | 639.579 | -26.396 | NOT OK |
| | Apr | I | 15 | 17.070 | 4.386 | 0.648 | 22.104 | 264.342 | 0.666 | 0.052 | 44.173 | 44.891 | 684.179 | -22.788 | NOT OK |
| | | II | 15 | 17.070 | 1.690 | 0.025 | 18.785 | 286.446 | 0.666 | 0.052 | 20.343 | 21.062 | 729.070 | -2.276 | NOT OK |
| | Mei | I | 15 | 17.070 | 3.351 | 0.452 | 20.874 | 305.231 | 0.905 | 0.052 | 6.639 | 7.596 | 750.132 | 13.278 | OK |
| | | II | 16 | 17.070 | 3.119 | 0.282 | 20.472 | 326.105 | 0.965 | 0.056 | 12.968 | 13.988 | 757.728 | 6.484 | NOT OK |
| | Jun | I | 15 | 17.070 | 1.419 | 0.029 | 18.519 | 346.577 | 0.665 | 0.052 | 29.971 | 30.688 | 771.716 | -12.169 | NOT OK |
| | | II | 15 | 17.070 | 1.669 | 0.183 | 18.922 | 365.096 | 0.665 | 0.052 | 44.147 | 44.864 | 802.405 | -25.942 | NOT OK |
| | Jul | I | 15 | 17.070 | 0.877 | 0.056 | 18.004 | 384.018 | 0.620 | 0.052 | 58.536 | 59.209 | 847.269 | -41.205 | NOT OK |
| | | II | 16 | 17.070 | 1.053 | 0.055 | 18.178 | 402.022 | 0.661 | 0.056 | 63.696 | 64.413 | 906.478 | -46.235 | NOT OK |
| | Agu | I | 15 | 17.070 | 0.499 | 0.023 | 17.592 | 420.200 | 0.741 | 0.052 | 46.566 | 47.359 | 970.891 | -29.767 | NOT OK |
| | | II | 16 | 17.070 | 1.302 | 0.036 | 18.407 | 437.792 | 0.790 | 0.056 | 15.813 | 16.659 | 1018.250 | 1.748 | NOT OK |
| | Sep | I | 15 | 17.070 | 1.867 | 0.054 | 18.991 | 456.199 | 0.560 | 0.052 | 0.000 | 0.613 | 1034.909 | 18.378 | OK |




**Gambar 5. 7** Grafik Volume Kumulatif *Inflow* dan *Outflow* dengan Luas Tanam Optimum Terbesar




**Gambar 5. 8** Grafik Volume *Inflow* dan *Outflow* dengan Luas Tanam Optimum Terbesar

Dalam kondisi tersebut menunjukan bahwa penggunaan luas tanam optimum terbesar tidak dapat diterapkan untuk luasan irigasi yang ditargetkan, karena pada periode-periode tertentu luasan tersebut tidak bisa terairi.

Perhitungan kedua dilakukan dengan menggunakan luas tanam optimum terkecil untuk mengetahui apakah dengan menggunakan luas tanam optimum terkecil, tampungan efektif waduk dapat memenuhi kebutuhan air yang diperlukan. Hasil perhitungan *inflow* dan *outflow* berdasarkan luas tanam optimum terkecil dapat dilihat pada **Tabel 5.8**, sedangkan untuk grafik volume kumulatif *inflow* dan *outflow* dapat dilihat pada **Gambar 5.9** dan untuk grafik volume *inflow* dan *outflow* dapat dilihat pada **Gambar 5.10** .

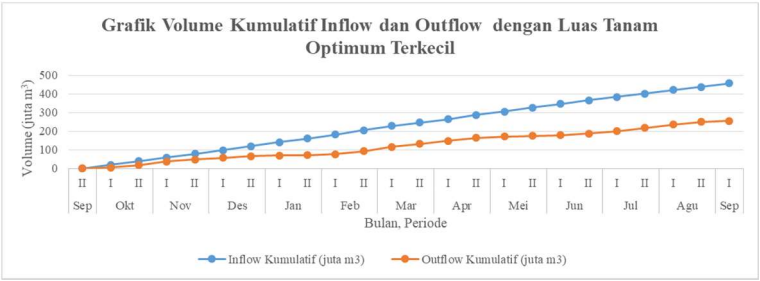
Dari **Gambar 5.9**, dapat diketahui bahwa volume kumulatif *inflow* lebih besar dibandingkan volume kumulatif *outflow*, serta kondisi tampungan waduk yang lebih atau sama dengan tampungan mati (*dead storage*). Maka dari itu, penggunaan luas tanam optimum terkecil dapat diterapkan pada kondisi tampungan Waduk Pidekso dan dapat digunakan sebagai acuan untuk diterapkan pada penggunaan air pada pola tanam yang dimaksud. Namun demikian, masih ada kelebihan air yang belum dimanfaatkan pada 21 periode. kelebihan air yang belum

dimanfaatkan ini akan dimanfaatkan dengan optimasi PLTMH di perhitungan ketiga.

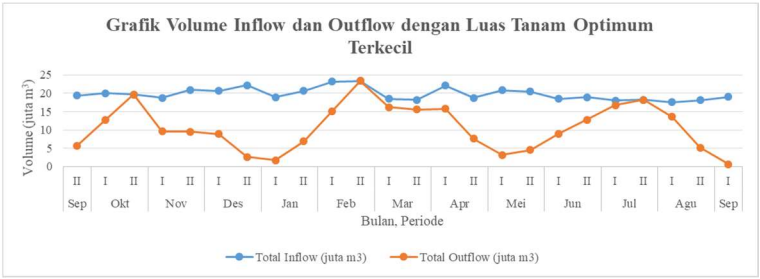
**Tabel 5. 8** Hasil Perhitungan *Inflow* dan *Outflow* dengan Luas Tanam Optimum Terkecil

| Waktu awal tanam | Bulan | Periode | Jumlah hari | ΔS | Inflow | | | | Outflow | | | | | Sisa Tampung | Kondisi Tampungan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Qt | PPt | Total Inflow | Inflow Kumulatif | EVt | Air Baku | Irigasi | Total Outflow | Outflow Kumulatif | (8) - (14) | |
| | | | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | $K_d \leq ST_t \leq K$ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 15 | 16 | 17 |
| | Sep | II | 15 | 17.070 | 1.994 | 0.280 | 19.344 | 0.000 | 0.560 | 0.052 | 5.066 | 5.679 | 0.000 | 13.665 | OK |
| | Okt | I | 15 | 17.070 | 2.602 | 0.319 | 19.991 | 19.344 | 1.357 | 0.052 | 11.345 | 12.754 | 5.679 | 7.237 | OK |
| | | II | 16 | 17.070 | 2.344 | 0.241 | 19.655 | 39.335 | 1.447 | 0.056 | 18.152 | 19.655 | 18.433 | 0.000 | OK |
| | Nov | I | 15 | 17.070 | 1.688 | 0.009 | 18.767 | 58.990 | 0.571 | 0.052 | 8.970 | 9.594 | 38.088 | 9.173 | OK |
| | | II | 15 | 17.070 | 3.303 | 0.524 | 20.897 | 77.757 | 0.571 | 0.052 | 8.869 | 9.492 | 47.682 | 11.405 | OK |
| | Des | I | 15 | 17.070 | 3.225 | 0.400 | 20.696 | 98.654 | 0.550 | 0.052 | 8.269 | 8.871 | 57.174 | 11.825 | OK |
| | | II | 16 | 17.070 | 4.525 | 0.632 | 22.228 | 119.350 | 0.587 | 0.056 | 2.007 | 2.650 | 66.046 | 19.577 | OK |
| | Jan | I | 15 | 17.070 | 1.665 | 0.158 | 18.894 | 141.578 | 0.633 | 0.052 | 1.077 | 1.762 | 68.696 | 17.132 | OK |
| | | II | 16 | 17.070 | 3.172 | 0.445 | 20.687 | 160.471 | 0.675 | 0.056 | 6.127 | 6.858 | 70.458 | 13.830 | OK |
| | Feb | I | 15 | 17.070 | 5.272 | 0.834 | 23.176 | 181.158 | 0.657 | 0.052 | 14.440 | 15.149 | 77.315 | 8.027 | OK |
| September Periode II | | II | 14 | 17.070 | 5.417 | 0.850 | 23.337 | 204.335 | 0.614 | 0.049 | 22.675 | 23.337 | 92.464 | 0.000 | OK |
| | Mar | I | 15 | 17.070 | 1.397 | 0.000 | 18.467 | 227.671 | 0.589 | 0.052 | 15.592 | 16.233 | 115.801 | 2.234 | OK |
| | | II | 16 | 17.070 | 1.133 | 0.000 | 18.204 | 246.138 | 0.628 | 0.056 | 14.924 | 15.608 | 132.035 | 2.596 | OK |
| | Apr | I | 15 | 17.070 | 4.386 | 0.648 | 22.104 | 264.342 | 0.666 | 0.052 | 15.012 | 15.730 | 147.643 | 6.373 | OK |
| | | II | 15 | 17.070 | 1.690 | 0.025 | 18.785 | 286.446 | 0.666 | 0.052 | 6.913 | 7.632 | 163.373 | 11.153 | OK |
| | Mei | I | 15 | 17.070 | 3.351 | 0.452 | 20.874 | 305.231 | 0.905 | 0.052 | 2.256 | 3.213 | 171.005 | 17.661 | OK |
| | | II | 16 | 17.070 | 3.119 | 0.282 | 20.472 | 326.105 | 0.965 | 0.056 | 3.555 | 4.576 | 174.218 | 15.896 | OK |
| | Jun | I | 15 | 17.070 | 1.419 | 0.029 | 18.519 | 346.577 | 0.665 | 0.052 | 8.216 | 8.933 | 178.794 | 9.586 | OK |
| | | II | 15 | 17.070 | 1.669 | 0.183 | 18.922 | 365.096 | 0.665 | 0.052 | 12.102 | 12.820 | 187.727 | 6.103 | OK |
| | Jul | I | 15 | 17.070 | 0.877 | 0.056 | 18.004 | 384.018 | 0.620 | 0.052 | 16.046 | 16.719 | 200.547 | 1.285 | OK |
| | | II | 16 | 17.070 | 1.053 | 0.055 | 18.178 | 402.022 | 0.661 | 0.056 | 17.461 | 18.178 | 217.266 | 0.000 | OK |
| | Agu | I | 15 | 17.070 | 0.499 | 0.023 | 17.592 | 420.200 | 0.741 | 0.052 | 12.765 | 13.558 | 235.444 | 4.034 | OK |
| | | II | 16 | 17.070 | 1.302 | 0.036 | 18.407 | 437.792 | 0.790 | 0.056 | 4.335 | 5.181 | 249.002 | 13.226 | OK |
| | Sep | I | 15 | 17.070 | 1.867 | 0.054 | 18.991 | 456.199 | 0.560 | 0.052 | 0.000 | 0.613 | 254.183 | 18.378 | OK |

Dari pembahasan sebelumnya dapat disimpulkan bahwa penggunaan air pada tampungan Waduk Pidekso dapat ditingkatkan lagi dengan cara menambah luas tanam irigasi untuk satu tahun masa tanam, dimana sebelumnya luas tanam pada lokasi studi sebesar 1500 ha menjadi untuk musim tanam padi 1 seluas 3.352 ha, musim tanam padi 2 seluas 7.605 ha, dan musim tanam palawija seluas 7.276 ha. Maka, penambahan luas tanam irigasi untuk masa tanam padi 1 sebesar 1.852 ha, masa tanam padi 2 sebesar 6.105 ha, dan masa tanam palawija sebesar 5.776 ha. Penambahan luas tanam irigasi diharapkan dapat digunakan sebagai acuan dalam pemakaian air Waduk Pidekso untuk masa tanam satu tahun ke depan.




**Gambar 5. 9** Grafik Volume Kumulatif *Inflow* dan *Outflow* dengan Luas Tanam Optimum Terkecil




**Gambar 5. 10** Grafik Volume *Inflow* dan *Outflow* dengan Luas Tanam Optimum Terkecil

Perhitungan ketiga adalah untuk memaksimalkan penggunaan air pada tampungan waduk yang tersisa pada perhitungan kedua adalah meningkatkan penggunaan PLTMH Suplai air untuk PLTMH didapatkan dari *release* air baku, irigasi, serta sisa air pada tampungan waduk yang belum terpakai pada langkah perhitungan kedua. Dari total supplai air dicari debit andalan 95% untuk menjalankan PLTMH. Debit andalan 95% yang dihasilkan adalah 6,911 $m^3$/detik. Pada operasional PLTMH, pada saat debit lebih, PLTMH tetap beroperasi tetapi air yang masuk ke intake irigasi adalah kebutuhan air yang diperlukan. Hasil perhitungan dengan maksimalkan penggunaan air pada

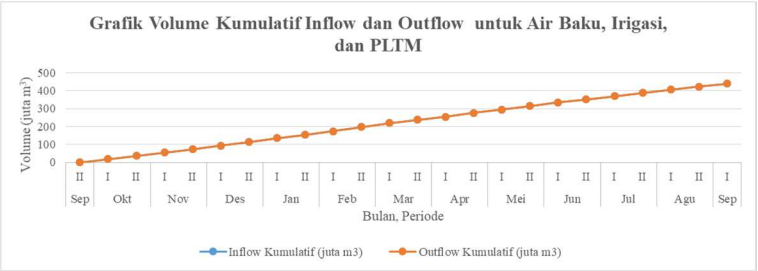
tampungan waduk untuk PLTMH dapat dilihat pada **Tabel 5.9**, sedangkan grafik volume kumulatif *inflow* dan *outflow* dapat dilihat pada **Gambar 5.11** dan untuk grafik volume *inflow* dan *outflow* dapat dilihat pada **Gambar 5.12**.

**Tabel 5. 9** Hasil Perhitungan Daya untuk PLTMH

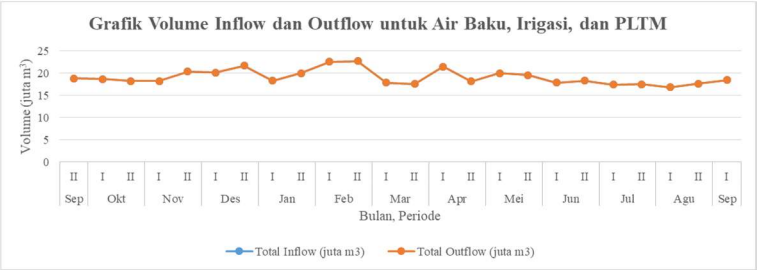
| Bulan | Periode | Jumlah hari | Release | | Sisa Tampungan | Total Suplai PLTMH | PLTMH 1 | | | | | Total suplai - PLTMH 1 | PLTMH 2 | | | | | Inflow Kumulatif PLTMH | Outflow Kumulatif PLTMH | Total Inflow PLTMH | Total Outflow PLTMH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Air Baku | Irigasi | | | $m^3$/dtk | juta $m^3$ | Demand | Release | P | | $m^3$/dtk | juta $m^3$ | Demand | Release | P | | | | |
| | | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | | juta $m^3$ | juta $m^3$ | kW | juta $m^3$ | | | juta $m^3$ | juta $m^3$ | kW | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Sep | II | 15 | 0.052 | 5.066 | 13.665 | 18.784 | 14.494 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 9.827 | 6.911 | 8.957 | 8.957 | 9.827 | 710.59 | 0.000 | 0.000 | 18.784 | 18.784 |
| Okt | I | 15 | 0.052 | 11.345 | 7.237 | 18.634 | 14.378 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 9.678 | 6.911 | 8.957 | 8.957 | 9.678 | 699.79 | 18.784 | 18.784 | 18.634 | 18.634 |
| | II | 16 | 0.056 | 18.152 | 0.000 | 18.208 | 13.171 | 6.911 | 9.554 | 9.554 | 9.554 | 828.988 | 8.654 | 6.911 | 9.554 | 9.554 | 8.654 | 586.67 | 37.418 | 37.418 | 18.208 | 18.208 |
| Nov | I | 15 | 0.052 | 8.970 | 9.173 | 18.195 | 14.040 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 9.239 | 6.911 | 8.957 | 8.957 | 9.239 | 668.05 | 55.626 | 55.626 | 18.195 | 18.195 |
| | II | 15 | 0.052 | 8.869 | 11.405 | 20.326 | 15.683 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 11.369 | 6.911 | 8.957 | 8.957 | 11.369 | 822.09 | 73.822 | 73.822 | 20.326 | 20.326 |
| Des | I | 15 | 0.052 | 8.269 | 11.825 | 20.145 | 15.544 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 11.189 | 6.911 | 8.957 | 8.957 | 11.189 | 809.05 | 94.147 | 94.147 | 20.145 | 20.145 |
| | II | 16 | 0.056 | 2.007 | 19.577 | 21.640 | 15.654 | 6.911 | 9.554 | 9.554 | 9.554 | 828.988 | 12.087 | 6.911 | 9.554 | 9.554 | 12.087 | 819.36 | 114.293 | 114.293 | 21.640 | 21.640 |
| Jan | I | 15 | 0.052 | 1.077 | 17.132 | 18.261 | 14.090 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 9.304 | 6.911 | 8.957 | 8.957 | 9.304 | 672.76 | 135.933 | 135.933 | 18.261 | 18.261 |
| | II | 16 | 0.056 | 6.127 | 13.830 | 20.012 | 14.476 | 6.911 | 9.554 | 9.554 | 9.554 | 828.988 | 10.458 | 6.911 | 9.554 | 9.554 | 10.458 | 708.98 | 154.194 | 154.194 | 20.012 | 20.012 |
| Feb | I | 15 | 0.052 | 14.440 | 8.027 | 22.519 | 17.376 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 13.562 | 6.911 | 8.957 | 8.957 | 13.562 | 980.68 | 174.206 | 174.206 | 22.519 | 22.519 |
| | II | 14 | 0.049 | 22.675 | 0.000 | 22.723 | 18.786 | 6.911 | 8.360 | 8.360 | 8.360 | 828.988 | 14.364 | 6.911 | 8.360 | 8.360 | 14.364 | 1112.81 | 196.725 | 196.725 | 22.723 | 22.723 |
| Mar | I | 15 | 0.052 | 15.592 | 2.234 | 17.878 | 13.795 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 8.922 | 6.911 | 8.957 | 8.957 | 8.922 | 645.12 | 219.448 | 219.448 | 17.878 | 17.878 |
| | II | 16 | 0.056 | 14.924 | 2.596 | 17.576 | 12.714 | 6.911 | 9.554 | 9.554 | 9.554 | 828.988 | 8.022 | 6.911 | 9.554 | 9.554 | 8.022 | 543.81 | 237.327 | 237.327 | 17.576 | 17.576 |
| Apr | I | 15 | 0.052 | 15.012 | 6.373 | 21.437 | 16.541 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 12.481 | 6.911 | 8.957 | 8.957 | 12.481 | 902.46 | 254.903 | 254.903 | 21.437 | 21.437 |
| | II | 15 | 0.052 | 6.913 | 11.153 | 18.119 | 13.981 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 9.162 | 6.911 | 8.957 | 8.957 | 9.162 | 662.53 | 276.340 | 276.340 | 18.119 | 18.119 |
| Mei | I | 15 | 0.052 | 2.256 | 17.661 | 19.969 | 15.408 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 11.012 | 6.911 | 8.957 | 8.957 | 11.012 | 796.30 | 294.459 | 294.459 | 19.969 | 19.969 |
| | II | 16 | 0.056 | 3.555 | 15.896 | 19.507 | 14.111 | 6.911 | 9.554 | 9.554 | 9.554 | 828.988 | 9.953 | 6.911 | 9.554 | 9.554 | 9.953 | 674.72 | 314.428 | 314.428 | 19.507 | 19.507 |
| Jun | I | 15 | 0.052 | 8.216 | 9.586 | 17.854 | 13.776 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 8.897 | 6.911 | 8.957 | 8.957 | 8.897 | 643.33 | 333.935 | 333.935 | 17.854 | 17.854 |
| | II | 15 | 0.052 | 12.102 | 6.103 | 18.257 | 14.087 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 9.300 | 6.911 | 8.957 | 8.957 | 9.300 | 672.50 | 351.789 | 351.789 | 18.257 | 18.257 |
| Jul | I | 15 | 0.052 | 16.046 | 1.285 | 17.384 | 13.414 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 8.427 | 6.911 | 8.957 | 8.957 | 8.427 | 609.38 | 370.046 | 370.046 | 17.384 | 17.384 |
| | II | 16 | 0.056 | 17.461 | 0.000 | 17.516 | 12.671 | 6.911 | 9.554 | 9.554 | 9.554 | 828.988 | 7.963 | 6.911 | 9.554 | 9.554 | 7.963 | 539.78 | 387.430 | 387.430 | 17.516 | 17.516 |
| Agu | I | 15 | 0.052 | 12.765 | 4.034 | 16.851 | 13.003 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 7.895 | 6.911 | 8.957 | 8.957 | 7.895 | 570.85 | 404.946 | 404.946 | 16.851 | 16.851 |
| | II | 16 | 0.056 | 4.335 | 13.226 | 17.617 | 12.744 | 6.911 | 9.554 | 9.554 | 9.554 | 828.988 | 8.063 | 6.911 | 9.554 | 9.554 | 8.063 | 546.58 | 421.797 | 421.797 | 17.617 | 17.617 |
| Sep | I | 15 | 0.052 | 0.000 | 18.378 | 18.430 | 14.221 | 6.911 | 8.957 | 8.957 | 8.957 | 828.988 | 9.474 | 6.911 | 8.957 | 8.957 | 9.474 | 685.03 | 439.414 | 439.414 | 18.430 | 18.430 |

Berdasarkan **Tabel 5.9**, diketahui bahwa daya yang dihasilkan oleh PLTMH 1 dan PLTMH 2 memiliki rata-rata pembangkit lebih besar dari 100 kW. Dengan nilai pembangkit dari optimasi ini pembangkit listrik yang dihasilkan tidak termasuk Mikro Hidro tetapi dapat dikategorikan sebagai Pembangkit Listrik Tenaga Mini Hidro (PLTM), dengan daya yang dihasilkan berkisar 100 kW – 5.000 kW (Morena, 2017).

Dari **Gambar 5.11** dan **Gambar 5.12**, dapat diketahui bahwa pemakaian air pada tampungan efektif waduk sudah habis terpakai untuk penggunaan air baku, irigasi dan PLTM, hal tersebut ditandai dengan garis grafik volume kumulatif *inflow* dan *outflow* dan grafik total volume *inflow* dan *outflow* adalah dua garis yang berimpit.




**Gambar 5. 11** Grafik Volume Kumulatif Inflow dan Outflow untuk Air Baku, Irigasi dan PLTM




**Gambar 5. 12** Grafik Volume Inflow dan Outflow untuk Air Baku, Irigasi, dan PLTM

Berdasarkan pembahasan diatas, dapat disimpulkan bahwa solusi untuk optimalisasi pemakaian air yang tersedia dalam tampungan efektif waduk dapat dilakukan dengan cara menambah luas tanam irigasi dengan luas tanam optimum terkecil serta meningkatkan penggunaan PLTM, sehingga pemakaian air pada tampungan Waduk Pidekso dapat digunakan secara maksimal. Hasil perhitungan tersebut diharapkan dapat diterapkan dan dapat digunakan sebagai acuan untuk penggunaan air pada tampungan efektif Waduk Pidekso untuk masa satu tahun ke depan.

“Halaman ini sengaja dikosongakan”

# BAB VI
# KESIMPULAN DAN SARAN

## 6.1 Kesimpulan

Berdasarkan hasil perhitungan, maka dapat diambil kesimpulan mengenai teknik optimasi dengan metode Richard Bellman pada Waduk Pidekso untuk kebutuhan air baku, irigasi, dan PLTMH, sebagai berikut :

1. Perhitungan ketersedian debit air untuk tahun 2020, didapatkan nilai debit terbesar yang tersedia adalah 4,478 $m^3$/dtk dan debit terkecil adalah 0,385 $m^3$/dtk.
2. Perhitungan kebutuhan air baku untuk tahun 2020, didapatkan nilai besar kebutuhan air baku pada kondisi harian sebesar 0,023 $m^3$/dtk, pada kondisi harian maksimum sebesar 0,026 $m^3$/dtk, pada kondisi jam puncak sebesar 0,040 $m^3$/dtk.
3. Perhitungan kebutuhan air irigasi untuk masa tanam tahun 2020 didapatkan nilai debit terbesar adalah 6,169 $m^3$/dtk dan nilai debit yang terkecil adalah 0 $m^3$/dtk.
4. Perhitungan kebutuhan PLTMH dengan menggunakan debit andalan 95% sebesar 1,152 $m^3$/dtk didapatkan daya listrik untuk PLTMH 1 sebesar 58,707 kW dan energi listrik sebesar 5.144.273,9 kWh. Sedangkan daya listrik untuk PLTMH 2 sebesar 48,865 kW dan energi listrik sebesar 401.776.5 kWh.
5. Simulasi teknik optimasi yang disusun dengan metode Richard Bellman terdiri dari 24 model simulasi dengan waktu awal tanam yang berbeda-beda berdasarkan bulan dan periode, dengan kendala (*constraint*) ketersediaan air dan kapasitas tampungan waduk.
6. Waktu awal tanam yang paling optimum untuk setiap kebutuhan adalah bulan September Periode II dengan solusi optimasi, penambahan luas tanam irigasi untuk untuk masa tanam padi 1 sebesar 1.852 ha, masa tanam padi 2 sebesar

6.105 ha, dan masa tanam palawija sebesar 5.776 ha, serta peningkatan penggunaan PLTM dengan debit andalan 95% sebesar 6,911$m^3$/dtk.

## 6.2 Saran

Agar lebih baik dan lebih bisa diaplikasikan di lapangan penulis berikan saran dalam Tugas Akhir Terapan ini, antara lain sebagai berikut :

1. Apabila hasil optimasi pada Tugas Akhir Terapan ini akan diterapkan pada lokasi studi, perlu dilakukan dengan *updating data* dengan data yang terbaru.
2. Pengembangan model yang bisa dijalankan (*running model*) secara keseluruhan dari analisis hidrologi sampai dengan rencana operasi waduk menjadi semacam *soffware* satu kesatuan.
3. Simulasi teknik optimasi dengan metode Richard Bellman dapat dilakukan dengan menggunakan pola tanam yang berbeda-beda.
4. Simulasi teknik optimasi dengan metode Richard Bellman dapat menggunakan bantuan bahasa pemograman lain untuk mempermudah perhitungan.

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# LAMPIRAN A

**Tabel A 1** Data Curah Hujan Harian Tahun 2001 – 2019
*(Sumber :Dinas PU Sumber Daya Air dan Penataan Ruang, 2019)*

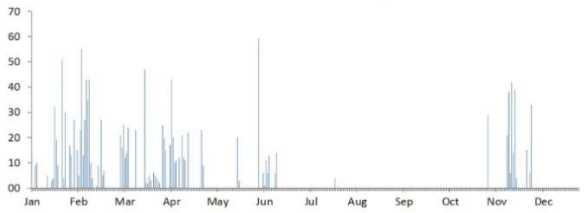
**DATA CURAH HUJAN HARIAN**

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2001** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 5,0 | 21,0 | 0,0 | 0,0 | 59,0 | 0,0 | 0,0 | ttd | ttd | 29,0 | ttd |
| 2 | 0,0 | 23,0 | 16,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 3 | 9,0 | 55,0 | 25,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 4 | 10,0 | 13,0 | 12,0 | 43,0 | 0,0 | 6,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 5 | 0,0 | 27,0 | 14,0 | 20,0 | 0,0 | 1,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 6 | 0,0 | 43,0 | 24,0 | 10,0 | 0,0 | 11,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 7 | 0,0 | 35,0 | 0,0 | 11,0 | 0,0 | 6,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 8 | 0,0 | 43,0 | 0,0 | 0,0 | 0,0 | 13,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 9 | 0,0 | 10,0 | 0,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 10 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 11 | 5,0 | 0,0 | 23,0 | 21,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 12 | 0,0 | 0,0 | 0,0 | 12,0 | 0,0 | 6,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 13 | 0,0 | 1,0 | 0,0 | 11,0 | 0,0 | 14,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 14 | 3,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 21,0 | - |
| 15 | 4,0 | 0,0 | 0,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 38,0 | - |
| 16 | 32,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 6,0 | - |
| 17 | 19,0 | 5,0 | 47,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 42,0 | - |
| 18 | 9,0 | 7,0 | 2,0 | 0,0 | 20,0 | 0,0 | 0,0 | 0,0 | - | - | 14,0 | - |
| 19 | 0,0 | 0,0 | 2,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | - | - | 39,0 | - |
| 20 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 4,0 | - |
| 21 | 51,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 22 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 | 0,0 | - | - | 0,0 | - |
| 23 | 30,0 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 24 | 0,0 | 0,0 | 5,0 | 23,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 25 | 0,0 | 0,0 | 4,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 26 | 17,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 27 | 13,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 15,0 | - |
| 28 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 0,0 | - |
| 29 | 27,0 | | 25,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 6,0 | - |
| 30 | 0,0 | | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | 33,0 | - |
| 31 | 15,0 | | 15,0 | | 0,0 | | 0,0 | 0,0 | | - | | - |
| Hujan Maks | 51,0 | 55,0 | 47,0 | 43,0 | 20,0 | 59,0 | 4,0 | 0,0 | - | - | 42,0 | - |
| Jml Curah Hujan | 248,0 | 307,0 | 274,0 | 211,0 | 23,0 | 116,0 | 4,0 | 0,0 | - | - | 247,0 | - |
| Jml Hari Hujan | 15 | 15 | 20 | 12 | 2 | 8 | 1 | 0 | - | - | 11 | - |
| Jml data (1-15) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | - | - | 15 | - |
| Jml Hujan (1-15) | 31,0 | 268,0 | 135,0 | 179,0 | 0,0 | 116,0 | 0,0 | 0,0 | - | - | 88,0 | - |
| Jml Data (16-31) | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | - | - | 15 | - |
| Jml Hujan (16-31) | 217,0 | 39,0 | 139,0 | 32,0 | 23,0 | 0,0 | 4,0 | 0,0 | - | - | 159,0 | - |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | - | - | - | 115 |

**GRAFIK HUJAN (mm)**



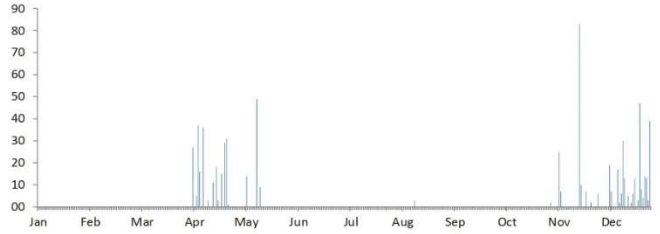
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2002** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | ttd | ttd | ttd | 0,0 | 0,0 | ttd | ttd | 0,0 | ttd | ttd | 0,0 | 0,0 |
| 2 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **2,0** | 0,0 |
| 3 | 0,0 | 0,0 | 0,0 | **27,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 4 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 5 | 0,0 | 0,0 | 0,0 | **5,0** | **14,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 6 | 0,0 | 0,0 | 0,0 | **37,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 7 | 0,0 | 0,0 | 0,0 | **16,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **25,0** | **19,0** |
| 8 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **7,0** | **7,0** |
| 9 | 0,0 | 0,0 | 0,0 | **36,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 10 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 11 | 0,0 | 0,0 | 0,0 | 0,0 | **49,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 12 | 0,0 | 0,0 | 0,0 | **3,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **17,0** |
| 13 | 0,0 | 0,0 | 0,0 | 0,0 | **9,0** | 0,0 | 0,0 | **3,0** | 0,0 | 0,0 | 0,0 | **2,0** |
| 14 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **6,0** |
| 15 | 0,0 | 0,0 | 0,0 | **11,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **30,0** |
| 16 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **13,0** |
| 17 | 0,0 | 0,0 | 0,0 | **18,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 18 | 0,0 | 0,0 | 0,0 | **3,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **5,0** |
| 19 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **83,0** | 0,0 |
| 20 | 0,0 | 0,0 | 0,0 | **15,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **10,0** | **2,0** |
| 21 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **6,0** |
| 22 | 0,0 | 0,0 | 0,0 | **29,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **13,0** |
| 23 | 0,0 | 0,0 | 0,0 | **31,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **7,0** | 0,0 |
| 24 | 0,0 | 0,0 | 0,0 | **1,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **3,0** |
| 25 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **47,0** |
| 26 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **2,0** | **8,0** |
| 27 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **4,0** |
| 28 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **14,0** |
| 29 | 0,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **13,0** |
| 30 | 0,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **6,0** | **3,0** |
| 31 | 0,0 | | 0,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | **39,0** |
| **Hujan Maks** | - | - | - | **37,0** | **49,0** | - | - | **3,0** | - | - | **83,0** | **47,0** |
| **Jml Curah Hujan** | - | - | - | **232,0** | **72,0** | - | - | **3,0** | - | - | **142,0** | **251,0** |
| **Jml Hari Hujan** | - | - | - | **13** | **3** | - | - | **1** | - | - | **8** | **19** |
| **Jml data (1-15)** | - | - | - | **15** | **15** | - | - | **15** | - | - | **15** | **15** |
| **Jml Hujan (1-15)** | - | - | - | **135,0** | **72,0** | - | - | **3,0** | - | - | **34,0** | **81,0** |
| **Jml Data (16-31)** | - | - | - | **15** | **16** | - | - | **16** | - | - | **15** | **16** |
| **Jml Hujan (16-31)** | - | - | - | **97,0** | 0,0 | - | - | 0,0 | - | - | **108,0** | **170,0** |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | - | - | - | 115 |

## GRAFIK HUJAN (mm)



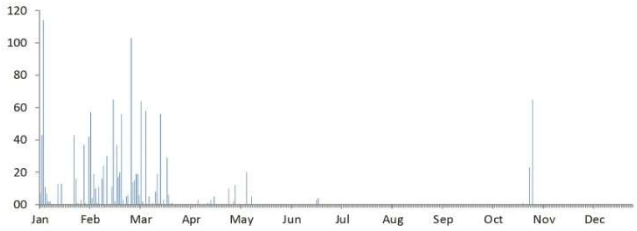
## DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2003** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 7,0 | 57,0 | 19,0 | 0,0 | 12,0 | 0,0 | ttd | ttd | ttd | 0,0 | tad | tad |
| 2 | 43,0 | 4,0 | 19,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 3 | 114,0 | 19,0 | 6,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 4 | 11,0 | 10,0 | 64,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 5 | 7,0 | 1,0 | 2,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 6 | 2,0 | 11,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 7 | 2,0 | 0,0 | 58,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 8 | 0,0 | 16,0 | 0,0 | 3,0 | 20,0 | 0,0 | - | - | - | 0,0 | - | - |
| 9 | 0,0 | 24,0 | 5,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 10 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 11 | 0,0 | 30,0 | 1,0 | 0,0 | 5,0 | 0,0 | - | - | - | 0,0 | - | - |
| 12 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 13 | 0,0 | 0,0 | 8,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 14 | 13,0 | 11,0 | 19,0 | 1,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 15 | 0,0 | 65,0 | 1,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 16 | 0,0 | 2,0 | 56,0 | 3,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 17 | 0,0 | 37,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 18 | 0,0 | 17,0 | 3,0 | 5,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 19 | 0,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 20 | 0,0 | 56,0 | 29,0 | 0,0 | 0,0 | 3,0 | - | - | - | 0,0 | - | - |
| 21 | 0,0 | 3,0 | 6,0 | 0,0 | 0,0 | 4,0 | - | - | - | 0,0 | - | - |
| 22 | 43,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 23 | 16,0 | 5,0 | 1,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 24 | 1,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 25 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 1,0 | - | - |
| 26 | 3,0 | 103,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 27 | 0,0 | 14,0 | 0,0 | 10,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 28 | 37,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 29 | 1,0 | | 0,0 | 0,0 | 0,0 | 0,0 | - | - | - | 23,0 | - | - |
| 30 | 0,0 | | 0,0 | 2,0 | 0,0 | 0,0 | - | - | - | 0,0 | - | - |
| 31 | 42,0 | | 0,0 | | 0,0 | | - | - | | 65,0 | | - |
| **Hujan Maks** | 114,0 | 103,0 | 64,0 | 10,0 | 20,0 | 4,0 | - | - | - | 65,0 | - | - |
| **Jml Curah Hujan** | 355,0 | 526,0 | 297,0 | 24,0 | 37,0 | 7,0 | - | - | - | 89,0 | - | - |
| **Jml Hari Hujan** | 16 | 22 | 16 | 6 | 3 | 2 | - | - | - | 3 | - | - |
| **Jml data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | - | - | - | 15 | - | - |
| **Jml Hujan (1-15)** | 212,0 | 248,0 | 202,0 | 4,0 | 37,0 | 0,0 | - | - | - | 0,0 | - | - |
| **Jml Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | - | - | - | 16 | - | - |
| **Jml Hujan (16-31)** | 143,0 | 278,0 | 95,0 | 20,0 | 0,0 | 7,0 | - | - | - | 89,0 | - | - |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | - | - | - | 115 |

## GRAFIK HUJAN (mm)



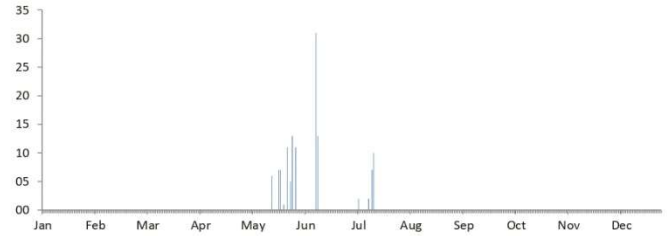
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2004** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | tad | tad | tad | tad | 0,0 | 0,0 | 0,0 | tad | tad | tad | tad | tad |
| 2 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 3 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 4 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 5 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 6 | - | - | - | - | 0,0 | 0,0 | **2,0** | - | - | - | - | - |
| 7 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 8 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 9 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 10 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 11 | - | - | - | - | 0,0 | **31,0** | 0,0 | - | - | - | - | - |
| 12 | - | - | - | - | 0,0 | **13,0** | **2,0** | - | - | - | - | - |
| 13 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 14 | - | - | - | - | 0,0 | 0,0 | **7,0** | - | - | - | - | - |
| 15 | - | - | - | - | 0,0 | 0,0 | **10,0** | - | - | - | - | - |
| 16 | - | - | - | - | **6,0** | 0,0 | 0,0 | - | - | - | - | - |
| 17 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 18 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 19 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 20 | - | - | - | - | **7,0** | 0,0 | 0,0 | - | - | - | - | - |
| 21 | - | - | - | - | **7,0** | 0,0 | 0,0 | - | - | - | - | - |
| 22 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 23 | - | - | - | - | **1,0** | 0,0 | 0,0 | - | - | - | - | - |
| 24 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 25 | - | - | - | - | **11,0** | 0,0 | 0,0 | - | - | - | - | - |
| 26 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 27 | - | - | - | - | **5,0** | 0,0 | 0,0 | - | - | - | - | - |
| 28 | - | - | - | - | **13,0** | 0,0 | 0,0 | - | - | - | - | - |
| 29 | - | - | - | - | 0,0 | 0,0 | 0,0 | - | - | - | - | - |
| 30 | - | | - | - | **11,0** | 0,0 | 0,0 | - | - | - | - | - |
| 31 | - | | - | | 0,0 | | 0,0 | - | | - | | - |
| **Hujan Maks** | - | - | - | - | **13,0** | **31,0** | **10,0** | - | - | - | - | - |
| **Jml. Curah Hujan** | - | - | - | - | **61,0** | **44,0** | **21,0** | - | - | - | - | - |
| **Jml. Hari Hujan** | - | - | - | - | **8** | **2** | **4** | - | - | - | - | - |
| **Jml. data (1-15)** | - | - | - | - | **15** | **15** | **15** | - | - | - | - | - |
| **Jml. Hujan (1-15)** | - | - | - | - | 0,0 | **44,0** | **21,0** | - | - | - | - | - |
| **Jml. Data (16-31)** | - | - | - | - | **16** | **15** | **16** | - | - | - | - | - |
| **Jml. Hujan (16-31)** | - | - | - | - | **61,0** | 0,0 | 0,0 | - | - | - | - | - |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | - | - | - | 115 |

## GRAFIK HUJAN (mm)



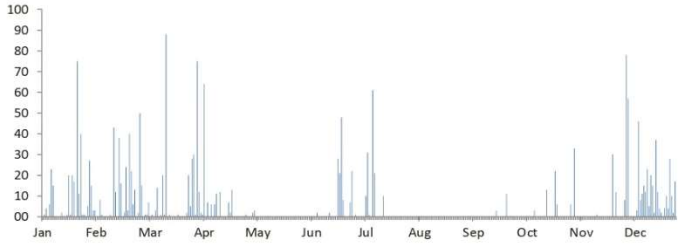
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2005** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 0,0 | 1,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 | 0,0 |
| 2 | 1,0 | 0,0 | 1,0 | 2,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 |
| 3 | 4,0 | 8,0 | 7,0 | 1,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 33,0 | 78,0 |
| 4 | 0,0 | 1,0 | 0,0 | 64,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 57,0 |
| 5 | 6,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 6 | 23,0 | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 10,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 7 | 15,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 31,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 8 | 0,0 | 0,0 | 14,0 | 6,0 | 0,0 | 2,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 9 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 10 | 0,0 | 0,0 | 1,0 | 6,0 | 0,0 | 0,0 | 61,0 | 0,0 | 0,0 | 0,0 | 0,0 | 46,0 |
| 11 | 0,0 | 43,0 | 20,0 | 11,0 | 0,0 | 0,0 | 21,0 | 0,0 | 0,0 | 3,0 | 0,0 | 8,0 |
| 12 | 2,0 | 12,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 |
| 13 | 0,0 | 0,0 | 88,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 15,0 |
| 14 | 0,0 | 38,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 15 | 1,0 | 16,0 | 1,0 | 0,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 23,0 |
| 16 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 | 0,0 | 0,0 | 0,0 | 1,0 | 5,0 |
| 17 | 1,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 20,0 |
| 18 | 20,0 | 24,0 | 0,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 13,0 | 0,0 | 15,0 |
| 19 | 17,0 | 3,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 | 0,0 | 0,0 | 2,0 |
| 20 | 0,0 | 40,0 | 1,0 | 13,0 | 0,0 | 28,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 37,0 |
| 21 | 75,0 | 22,0 | 0,0 | 0,0 | 0,0 | 21,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 22 | 11,0 | 6,0 | 0,0 | 0,0 | 0,0 | 48,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 |
| 23 | 40,0 | 13,0 | 0,0 | 0,0 | 0,0 | 8,0 | 0,0 | 0,0 | 0,0 | 22,0 | 0,0 | 2,0 |
| 24 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 | 0,0 | 0,0 |
| 25 | 1,0 | 2,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 | 0,0 | 30,0 | 4,0 |
| 26 | 0,0 | 50,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 |
| 27 | 5,0 | 15,0 | 5,0 | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 | 4,0 |
| 28 | 27,0 | 0,0 | 28,0 | 1,0 | 0,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 28,0 |
| 29 | 15,0 | | 30,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 |
| 30 | 3,0 | | 1,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 31 | 3,0 | | 75,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 17,0 |
| **Hujan Maks** | 75,0 | 50,0 | 88,0 | 64,0 | 3,0 | 48,0 | 61,0 | 0,0 | 11,0 | 22,0 | 33,0 | 78,0 |
| **Jml Curah Hujan** | 291,0 | 296,0 | 300,0 | 144,0 | 5,0 | 139,0 | 134,0 | 0,0 | 14,0 | 44,0 | 82,0 | 433,0 |
| **Jml Hari Hujan** | 21 | 17 | 19 | 13 | 2 | 9 | 6 | 0 | 2 | 4 | 5 | 25 |
| **Jml data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml Hujan (1-15)** | 52,0 | 119,0 | 138,0 | 121,0 | 5,0 | 4,0 | 124,0 | 0,0 | 0,0 | 3,0 | 39,0 | 261,0 |
| **Jml Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml Hujan (16-31)** | 239,0 | 177,0 | 162,0 | 23,0 | 0,0 | 135,0 | 10,0 | 0,0 | 14,0 | 41,0 | 43,0 | 172,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 88,0 | 1882,0 | 123 | 115 |

## GRAFIK HUJAN (mm)



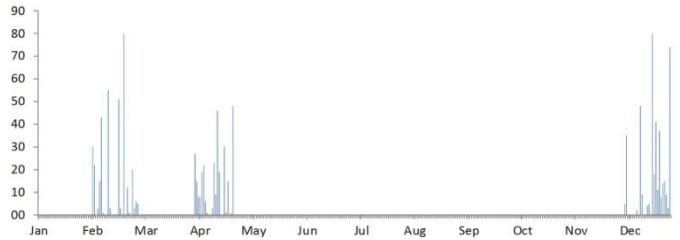
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2006** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | **30,0** | 0,0 | **27,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 0,0 | **22,0** | 0,0 | **15,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 3 | 0,0 | 0,0 | 0,0 | **8,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 4 | 0,0 | **3,0** | 0,0 | **8,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 5 | 0,0 | **15,0** | 0,0 | **19,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **5,0** |
| 6 | 0,0 | **43,0** | 0,0 | **22,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **35,0** |
| 7 | 0,0 | **1,0** | 0,0 | **6,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 8 | 0,0 | 0,0 | 0,0 | **1,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 9 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 10 | 0,0 | **55,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 11 | 0,0 | **3,0** | 0,0 | **3,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 12 | 0,0 | 0,0 | 0,0 | **23,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **2,0** |
| 13 | 0,0 | 0,0 | 0,0 | **9,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 14 | 0,0 | 0,0 | 0,0 | **46,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **48,0** |
| 15 | 0,0 | 0,0 | 0,0 | **19,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **9,0** |
| 16 | 0,0 | **51,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 17 | 0,0 | **3,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 18 | 0,0 | 0,0 | 0,0 | **30,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **4,0** |
| 19 | 0,0 | **80,0** | 0,0 | **1,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **5,0** |
| 20 | 0,0 | 0,0 | 0,0 | **15,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 21 | 0,0 | **12,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **80,0** |
| 22 | 0,0 | **1,0** | 0,0 | **1,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **18,0** |
| 23 | 0,0 | 0,0 | 0,0 | **48,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **41,0** |
| 24 | 0,0 | **20,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **11,0** |
| 25 | 0,0 | **3,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **37,0** |
| 26 | 0,0 | **6,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **8,0** |
| 27 | 0,0 | **5,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **14,0** |
| 28 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **15,0** |
| 29 | 0,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **9,0** |
| 30 | 0,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **3,0** |
| 31 | 0,0 | | 0,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | **74,0** |
| **Hujan Maks** | 0,0 | **80,0** | 0,0 | **48,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **80,0** |
| **Jml. Curah Hujan** | 0,0 | **353,0** | 0,0 | **301,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **418,0** |
| **Jml. Hari Hujan** | 0 | **17** | 0 | **18** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **18** |
| **Jml. data (1-15)** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** |
| **Jml. Hujan (1-15)** | 0,0 | **172,0** | 0,0 | **206,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **99,0** |
| **Jml. Data (16-31)** | **16** | **13** | **16** | **15** | **16** | **15** | **16** | **16** | **15** | **16** | **15** | **16** |
| **Jml. Hujan (16-31)** | 0,0 | **181,0** | 0,0 | **95,0** | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | **319,0** |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | **80,0** | **1072,0** | **53** | **115** |

## GRAFIK HUJAN (mm)



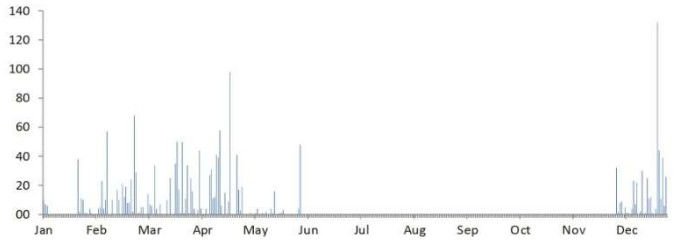
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2007** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 10,0 | 0,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 7,0 | 4,0 | 0,0 | 44,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 32,0 |
| 3 | 6,0 | 5,0 | 14,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 4 | 0,0 | 23,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 |
| 5 | 0,0 | 4,0 | 6,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 |
| 6 | 0,0 | 10,0 | 0,0 | 4,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 7 | 0,0 | 57,0 | 34,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 |
| 8 | 0,0 | 0,0 | 4,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 9 | 0,0 | 0,0 | 0,0 | 31,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 10 | 0,0 | 10,0 | 7,0 | 11,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 11 | 0,0 | 0,0 | 0,0 | 12,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 |
| 12 | 0,0 | 0,0 | 0,0 | 41,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 23,0 |
| 13 | 0,0 | 17,0 | 0,0 | 39,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 14 | 0,0 | 10,0 | 10,0 | 58,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 22,0 |
| 15 | 0,0 | 0,0 | 0,0 | 6,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 16 | 0,0 | 21,0 | 25,0 | 0,0 | 16,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 17 | 0,0 | 12,0 | 0,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 30,0 |
| 18 | 0,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 19 | 0,0 | 8,0 | 35,0 | 9,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 20 | 0,0 | 8,0 | 50,0 | 98,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 25,0 |
| 21 | 38,0 | 24,0 | 17,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 |
| 22 | 2,0 | 2,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 23 | 11,0 | 68,0 | 50,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 24 | 10,0 | 29,0 | 1,0 | 41,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 25 | 1,0 | 1,0 | 11,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 |
| 26 | 1,0 | 1,0 | 34,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 132,0 |
| 27 | 0,0 | 5,0 | 1,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 44,0 |
| 28 | 4,0 | 5,0 | 25,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 |
| 29 | 1,0 | | 16,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 39,0 |
| 30 | 0,0 | | 4,0 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 |
| 31 | 0,0 | | 0,0 | | 48,0 | | 0,0 | 0,0 | | 0,0 | | 26,0 |
| **Hujan Maks** | 38,0 | 68,0 | 50,0 | 98,0 | 48,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 132,0 |
| **Jml. Curah Hujan** | 91,0 | 343,0 | 352,0 | 482,0 | 87,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 458,0 |
| **Jml. Hari Hujan** | 11 | 22 | 20 | 19 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 25 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 23,0 | 140,0 | 82,0 | 280,0 | 14,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 114,0 |
| **Jml. Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 68,0 | 203,0 | 270,0 | 202,0 | 73,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 344,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 132,0 | 1813,0 | 110 | 132 |

## GRAFIK HUJAN (mm)



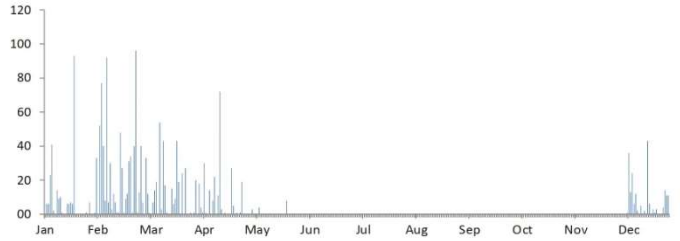
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2008** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 0,0 | 33,0 | 18,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 6,0 | 52,0 | 12,0 | 4,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 3 | 6,0 | 77,0 | 1,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 4 | 23,0 | 40,0 | 0,0 | 30,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 5 | 41,0 | 8,0 | 7,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 6 | 2,0 | 92,0 | 14,0 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 7 | 0,0 | 7,0 | 19,0 | 14,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 8 | 14,0 | 30,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 36,0 |
| 9 | 9,0 | 3,0 | 54,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 13,0 |
| 10 | 10,0 | 12,0 | 3,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 24,0 |
| 11 | 1,0 | 7,0 | 43,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 |
| 12 | 0,0 | 1,0 | 17,0 | 11,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 13 | 0,0 | 1,0 | 1,0 | 72,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 14 | 6,0 | 48,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 15 | 6,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 |
| 16 | 7,0 | 1,0 | 15,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 17 | 6,0 | 9,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 18 | 93,0 | 12,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 19 | 0,0 | 31,0 | 43,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 43,0 |
| 20 | 0,0 | 34,0 | 19,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 |
| 21 | 0,0 | 1,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 22 | 0,0 | 40,0 | 24,0 | 0,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 23 | 0,0 | 96,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 24 | 0,0 | 1,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 25 | 1,0 | 13,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 26 | 0,0 | 40,0 | 0,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 27 | 7,0 | 7,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 28 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 |
| 29 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 30 | 1,0 | | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 |
| 31 | 33,0 | | 0,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 11,0 |
| **Hujan Maks** | 93,0 | 96,0 | 54,0 | 72,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 43,0 |
| **Jml. Curah Hujan** | 272,0 | 690,0 | 369,0 | 238,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 197,0 |
| **Jml. Hari Hujan** | 18 | 26 | 21 | 17 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 124,0 | 405,0 | 204,0 | 184,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 99,0 |
| **Jml. Data (16-31)** | 16 | 14 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 148,0 | 285,0 | 165,0 | 54,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 98,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 96,0 | 1781,0 | 103 | 132 |

## GRAFIK HUJAN (mm)



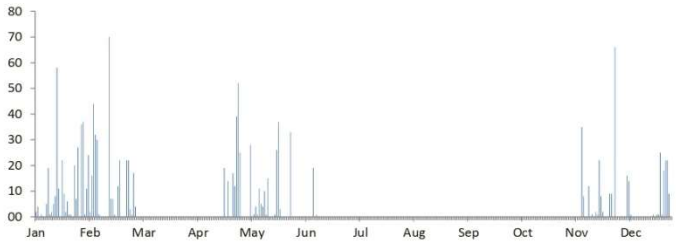
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2009** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 2,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 4,0 | 16,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 3 | 0,0 | 44,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 4 | 1,0 | 32,0 | 0,0 | 0,0 | 28,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 5 | 0,0 | 30,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 6 | 0,0 | 1,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 16,0 |
| 7 | 5,0 | 0,0 | 0,0 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 8 | 19,0 | 0,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 9 | 1,0 | 0,0 | 0,0 | 0,0 | 11,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 10 | 2,0 | 0,0 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 35,0 | 0,0 |
| 11 | 5,0 | 0,0 | 0,0 | 0,0 | 4,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 0,0 |
| 12 | 8,0 | 70,0 | 0,0 | 0,0 | 10,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 13 | 58,0 | 7,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 14 | 11,0 | 7,0 | 0,0 | 0,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 | 0,0 |
| 15 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 16 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 0,0 |
| 17 | 9,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 18 | 2,0 | 22,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 |
| 19 | 6,0 | 0,0 | 0,0 | 19,0 | 26,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 0,0 |
| 20 | 1,0 | 0,0 | 0,0 | 0,0 | 37,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 22,0 | 0,0 |
| 21 | 1,0 | 0,0 | 0,0 | 14,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 1,0 |
| 22 | 0,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 |
| 23 | 20,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 24 | 7,0 | 3,0 | 0,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 25 | 27,0 | 1,0 | 0,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 25,0 |
| 26 | 0,0 | 17,0 | 0,0 | 39,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 | 1,0 |
| 27 | 36,0 | 4,0 | 0,0 | 52,0 | 33,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 | 18,0 |
| 28 | 37,0 | 0,0 | 0,0 | 25,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 22,0 |
| 29 | 1,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 66,0 | 22,0 |
| 30 | 11,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 |
| 31 | 24,0 | | 0,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 0,0 |
| **Hujan Maks** | 58,0 | 70,0 | 0,0 | 52,0 | 37,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 66,0 | 25,0 |
| **Jml Curah Hujan** | 320,0 | 313,0 | 0,0 | 178,0 | 180,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 175,0 | 131,0 |
| **Jml Hari Hujan** | 25 | 18 | 0 | 7 | 15 | 2 | 0 | 0 | 0 | 0 | 12 | 12 |
| **Jml data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml Hujan (1-15)** | 116,0 | 210,0 | 0,0 | 0,0 | 80,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 55,0 | 31,0 |
| **Jml Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml Hujan (16-31)** | 204,0 | 103,0 | 0,0 | 178,0 | 100,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 120,0 | 100,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 70,0 | 1317,0 | 91 | 132 |

## GRAFIK HUJAN (mm)



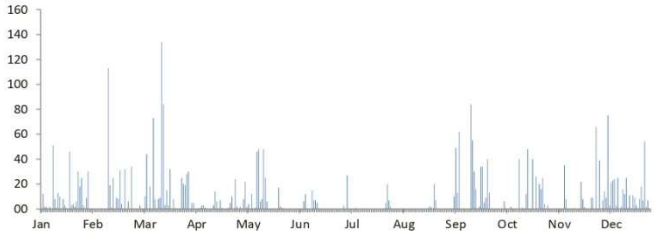
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2010** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 0,0 | 3,0 | 5,0 | 0,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 39,0 |
| 2 | 12,0 | 0,0 | 0,0 | 5,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 3 | 2,0 | 0,0 | 0,0 | 0,0 | 22,0 | 0,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 4 | 2,0 | 0,0 | 10,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 5 | 0,0 | 0,0 | 44,0 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 10,0 | 6,0 | 0,0 | 9,0 |
| 6 | 2,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 49,0 | 0,0 | 0,0 | 75,0 |
| 7 | 0,0 | 0,0 | 18,0 | 3,0 | 12,0 | 6,0 | 0,0 | 0,0 | 13,0 | 0,0 | 0,0 | 3,0 |
| 8 | 51,0 | 0,0 | 0,0 | 3,0 | 0,0 | 12,0 | 1,0 | 0,0 | 62,0 | 0,0 | 0,0 | 21,0 |
| 9 | 8,0 | 0,0 | 73,0 | 1,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 | 23,0 |
| 10 | 1,0 | 113,0 | 8,0 | 0,0 | 46,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 35,0 | 24,0 |
| 11 | 13,0 | 19,0 | 0,0 | 0,0 | 48,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 3,0 |
| 12 | 10,0 | 1,0 | 8,0 | 0,0 | 6,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 25,0 |
| 13 | 0,0 | 25,0 | 9,0 | 0,0 | 8,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 14 | 8,0 | 0,0 | 134,0 | 3,0 | 48,0 | 7,0 | 0,0 | 0,0 | 0,0 | 40,0 | 0,0 | 2,0 |
| 15 | 3,0 | 9,0 | 84,0 | 14,0 | 25,0 | 5,0 | 0,0 | 0,0 | 84,0 | 0,0 | 0,0 | 16,0 |
| 16 | 1,0 | 8,0 | 3,0 | 6,0 | 6,0 | 0,0 | 0,0 | 0,0 | 55,0 | 1,0 | 1,0 | 12,0 |
| 17 | 0,0 | 31,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 30,0 | 0,0 | 0,0 | 25,0 |
| 18 | 46,0 | 4,0 | 3,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 16,0 | 12,0 | 0,0 | 1,0 |
| 19 | 3,0 | 0,0 | 32,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 48,0 | 0,0 | 11,0 |
| 20 | 4,0 | 32,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 | 22,0 | 0,0 |
| 21 | 2,0 | 0,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 34,0 | 0,0 | 8,0 | 11,0 |
| 22 | 6,0 | 6,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 34,0 | 40,0 | 2,0 | 9,0 |
| 23 | 30,0 | 0,0 | 0,0 | 1,0 | 17,0 | 0,0 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 3,0 |
| 24 | 18,0 | 34,0 | 0,0 | 5,0 | 2,0 | 0,0 | 0,0 | 20,0 | 9,0 | 26,0 | 0,0 | 0,0 |
| 25 | 25,0 | 0,0 | 0,0 | 10,0 | 1,0 | 0,0 | 0,0 | 7,0 | 40,0 | 0,0 | 0,0 | 8,0 |
| 26 | 3,0 | 0,0 | 25,0 | 0,0 | 0,0 | 0,0 | 5,0 | 0,0 | 13,0 | 20,0 | 9,0 | 18,0 |
| 27 | 1,0 | 0,0 | 20,0 | 24,0 | 0,0 | 0,0 | 20,0 | 0,0 | 0,0 | 16,0 | 9,0 | 7,0 |
| 28 | 9,0 | 0,0 | 19,0 | 2,0 | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 25,0 | 0,0 | 54,0 |
| 29 | 30,0 | | 28,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 | 0,0 | 4,0 | 66,0 | 2,0 |
| 30 | 0,0 | | 30,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 31 | 0,0 | | 0,0 | | 0,0 | | 0,0 | 0,0 | | 3,0 | | 0,0 |
| **Hujan Maks** | 51,0 | 113,0 | 134,0 | 24,0 | 48,0 | 15,0 | 27,0 | 20,0 | 84,0 | 48,0 | 66,0 | 75,0 |
| **Jml. Curah Hujan** | 290,0 | 282,0 | 575,0 | 93,0 | 256,0 | 52,0 | 65,0 | 31,0 | 456,0 | 243,0 | 160,0 | 429,0 |
| **Jml. Hari Hujan** | 24 | 11 | 21 | 17 | 16 | 6 | 7 | 4 | 15 | 13 | 9 | 26 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 112,0 | 167,0 | 391,0 | 35,0 | 230,0 | 52,0 | 31,0 | 0,0 | 218,0 | 48,0 | 43,0 | 261,0 |
| **Jml. Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 178,0 | 115,0 | 184,0 | 58,0 | 26,0 | 0,0 | 34,0 | 31,0 | 238,0 | 195,0 | 117,0 | 168,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 134,0 | 2932,0 | 169 | 134 |

## GRAFIK HUJAN (mm)



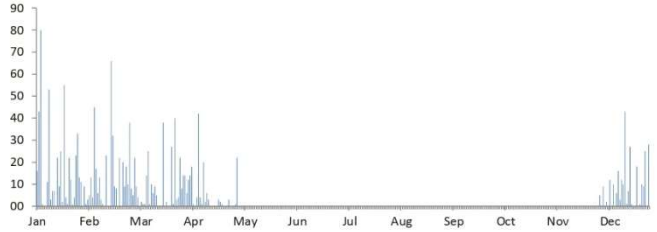
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2011** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 16,0 | 5,0 | 9,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 43,0 | 13,0 | 4,0 | 14,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 |
| 3 | 80,0 | 4,0 | 0,0 | 18,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 4 | 1,0 | 45,0 | 2,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 |
| 5 | 0,0 | 17,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 6 | 0,0 | 6,0 | 1,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 7 | 11,0 | 13,0 | 14,0 | 42,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 8 | 53,0 | 3,0 | 25,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 9 | 3,0 | 1,0 | 1,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 10 | 7,0 | 0,0 | 10,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 |
| 11 | 7,0 | 23,0 | 6,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 12 | 0,0 | 0,0 | 9,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 |
| 13 | 22,0 | 0,0 | 5,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 16,0 |
| 14 | 9,0 | 66,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 15 | 25,0 | 32,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 16 | 2,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 |
| 17 | 55,0 | 8,0 | 38,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 43,0 |
| 18 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 19 | 1,0 | 22,0 | 2,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 20 | 22,0 | 0,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 27,0 |
| 21 | 12,0 | 20,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 22 | 1,0 | 9,0 | 27,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 23 | 4,0 | 18,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 24 | 23,0 | 10,0 | 40,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 18,0 |
| 25 | 33,0 | 38,0 | 3,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 26 | 13,0 | 8,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 27 | 11,0 | 5,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 |
| 28 | 0,0 | 22,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 |
| 29 | 9,0 | | 14,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 25,0 |
| 30 | 1,0 | | 14,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 31 | 3,0 | | 6,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 28,0 |
| **Hujan Maks** | 80,0 | 66,0 | 40,0 | 42,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 43,0 |
| **Jml. Curah Hujan** | 471,0 | 397,0 | 266,0 | 159,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 255,0 |
| **Jml. Hari Hujan** | 27 | 23 | 24 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 277,0 | 228,0 | 87,0 | 127,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 75,0 |
| **Jml. Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 194,0 | 169,0 | 179,0 | 32,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 180,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 80,0 | 1548,0 | 113 | 134 |

## GRAFIK HUJAN (mm)



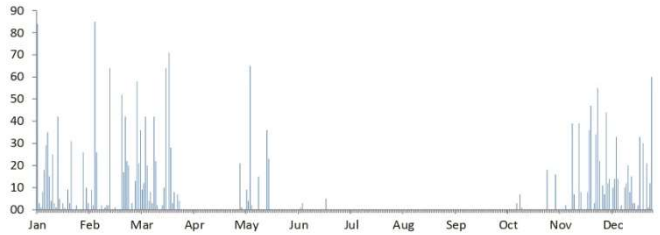
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2012** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 84,0 | 0,0 | 58,0 | 0,0 | 21,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 3,0 | 9,0 | 21,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 |
| 3 | 1,0 | 2,0 | 36,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 4 | 8,0 | 85,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 16,0 | 44,0 |
| 5 | 18,0 | 26,0 | 12,0 | 0,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 6 | 29,0 | 0,0 | 42,0 | 0,0 | 4,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 7 | 35,0 | 0,0 | 20,0 | 0,0 | 65,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 8 | 15,0 | 2,0 | 4,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 |
| 9 | 4,0 | 0,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 10 | 25,0 | 1,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 33,0 |
| 11 | 3,0 | 2,0 | 42,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 12 | 1,0 | 2,0 | 22,0 | 0,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 | 0,0 | 0,0 |
| 13 | 42,0 | 64,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 14 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 | 39,0 | 0,0 |
| 15 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 7,0 | 10,0 |
| 16 | 3,0 | 1,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 17 | 1,0 | 0,0 | 10,0 | 0,0 | 36,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 20,0 |
| 18 | 0,0 | 0,0 | 64,0 | 0,0 | 23,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 39,0 | 8,0 |
| 19 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 15,0 |
| 20 | 3,0 | 52,0 | 71,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 21 | 31,0 | 17,0 | 28,0 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 22 | 0,0 | 42,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 23 | 0,0 | 22,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 2,0 |
| 24 | 2,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 36,0 | 33,0 |
| 25 | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 47,0 | 0,0 |
| 26 | 0,0 | 3,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 30,0 |
| 27 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 | 0,0 |
| 28 | 26,0 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 34,0 | 21,0 |
| 29 | 0,0 | 42,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 55,0 | 1,0 |
| 30 | 10,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 18,0 | 22,0 | 12,0 |
| 31 | 3,0 | | 0,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 60,0 |
| **Hujan Maks** | 84,0 | 85,0 | 71,0 | 0,0 | 65,0 | 5,0 | 0,0 | 0,0 | 0,0 | 18,0 | 55,0 | 60,0 |
| **Jml. Curah Hujan** | 361,0 | 405,0 | 476,0 | 0,0 | 176,0 | 9,0 | 0,0 | 0,0 | 0,0 | 29,0 | 316,0 | 391,0 |
| **Jml. Hari Hujan** | 23 | 18 | 22 | 0 | 9 | 3 | 0 | 0 | 0 | 4 | 13 | 24 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 273,0 | 193,0 | 279,0 | 0,0 | 117,0 | 4,0 | 0,0 | 0,0 | 0,0 | 11,0 | 64,0 | 171,0 |
| **Jml. Data (16-31)** | 16 | 14 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 88,0 | 212,0 | 197,0 | 0,0 | 59,0 | 5,0 | 0,0 | 0,0 | 0,0 | 18,0 | 252,0 | 220,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 85,0 | 2163,0 | 116 | 134 |

## GRAFIK HUJAN (mm)



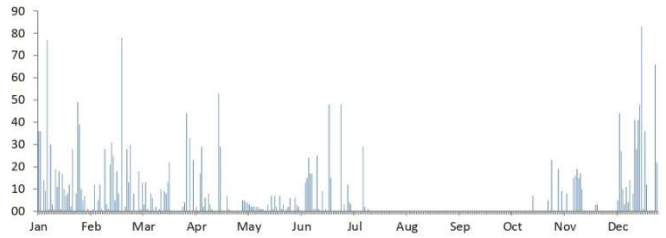
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2013** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 36,0 | 0,0 | 18,0 | 0,0 | 5,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 36,0 | 1,0 | 1,0 | 23,0 | 5,0 | 3,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 3 | 0,0 | 12,0 | 13,0 | 0,0 | 4,0 | 2,0 | 4,0 | 0,0 | 0,0 | 0,0 | 19,0 | 0,0 |
| 4 | 14,0 | 0,0 | 3,0 | 2,0 | 4,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 5 | 9,0 | 5,0 | 13,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 | 0,0 |
| 6 | 77,0 | 12,0 | 1,0 | 17,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 7 | 1,0 | 1,0 | 0,0 | 29,0 | 2,0 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 8 | 30,0 | 0,0 | 8,0 | 2,0 | 2,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 5,0 |
| 9 | 3,0 | 28,0 | 6,0 | 6,0 | 2,0 | 24,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 44,0 |
| 10 | 1,0 | 3,0 | 0,0 | 0,0 | 2,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 27,0 |
| 11 | 19,0 | 1,0 | 2,0 | 8,0 | 1,0 | 17,0 | 29,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 |
| 12 | 11,0 | 21,0 | 0,0 | 3,0 | 1,0 | 1,0 | 2,0 | 0,0 | 0,0 | 0,0 | 15,0 | 3,0 |
| 13 | 18,0 | 31,0 | 1,0 | 1,0 | 1,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 16,0 | 11,0 |
| 14 | 1,0 | 25,0 | 10,0 | 0,0 | 0,0 | 25,0 | 1,0 | 0,0 | 0,0 | 0,0 | 19,0 | 4,0 |
| 15 | 17,0 | 5,0 | 0,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 15,0 | 14,0 |
| 16 | 10,0 | 18,0 | 9,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 17,0 | 0,0 |
| 17 | 7,0 | 8,0 | 8,0 | 53,0 | 0,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 | 8,0 |
| 18 | 8,0 | 0,0 | 13,0 | 29,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 41,0 |
| 19 | 12,0 | 78,0 | 22,0 | 0,0 | 1,0 | 1,0 | 0,0 | 0,0 | 0,0 | 7,0 | 0,0 | 28,0 |
| 20 | 2,0 | 0,0 | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 41,0 |
| 21 | 28,0 | 2,0 | 0,0 | 0,0 | 2,0 | 48,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 48,0 |
| 22 | 0,0 | 28,0 | 0,0 | 7,0 | 0,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 83,0 |
| 23 | 8,0 | 13,0 | 0,0 | 1,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 24 | 49,0 | 30,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 36,0 |
| 25 | 39,0 | 0,0 | 0,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 | 12,0 |
| 26 | 10,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 | 0,0 |
| 27 | 5,0 | 0,0 | 2,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 28 | 7,0 | 0,0 | 4,0 | 0,0 | 2,0 | 48,0 | 0,0 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 |
| 29 | 0,0 | | 44,0 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 30 | 1,0 | | 0,0 | 0,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 23,0 | 0,0 | 66,0 |
| 31 | 0,0 | | 33,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 22,0 |
| **Hujan Maks** | 77,0 | 78,0 | 44,0 | 53,0 | 7,0 | 48,0 | 29,0 | 0,0 | 0,0 | 23,0 | 19,0 | 83,0 |
| **Jml. Curah Hujan** | 459,0 | 330,0 | 211,0 | 181,0 | 74,0 | 249,0 | 51,0 | 0,0 | 0,0 | 35,0 | 134,0 | 504,0 |
| **Jml. Hari Hujan** | 27 | 20 | 19 | 13 | 24 | 18 | 6 | 0 | 0 | 3 | 11 | 19 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 273,0 | 145,0 | 76,0 | 91,0 | 34,0 | 125,0 | 51,0 | 0,0 | 0,0 | 0,0 | 101,0 | 118,0 |
| **Jml. Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 186,0 | 185,0 | 135,0 | 90,0 | 40,0 | 124,0 | 0,0 | 0,0 | 0,0 | 35,0 | 33,0 | 386,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 83,0 | 2228,0 | 160 | 134 |

## GRAFIK HUJAN (mm)



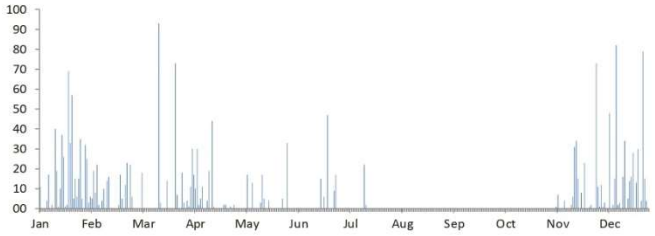
## DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2014** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 11,0 | 5,0 | 0,0 | 11,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 |
| 2 | 0,0 | 19,0 | 0,0 | 30,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 3 | 0,0 | 8,0 | 18,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 4 | 0,0 | 22,0 | 0,0 | 10,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 5 | 4,0 | 2,0 | 0,0 | 30,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 6 | 17,0 | 0,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 0,0 |
| 7 | 0,0 | 4,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 | 0,0 |
| 8 | 2,0 | 10,0 | 0,0 | 11,0 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 48,0 |
| 9 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 10 | 40,0 | 14,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 11 | 19,0 | 16,0 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 | 15,0 |
| 12 | 1,0 | 0,0 | 0,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 82,0 |
| 13 | 10,0 | 0,0 | 93,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 14 | 37,0 | 0,0 | 3,0 | 44,0 | 17,0 | 0,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 15 | 26,0 | 0,0 | 0,0 | 1,0 | 5,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 |
| 16 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 | 16,0 |
| 17 | 2,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 31,0 | 34,0 |
| 18 | 69,0 | 17,0 | 14,0 | 0,0 | 4,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 34,0 | 0,0 |
| 19 | 33,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 15,0 | 5,0 |
| 20 | 57,0 | 0,0 | 0,0 | 0,0 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 21 | 5,0 | 12,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 16,0 |
| 22 | 15,0 | 23,0 | 0,0 | 2,0 | 0,0 | 47,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 28,0 |
| 23 | 6,0 | 0,0 | 73,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 23,0 | 0,0 |
| 24 | 15,0 | 22,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 13,0 |
| 25 | 35,0 | 6,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 30,0 |
| 26 | 5,0 | 0,0 | 0,0 | 0,0 | 5,0 | 9,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 0,0 |
| 27 | 0,0 | 0,0 | 18,0 | 2,0 | 0,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 4,0 |
| 28 | 32,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 79,0 |
| 29 | 25,0 | | 0,0 | 0,0 | 33,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 15,0 |
| 30 | 3,0 | | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 73,0 | 4,0 |
| 31 | 6,0 | | 1,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 0,0 |
| **Hujan Maks** | 69,0 | 23,0 | 93,0 | 44,0 | 33,0 | 47,0 | 22,0 | 0,0 | 0,0 | 0,0 | 73,0 | 82,0 |
| **Jml Curah Hujan** | 476,0 | 187,0 | 234,0 | 191,0 | 97,0 | 94,0 | 24,0 | 0,0 | 0,0 | 0,0 | 207,0 | 438,0 |
| **Jml Hari Hujan** | 25 | 16 | 10 | 16 | 8 | 5 | 2 | 0 | 0 | 0 | 13 | 23 |
| **Jml data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml Hujan (1-15)** | 167,0 | 100,0 | 114,0 | 184,0 | 55,0 | 0,0 | 24,0 | 0,0 | 0,0 | 0,0 | 14,0 | 180,0 |
| **Jml Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml Hujan (16-31)** | 309,0 | 87,0 | 120,0 | 7,0 | 42,0 | 94,0 | 0,0 | 0,0 | 0,0 | 0,0 | 193,0 | 258,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 93,0 | 1948,0 | 118 | 134 |

## GRAFIK HUJAN (mm)



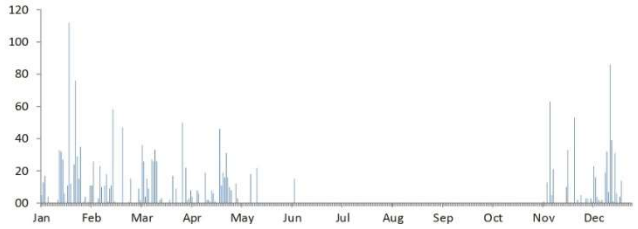
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2015** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 5,0 | 11,0 | 0,0 | 2,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 13,0 | 26,0 | 9,0 | 3,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 3 | 17,0 | 0,0 | 2,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 4 | 0,0 | 0,0 | 36,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 5 | 4,0 | 3,0 | 26,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 6 | 0,0 | 23,0 | 4,0 | 0,0 | 0,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 7 | 0,0 | 10,0 | 15,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 1,0 |
| 8 | 0,0 | 0,0 | 9,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 23,0 |
| 9 | 0,0 | 11,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 13,0 | 16,0 |
| 10 | 0,0 | 18,0 | 27,0 | 0,0 | 18,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 |
| 11 | 2,0 | 1,0 | 26,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 63,0 | 2,0 |
| 12 | 33,0 | 9,0 | 33,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 | 1,0 |
| 13 | 32,0 | 11,0 | 26,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 21,0 | 2,0 |
| 14 | 27,0 | 58,0 | 0,0 | 2,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 15 | 6,0 | 1,0 | 2,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 19,0 |
| 16 | 0,0 | 0,0 | 3,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 32,0 |
| 17 | 11,0 | 0,0 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 18 | 112,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 86,0 |
| 19 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 39,0 |
| 20 | 0,0 | 47,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 |
| 21 | 24,0 | 0,0 | 2,0 | 46,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 | 31,0 |
| 22 | 76,0 | 0,0 | 0,0 | 11,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 33,0 | 6,0 |
| 23 | 29,0 | 0,0 | 17,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 24 | 15,0 | 1,0 | 0,0 | 16,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 |
| 25 | 35,0 | 15,0 | 9,0 | 31,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 26 | 0,0 | 0,0 | 0,0 | 16,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 53,0 | 0,0 |
| 27 | 1,0 | 0,0 | 0,0 | 10,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 28 | 4,0 | 0,0 | 0,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 |
| 29 | 0,0 | | 50,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 30 | 1,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 | 0,0 |
| 31 | 11,0 | | 22,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 0,0 |
| **Hujan Maks** | 112,0 | 58,0 | 50,0 | 46,0 | 22,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 63,0 | 86,0 |
| **Jml Curah Hujan** | 470,0 | 245,0 | 318,0 | 227,0 | 55,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 206,0 | 297,0 |
| **Jml Hari Hujan** | 21 | 15 | 18 | 21 | 4 | 1 | 0 | 0 | 0 | 0 | 10 | 20 |
| **Jml data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml Hujan (1-15)** | 139,0 | 182,0 | 215,0 | 55,0 | 55,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 103,0 | 77,0 |
| **Jml Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml Hujan (16-31)** | 331,0 | 63,0 | 103,0 | 172,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 103,0 | 220,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 112,0 | 1833,0 | 110 | 134 |

## GRAFIK HUJAN (mm)



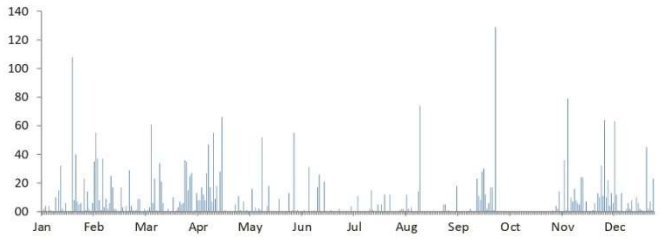
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20 36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2016** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 35,0 | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 11,0 |
| 2 | 2,0 | 55,0 | 0,0 | 1,0 | 0,0 | 1,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 64,0 |
| 3 | 4,0 | 37,0 | 2,0 | 13,0 | 1,0 | 0,0 | 0,0 | 2,0 | 0,0 | 0,0 | 4,0 | 10,0 |
| 4 | 0,0 | 8,0 | 0,0 | 8,0 | 0,0 | 0,0 | 4,0 | 2,0 | 0,0 | 0,0 | 2,0 | 22,0 |
| 5 | 4,0 | 1,0 | 1,0 | 8,0 | 0,0 | 0,0 | 0,0 | 0,0 | 18,0 | 0,0 | 14,0 | 4,0 |
| 6 | 1,0 | 37,0 | 3,0 | 17,0 | 16,0 | 1,0 | 0,0 | 12,0 | 0,0 | 0,0 | 0,0 | 13,0 |
| 7 | 0,0 | 3,0 | 61,0 | 12,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 | 0,0 | 0,0 | 6,0 |
| 8 | 0,0 | 9,0 | 6,0 | 8,0 | 3,0 | 0,0 | 11,0 | 0,0 | 0,0 | 0,0 | 36,0 | 63,0 |
| 9 | 10,0 | 2,0 | 23,0 | 27,0 | 0,0 | 31,0 | 0,0 | 3,0 | 0,0 | 0,0 | 1,0 | 12,0 |
| 10 | 0,0 | 6,0 | 1,0 | 47,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 79,0 | 1,0 |
| 11 | 15,0 | 25,0 | 0,0 | 17,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 12 | 32,0 | 17,0 | 34,0 | 7,0 | 52,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 | 13,0 |
| 13 | 2,0 | 2,0 | 21,0 | 55,0 | 0,0 | 0,0 | 0,0 | 14,0 | 2,0 | 0,0 | 7,0 | 0,0 |
| 14 | 0,0 | 2,0 | 6,0 | 9,0 | 0,0 | 17,0 | 0,0 | 74,0 | 0,0 | 0,0 | 16,0 | 0,0 |
| 15 | 6,0 | 0,0 | 0,0 | 18,0 | 4,0 | 26,0 | 2,0 | 0,0 | 0,0 | 0,0 | 8,0 | 2,0 |
| 16 | 0,0 | 0,0 | 0,0 | 0,0 | 18,0 | 0,0 | 15,0 | 0,0 | 0,0 | 0,0 | 6,0 | 6,0 |
| 17 | 0,0 | 17,0 | 2,0 | 28,0 | 0,0 | 0,0 | 1,0 | 0,0 | 23,0 | 0,0 | 5,0 | 2,0 |
| 18 | 0,0 | 3,0 | 0,0 | 66,0 | 0,0 | 21,0 | 0,0 | 0,0 | 11,0 | 0,0 | 24,0 | 8,0 |
| 19 | 108,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 0,0 | 24,0 | 0,0 |
| 20 | 8,0 | 4,0 | 10,0 | 1,0 | 0,0 | 0,0 | 5,0 | 0,0 | 28,0 | 0,0 | 0,0 | 0,0 |
| 21 | 40,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 30,0 | 0,0 | 7,0 | 10,0 |
| 22 | 7,0 | 29,0 | 1,0 | 0,0 | 9,0 | 1,0 | 5,0 | 0,0 | 12,0 | 0,0 | 0,0 | 6,0 |
| 23 | 5,0 | 4,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 | 0,0 | 2,0 |
| 24 | 6,0 | 1,0 | 7,0 | 0,0 | 0,0 | 0,0 | 12,0 | 0,0 | 6,0 | 0,0 | 0,0 | 1,0 |
| 25 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 17,0 | 0,0 | 1,0 | 0,0 |
| 26 | 23,0 | 1,0 | 6,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 17,0 | 0,0 | 6,0 | 0,0 |
| 27 | 1,0 | 9,0 | 36,0 | 0,0 | 0,0 | 2,0 | 12,0 | 0,0 | 1,0 | 0,0 | 0,0 | 45,0 |
| 28 | 14,0 | 9,0 | 35,0 | 11,0 | 13,0 | 0,0 | 0,0 | 5,0 | 129,0 | 0,0 | 13,0 | 2,0 |
| 29 | 2,0 | 13,0 | 15,0 | 1,0 | 0,0 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 10,0 | 7,0 |
| 30 | 0,0 | | 25,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 32,0 | 1,0 |
| 31 | 6,0 | | 27,0 | | 55,0 | | 0,0 | 1,0 | | 0,0 | | 23,0 |
| **Hujan Maks** | 108,0 | 55,0 | 61,0 | 66,0 | 55,0 | 31,0 | 15,0 | 74,0 | 129,0 | 0,0 | 79,0 | 64,0 |
| **Jml. Curah Hujan** | 296,0 | 329,0 | 330,0 | 359,0 | 182,0 | 101,0 | 67,0 | 121,0 | 304,0 | 0,0 | 306,0 | 334,0 |
| **Jml. Hari Hujan** | 20 | 24 | 22 | 20 | 13 | 9 | 9 | 11 | 14 | 0 | 21 | 24 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 76,0 | 239,0 | 158,0 | 247,0 | 86,0 | 77,0 | 17,0 | 110,0 | 20,0 | 0,0 | 178,0 | 221,0 |
| **Jml. Data (16-31)** | 16 | 14 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 220,0 | 90,0 | 172,0 | 112,0 | 96,0 | 24,0 | 50,0 | 11,0 | 284,0 | 0,0 | 128,0 | 113,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 129,0 | 2729,0 | 187 | 134 |

## GRAFIK HUJAN (mm)



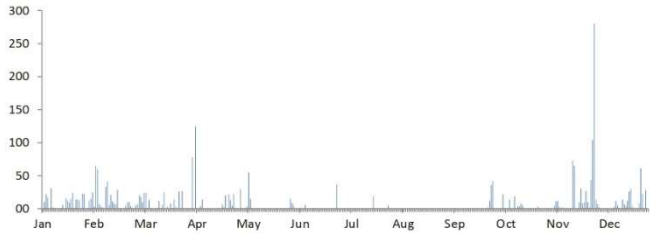
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115`b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2017** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 3,0 | 18,0 | 78,0 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 2 | 10,0 | 65,0 | 10,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 |
| 3 | 22,0 | 60,0 | 24,0 | 124,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 4 | 17,0 | 7,0 | 24,0 | 0,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 5 | 0,0 | 3,0 | 1,0 | 0,0 | 55,0 | 0,0 | 0,0 | 0,0 | 0,0 | 22,0 | 5,0 | 0,0 |
| 6 | 31,0 | 2,0 | 13,0 | 4,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 | 0,0 |
| 7 | 2,0 | 0,0 | 0,0 | 14,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 | 0,0 |
| 8 | 1,0 | 33,0 | 0,0 | 0,0 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 | 0,0 |
| 9 | 0,0 | 41,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 | 1,0 | 0,0 |
| 10 | 0,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 |
| 11 | 0,0 | 21,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 |
| 12 | 1,0 | 11,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 19,0 | 0,0 | 12,0 |
| 13 | 6,0 | 8,0 | 1,0 | 0,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 5,0 |
| 14 | 0,0 | 7,0 | 6,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 | 0,0 | 1,0 |
| 15 | 16,0 | 29,0 | 25,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 | 0,0 | 0,0 |
| 16 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 73,0 | 14,0 |
| 17 | 9,0 | 1,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 | 65,0 | 7,0 |
| 18 | 15,0 | 0,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 |
| 19 | 24,0 | 0,0 | 8,0 | 7,0 | 0,0 | 0,0 | 19,0 | 0,0 | 0,0 | 0,0 | 0,0 | 12,0 |
| 20 | 1,0 | 5,0 | 1,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 | 26,0 |
| 21 | 14,0 | 10,0 | 14,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 31,0 | 30,0 |
| 22 | 14,0 | 10,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 8,0 | 4,0 |
| 23 | 13,0 | 4,0 | 0,0 | 22,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 | 0,0 |
| 24 | 0,0 | 0,0 | 26,0 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 27,0 | 0,0 |
| 25 | 23,0 | 0,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 0,0 | 10,0 | 0,0 |
| 26 | 22,0 | 5,0 | 27,0 | 23,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,5 | 3,0 | 2,0 | 8,0 |
| 27 | 0,0 | 7,0 | 0,0 | 1,0 | 0,0 | 37,0 | 0,0 | 0,0 | 12,0 | 0,0 | 44,0 | 61,0 |
| 28 | 1,0 | 21,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 | 0,0 | 36,0 | 0,0 | 104,0 | 23,0 |
| 29 | 12,0 | | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 42,0 | 0,0 | 280,0 | 0,0 |
| 30 | 15,0 | | 0,0 | 30,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 | 28,0 |
| 31 | 25,0 | | 0,0 | | 9,0 | | 0,0 | 0,0 | | 0,0 | | 0,0 |
| **Hujan Maks** | 31,0 | 65,0 | 27,0 | 124,0 | 55,0 | 37,0 | 19,0 | 0,0 | 42,0 | 22,0 | 280,0 | 61,0 |
| **Jml Curah Hujan** | 306,0 | 359,0 | 218,0 | 344,0 | 99,0 | 50,0 | 24,0 | 0,0 | 92,5 | 79,0 | 713,0 | 247,0 |
| **Jml Hari Hujan** | 23 | 22 | 19 | 13 | 6 | 4 | 2 | 0 | 5 | 8 | 20 | 17 |
| **Jml data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml Hujan (1-15)** | 106,0 | 296,0 | 134,0 | 220,0 | 75,0 | 13,0 | 0,0 | 0,0 | 0,0 | 63,0 | 35,0 | 30,0 |
| **Jml Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml Hujan (16-31)** | 200,0 | 63,0 | 84,0 | 124,0 | 24,0 | 37,0 | 24,0 | 0,0 | 92,5 | 16,0 | 678,0 | 217,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 280,0 | 2531,5 | 139 | 280 |

## GRAFIK HUJAN (mm)



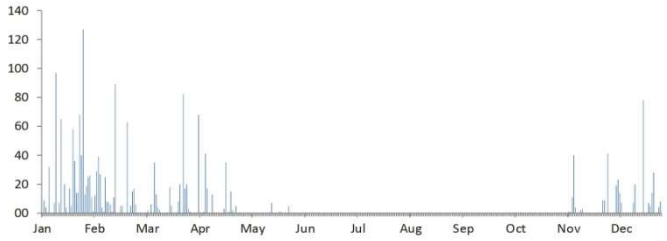
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2018** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | 0,0 | 12,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 2 | 9,0 | 29,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 3 | 4,0 | 39,0 | 0,0 | 68,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 4 | 0,0 | 27,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 5 | 32,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 19,0 |
| 6 | 0,0 | 1,0 | 6,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 23,0 |
| 7 | 0,0 | 25,0 | 0,0 | 41,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 14,0 |
| 8 | 7,0 | 8,0 | 35,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 1,0 | 7,0 |
| 9 | 97,0 | 7,5 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 11,0 | 0,0 |
| 10 | 0,0 | 6,0 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 40,0 | 0,0 |
| 11 | 7,0 | 1,0 | 2,0 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 4,0 | 0,0 |
| 12 | 65,0 | 11,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 13 | 0,0 | 89,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 14 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 2,0 | 0,0 |
| 15 | 4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 3,0 | 7,0 |
| 16 | 0,0 | 5,0 | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 20,0 |
| 17 | 17,0 | 5,0 | 18,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 18 | 5,0 | 0,0 | 5,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 19 | 58,0 | 0,0 | 0,0 | 35,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 20 | 36,0 | 63,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 21 | 14,0 | 0,0 | 0,0 | 1,0 | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 78,0 |
| 22 | 14,0 | 5,0 | 8,0 | 15,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 23 | 68,0 | 15,0 | 20,0 | 2,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 24 | 40,0 | 17,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 7,0 |
| 25 | 127,0 | 6,0 | 82,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 5,0 |
| 26 | 13,0 | 0,0 | 17,0 | 0,0 | 5,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 14,0 |
| 27 | 19,0 | 0,0 | 20,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 | 28,0 |
| 28 | 25,0 | 0,0 | 3,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 9,0 | 0,0 |
| 29 | 26,0 | | 1,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| 30 | 11,0 | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 41,0 | 4,0 |
| 31 | 1,0 | | 0,0 | | 0,0 | | 0,0 | 0,0 | | 0,0 | | 8,0 |
| **Hujan Maks** | 127,0 | 89,0 | 82,0 | 68,0 | 7,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 41,0 | 78,0 |
| **Jml. Curah Hujan** | 719,0 | 375,5 | 236,0 | 201,0 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 121,0 | 234,0 |
| **Jml. Hari Hujan** | 24 | 20 | 15 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 10 | 13 |
| **Jml. data (1-15)** | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| **Jml. Hujan (1-15)** | 245,0 | 259,5 | 62,0 | 140,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 62,0 | 70,0 |
| **Jml. Data (16-31)** | 16 | 13 | 16 | 15 | 16 | 15 | 16 | 16 | 15 | 16 | 15 | 16 |
| **Jml. Hujan (16-31)** | 474,0 | 116,0 | 174,0 | 61,0 | 13,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 59,0 | 164,0 |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | 127,0 | 1899,5 | 96 | 280 |

## GRAFIK HUJAN (mm)



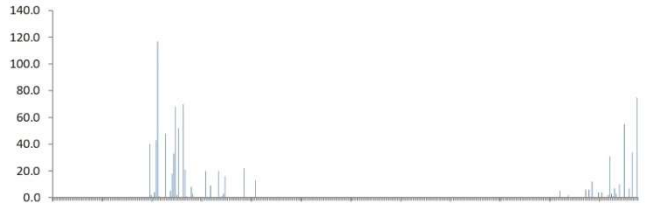
# DATA CURAH HUJAN HARIAN

| | | | |
|---|---|---|---|
| **Nama Pos** | : **Ngancar** | **Provinsi** | : Jawa Tengah |
| **Nomor Pos** | : 115 b | **Kota/Kabupaten** | : Wonogiri |
| **Jenis Alat** | : Manual | **Kecamatan** | : Ngancar |
| **Koordinat** | : 7 59' 20.36" LS-110 58' 44.5" BT | **Desa/Kampung** | : Selopuro |
| **Elevasi** | : - | **Pengelola** | : BAPUSDATARU Bengawan Solo |
| **SWS - DAS** | : B Solo | **Didirikan** | : Sub Din Wonogiri |
| **Tahun Pendirian** | : - | **Tahun** | : **2019** |

| TANGGAL | BULAN (mm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
| 1 | a | a | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **6.0** |
| 2 | l | l | **40.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | a | a | **2.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **12.0** |
| 4 | t | t | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | - | - | **4.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 | r | r | **43.0** | **20.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 | u | u | **117.0** | 0.0 | **13.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **4.0** |
| 8 | s | s | **1.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | a | a | 0.0 | **9.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **4.0** |
| 10 | k | k | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12 | - | - | **48.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **5.0** | **2.0** |
| 14 | - | - | 0.0 | **20.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **31.0** |
| 15 | - | - | **5.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **3.0** |
| 16 | - | - | **18.0** | **1.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **1.0** |
| 17 | - | - | **33.0** | **3.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **7.0** |
| 18 | - | - | **68.0** | **16.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **2.0** | **3.0** |
| 19 | - | - | **2.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20 | - | - | **52.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **10.0** |
| 21 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 22 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 23 | - | - | **70.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **55.0** |
| 24 | - | - | **21.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 25 | - | - | **1.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 26 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **7.0** |
| 27 | - | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 28 | - | - | **8.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **34.0** |
| 29 | - | | **3.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **6.0** | 0.0 |
| 30 | - | | 0.0 | **22.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 31 | - | | 0.0 | | 0.0 | | 0.0 | 0.0 | | 0.0 | | **75.0** |
| **Hujan Maks** | - | - | **117.0** | **22.0** | **13.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **6.0** | **75.0** |
| **Jml. Curah Hujan** | - | - | **536.0** | **91.0** | **13.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **13.0** | **254.0** |
| **Jml. Hari Hujan** | - | - | **18** | **7** | **1** | 0 | 0 | 0 | 0 | 0 | **3** | **15** |
| **Jml. data (1-15)** | - | - | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** | **15** |
| **Jml. Hujan (1-15)** | - | - | **260.0** | **49.0** | **13.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **5.0** | **62.0** |
| **Jml. Data (16-31)** | - | - | **16** | **15** | **16** | **15** | **16** | **16** | **15** | **16** | **15** | **16** |
| **Jml. Hujan (16-31)** | - | - | **276.0** | **42.0** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **8.0** | **192.0** |

| Tahunan | Hujan Maksimum | Jumlah Curah Hujan | Jumlah Hari Hujan | Hujan Ekstrim |
|---|---|---|---|---|
| | - | - | - | **280** |

## GRAFIK HUJAN (mm)



# LAMPIRAN B

**Tabel B 1** Rekapitulasi Data Klimatologi Tahun 2001-2019

| Tahun | Data Klimatologi | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2001 | Temperatur Udara (°C) | 29.2 | 26.4 | 29.4 | 29.1 | 29.7 | 28.6 | 28.1 | 29.3 | 29.5 | 30.2 | 29.8 | 29.4 |
| | Kecepatan angin, U (Km/hari) | 492.7 | 293 | 444.8 | 579.1 | 643.9 | 1387.4 | 1328.9 | 1773.2 | 2226 | 2136 | 627.3 | 627.3 |
| | Penyinaran Matahari (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Kelembapan Relatif, RH (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2002 | Temperatur Udara (°C) | 29.2 | 26.4 | 29.4 | 29.1 | 29.7 | 28.6 | 28.1 | 29.3 | 29.5 | 30.2 | 29.8 | 29.4 |
| | Kecepatan angin, U (Km/hari) | 492.7 | 293 | 444.8 | 579.1 | 643.9 | 1387.4 | 1328.9 | 1773.2 | 2226 | 2136 | 627.3 | 627.3 |
| | Penyinaran Matahari (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Kelembapan Relatif, RH (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2003 | Temperatur Udara (°C) | 29.1 | 26.9 | 29.8 | 30 | 29.5 | 31.4 | 29 | 29.2 | 30.4 | 29.4 | 29.5 | 28.7 |
| | Kecepatan angin, U (Km/hari) | 371.2 | 254.5 | 453.7 | 699.8 | 938.1 | 897.7 | 1559.2 | 1698.7 | 2517.2 | 2395.5 | 1374 | 516.1 |
| | Penyinaran Matahari (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.3 |
| | Kelembapan Relatif, RH (%) | 97.3 | 91.2 | 97.7 | 97.2 | 97.4 | 97.4 | 97.1 | 97.1 | 97.6 | 97.1 | 97.6 | 97.8 |
| 2004 | Temperatur Udara (°C) | 29.9 | 28.2 | 29.4 | 19.2 | 15.8 | 15.6 | 17.2 | 14.9 | 0 | 0 | 0 | 0 |
| | Kecepatan angin, U (Km/hari) | 466.2 | 217.2 | 324.9 | 761.6 | 1052.9 | 1025.7 | 1014.1 | 1487.2 | 0 | 0 | 0 | 0 |
| | Penyinaran Matahari (%) | 46 | 0 | 41.5 | 62.7 | 57.6 | 63.8 | 56.4 | 0 | 0 | 0 | 0 | 0 |
| | Kelembapan Relatif, RH (%) | 0 | 94.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2005 | Temperatur Udara (°C) | 15.9 | 16.8 | 16.3 | 15.9 | 16.2 | 16 | 15.5 | 28.5 | 29.9 | 30.1 | 30.3 | 29.1 |
| | Kecepatan angin, U (Km/hari) | 478.4 | 388.3 | 475.7 | 530.8 | 569.8 | 739.4 | 1260.7 | 1768.1 | 2066 | 1645.43 | 0 | 175.4 |
| | Penyinaran Matahari (%) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Kelembapan Relatif, RH (%) | 0 | 0 | 0 | 0 | 0 | 97.4 | 0 | 0 | 97.6 | 0 | 48.2 | 0 |
| 2006 | Temperatur Udara (°C) | 15.9 | 16.8 | 29.3 | 29.1 | 29 | 27.3 | 28.3 | 28 | 29.2 | 30 | 31.1 | 29.9 |
| | Kecepatan angin, U (Km/hari) | 478.4 | 285.5 | 356 | 588.7 | 609.4 | 1461.6 | 1427.4 | 1775.6 | 2108.2 | 2344 | 1893.4 | 868.7 |
| | Penyinaran Matahari (%) | 4 | 4.5 | 4.4 | 5.8 | 6 | 7.6 | 8.2 | 8.3 | 8.8 | 8.6 | 7.4 | 5 |
| | Kelembapan Relatif, RH (%) | 96.8 | 90.7 | 96.7 | 98 | 96.9 | 97.6 | 97 | 98 | 97.7 | 97.8 | 98 | 95.7 |
| 2007 | Temperatur Udara (°C) | 29.3 | 26.4 | 27 | 28.8 | 27.1 | 25.3 | 24.8 | 25.6 | 25.9 | 28.2 | 27.6 | 27.1 |
| | Kecepatan angin, U (Km/hari) | 658.4 | 313.1 | 410.8 | 15143.7 | 665.7 | 986.8 | 1176.9 | 1877.5 | 2288.3 | 2067.3 | 1100.9 | 390.1 |
| | Penyinaran Matahari (%) | 6.9 | 4.2 | 4.2 | 4.8 | 5.8 | 7.6 | 8.2 | 8.3 | 8.8 | 8.3 | 5.3 | 3.1 |
| | Kelembapan Relatif, RH (%) | 97.6 | 91.8 | 97.4 | 98.1 | 97.3 | 97.1 | 97.3 | 97.1 | 97.5 | 97.4 | 97.1 | 97.1 |
| 2008 | Temperatur Udara (°C) | 27.8 | 26.3 | 27.4 | 27.7 | 27.7 | 27.8 | 26.9 | 27.7 | 28.1 | 28.6 | 27.7 | 27.4 |
| | Kecepatan angin, U (Km/hari) | 383.3 | 267.3 | 395.8 | 628 | 1193.7 | 990.2 | 1616.4 | 1660.8 | 2535.3 | 1499.2 | 464.6 | 582.133 |
| | Penyinaran Matahari (%) | 6.9 | 4.4 | 4.2 | 4.8 | 5.8 | 7.6 | 8.2 | 8.3 | 8.8 | 8.3 | 5.3 | 3.1 |
| | Kelembapan Relatif, RH (%) | 97.5 | 93.4 | 90.4 | 96.2 | 97.3 | 97.2 | 96.5 | 97 | 97.2 | 96.7 | 96.5 | 97.9 |
| 2009 | Temperatur Udara (°C) | 27.6 | 25.3 | 28.6 | 30.1 | 27.9 | 28.3 | 28.4 | 27.6 | 25.8 | 28.3 | 28.6 | 28.2 |
| | Kecepatan angin, U (Km/hari) | 314.9 | 262.7 | 460.5 | 590.8 | 587.9 | 809.3 | 1331.6 | 1525.7 | 2654.4 | 2033.3 | 1168.1 | 900.9 |
| | Penyinaran Matahari (%) | 4.1 | 2.8 | 5.8 | 5.2 | 4.9 | 7 | 7.8 | 8.2 | 8.2 | 7.2 | 5.8 | 6.3 |
| | Kelembapan Relatif, RH (%) | 97.4 | 91.4 | 90.4 | 96.6 | 97.3 | 96.8 | 97.1 | 96.7 | 96.7 | 96.7 | 96.4 | 96.9 |
| 2010 | Temperatur Udara (°C) | 27.9 | 26.2 | 27.9 | 28.3 | 27.9 | 27.8 | 29.1 | 28.1 | 27.7 | 27.7 | 27.8 | 26.9 |
| | Kecepatan angin, U (Km/hari) | 356.8 | 402.6 | 451.3 | 449 | 628.3 | 777.3 | 960.7 | 1165.8 | 885.2 | 1015.5 | 613.2 | 305.1 |
| | Penyinaran Matahari (%) | 4.1 | 2.8 | 5.8 | 5.2 | 4.9 | 7 | 7.8 | 8.2 | 8.2 | 7.2 | 5.8 | 6.3 |
| | Kelembapan Relatif, RH (%) | 97.4 | 91.4 | 90.4 | 96.6 | 97.3 | 96.8 | 97.1 | 96.7 | 96.7 | 96.7 | 96.4 | 96.9 |
| 2011 | Temperatur Udara (°C) | 26.8 | 25.2 | 26.9 | 27.2 | 27.7 | 26.9 | 27.5 | 27.1 | 27 | 28.2 | 27.8 | 27.6 |
| | Kecepatan angin, U (Km/hari) | 251 | 279.5 | 308.3 | 451.7 | 723.6 | 1237.2 | 1111 | 1444.6 | 2207 | 1676.8 | 865.9 | 483.2 |
| | Penyinaran Matahari (%) | 3.9 | 3.6 | 4 | 4.3 | 6.1 | 7.6 | 7.3 | 7.9 | 0 | 7 | 4.5 | 4 |
| | Kelembapan Relatif, RH (%) | 97.4 | 89.7 | 96.9 | 97.1 | 96.2 | 93.2 | 96.9 | 97.1 | 96.5 | 96.5 | 96.6 | 96.8 |
| 2012 | Temperatur Udara (°C) | 26.9 | 26.3 | 26.9 | 27.9 | 27.6 | 27.3 | 21.4 | 26.5 | 27.5 | 28.4 | 27.9 | 27.4 |
| | Kecepatan angin, U (Km/hari) | 308.7 | 461.7 | 367.5 | 607.5 | 871 | 1078.2 | 1663.9 | 1818.6 | 1675.2 | 1889.2 | 1262.4 | 365.8 |
| | Penyinaran Matahari (%) | 3.5 | 4.9 | 3.9 | 6.7 | 6.7 | 7.1 | 7.5 | 8.9 | 8 | 7.5 | 4.8 | 4.4 |
| | Kelembapan Relatif, RH (%) | 95.9 | 91 | 96.9 | 95.9 | 96.8 | 96.8 | 97.5 | 96.4 | 96.2 | 96.4 | 96.1 | 96 |
| 2013 | Temperatur Udara (°C) | 27.5 | 26 | 28.2 | 28.4 | 28.4 | 27.8 | 26.8 | 27.1 | 27.6 | 28.4 | 27.8 | 26.9 |
| | Kecepatan angin, U (Km/hari) | 243.6 | 301.7 | 436.9 | 437.9 | 331.6 | 335.8 | 1176.5 | 1516 | 2099.8 | 1764 | 743.8 | 556.1 |
| | Penyinaran Matahari (%) | 4.3 | 40.5 | 51.6 | 5.2 | 4.8 | 4.7 | 6 | 8 | 8.6 | 8 | 6.1 | 4.5 |
| | Kelembapan Relatif, RH (%) | 93.2 | 67.1 | 95.1 | 94.9 | 95.3 | 94.6 | 95.9 | 96.1 | 96.5 | 95.5 | 95.7 | 95.2 |

*(Sumber :Dinas PU Sumber Daya Air dan Penataan Ruang, 2019)*

**Tabel B 2** Rekapitulasi Data Klimatologi Tahun 2001-2019

| Tahun | Data Klimatologi | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Ags | Sep | Okt | Nov | Des |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2014 | Temperatur Udara (°C) | 27 | 25.9 | 17.9 | 28.4 | 28.9 | 28.3 | 26.9 | 27.4 | 27.2 | 28.8 | 28.5 | 27.3 |
| | Kecepatan angin, U (Km/hari) | 213.4 | 251.5 | 448.9 | 397.2 | 444.9 | 604.7 | 1233.5 | 1320.6 | 1609.4 | 1946.4 | 1163.2 | 391.4 |
| | Penyinaran Matahari (%) | 3.8 | 4 | 5.8 | 6.4 | 6.2 | 6.8 | 5.7 | 8.9 | 8.4 | 8.3 | 5.6 | 3.6 |
| | Kelembapan Relatif, RH (%) | 94.7 | 88.6 | 95.9 | 96 | 96.1 | 97 | 96.8 | 96.1 | 95.5 | 93 | 95 | 95.9 |
| 2015 | Temperatur Udara (°C) | 28 | 26 | 27.9 | 27.8 | 28.3 | 27.9 | 27.9 | 27.7 | 28.3 | 30.1 | 29.3 | 28 |
| | Kecepatan angin, U (Km/hari) | 268 | 331.2 | 337.3 | 283.2 | 516.2 | 998.4 | 1005.2 | 1298.2 | 1515.9 | 1387.3 | 1176 | 485.2 |
| | Penyinaran Matahari (%) | 5.6 | 5.6 | 5.1 | 5.5 | 6.2 | 7.6 | 7.9 | 8.6 | 9.1 | 8.7 | 6.7 | 5.9 |
| | Kelembapan Relatif, RH (%) | 95.6 | 88.7 | 96.4 | 95.4 | 96.7 | 97.2 | 96.2 | 96.8 | 96.4 | 96.2 | 96.4 | 95.8 |
| 2016 | Temperatur Udara (°C) | 28.7 | 26.6 | 28.3 | 28.4 | 28.4 | 27.7 | 27.8 | 27.1 | 27.4 | 27.5 | 27.5 | 27 |
| | Kecepatan angin, U (Km/hari) | 430.1 | 293.7 | 340.5 | 311.1 | 344 | 551 | 602.2 | 1011.5 | 858.6 | 539.1 | 634.5 | 254.6 |
| | Penyinaran Matahari (%) | 42.5 | 30.6 | 39.3 | 51.2 | 48.7 | 52.6 | 49.8 | 56.1 | 50.7 | 42.5 | 36.1 | 25.4 |
| | Kelembapan Relatif, RH (%) | 92.2 | 88.7 | 92.3 | 92.6 | 93.9 | 93.1 | 93.5 | 92.3 | 91.6 | 93.9 | 92.5 | 94 |
| 2017 | Temperatur Udara (°C) | 26.5 | 25.1 | 27.8 | 28.2 | 27.9 | 28 | 26.5 | 26.6 | 27.6 | 27.7 | 27 | 27.7 |
| | Kecepatan angin, U (Km/hari) | 231.8 | 315.6 | 311.1 | 587.8 | 895.8 | 644.8 | 1453.1 | 1606 | 1627.2 | 1639.6 | 597.6 | 355.5 |
| | Penyinaran Matahari (%) | 29.7 | 36.9 | 48.5 | 53.6 | 66.1 | 57.7 | 56.8 | 71.4 | 66.9 | 53.7 | 23.4 | 25.4 |
| | Kelembapan Relatif, RH (%) | 95.1 | 88.8 | 94.9 | 94.9 | 95 | 95.1 | 95.3 | 95 | 94.6 | 91.7 | 94.5 | 94 |
| 2018 | Temperatur Udara (°C) | 26.7 | 25 | 27.4 | 28.1 | 27.9 | 27.6 | 27.2 | 26.8 | 27.9 | 28.9 | 28.2 | 27.5 |
| | Kecepatan angin, U (Km/hari) | 232.7 | 303.1 | 465.2 | 546.4 | 796.1 | 1152.1 | 1514.5 | 1691.2 | 1872.3 | 1989 | 1339.3 | 802.8 |
| | Penyinaran Matahari (%) | 21.6 | 36.1 | 53.1 | 60.2 | 62.1 | 58.4 | 72.8 | 78.5 | 72.4 | 68 | 40.3 | 39.2 |
| | Kelembapan Relatif, RH (%) | 95.3 | 88.3 | 94.2 | 93.6 | 93.3 | 92.4 | 89.1 | 88 | 86.9 | 83.5 | 88.1 | 91 |
| 2019 | Temperatur Udara (°C) | 27.7 | 25.9 | 27.1 | 30 | 28.5 | 27.1 | 26.6 | 26.8 | 27.4 | 29.1 | 29.3 | 28.4 |
| | Kecepatan angin, U (Km/hari) | 394.3 | 438.6 | 395.5 | 573.9 | 964.7 | 1125.9 | 1377.4 | 1635.1 | 1652.8 | 2077.8 | 1303.6 | 1474.4 |
| | Penyinaran Matahari (%) | 21.6 | 42.9 | 0 | 56.9 | 65.4 | 68.4 | 68.4 | 76.1 | 0 | 8.9 | 7.7 | 4.2 |
| | Kelembapan Relatif, RH (%) | 93.1 | 87 | 93.7 | 93.6 | 88.5 | 92.5 | 89 | 88.7 | 85.9 | 80.7 | 0 | 0 |

*(Sumber : Dinas PU Sumber Daya Air dan Penataan Ruang, 2019)*

**Tabel B 3** Tekanan Uap Jenuh (ea)

Table 5 Saturation Vapour Pressure (ea) in mbar as Function of Mean Air Temperature (T) in °C 1/

| Temperature °C | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ea mbar | 6.1 | 6.6 | 7.1 | 7.6 | 8.1 | 8.7 | 9.3 | 10.0 | 10.7 | 11.5 | 12.3 | 13.1 | 14.0 | 15.0 | 16.1 | 17.0 | 18.2 | 19.4 | 20.6 | 22.0 |

| Temperature °C | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ea mbar | 23.4 | 24.9 | 26.4 | 28.1 | 29.8 | 31.7 | 33.6 | 35.7 | 37.8 | 40.1 | 42.4 | 44.9 | 47.6 | 50.3 | 53.2 | 56.2 | 59.4 | 62.8 | 66.3 | 69.9 |

1/ Also actual vapour pressure (ed) can be obtained from this table using available Tdewpoint data.
(Example: Tdewpoint is 18°C; ed is 20.6 mbar)

*(Sumber : Doorenbos, 1977)*

**Tabel B 4** Nilai (1-W)

Table 8 Values of Weighting Factor (1-W) for the Effect of Wind and Humidity on ETo at Different Temperatures and Altitudes

| Temperature °C | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1-W) at altitude m | | | | | | | | | | | | | | | | | | | | |
| 0 | 0.57 | .54 | .51 | .48 | .45 | .42 | .39 | .36 | .34 | .32 | .29 | .27 | .25 | .23 | .22 | .20 | .19 | .17 | .16 | .15 |
| 500 | .56 | .52 | .49 | .46 | .43 | .40 | .38 | .35 | .33 | .30 | .28 | .26 | .24 | .22 | .21 | .19 | .18 | .16 | .15 | .14 |
| 1 000 | .54 | .51 | .48 | .45 | .42 | .39 | .36 | .34 | .31 | .29 | .27 | .25 | .23 | .21 | .20 | .18 | .17 | .15 | .14 | .13 |
| 2 000 | .51 | .48 | .45 | .42 | .39 | .36 | .34 | .31 | .29 | .27 | .25 | .23 | .21 | .19 | .18 | .16 | .15 | .14 | .13 | .12 |
| 3 000 | .48 | .45 | .42 | .39 | .36 | .34 | .31 | .29 | .27 | .25 | .23 | .21 | .19 | .18 | .16 | .15 | .14 | .13 | .12 | .11 |
| 4 000 | .46 | .42 | .39 | .36 | .34 | .31 | .29 | .27 | .25 | .23 | .21 | .19 | .18 | .16 | .15 | .14 | .13 | .12 | .11 | .10 |

*(Sumber : Doorenbos, 1977)*

## **Tabel B 5** Nilai W

Table 9 Values of Weighting Factor (W) for the Effect of Radiation on ETo at Different Temperatures and Altitudes

| Temperature °C | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W at altitude m | | | | | | | | | | | | | | | | | | | | |
| 0 | 0.43 | .46 | .49 | .52 | .55 | .58 | .61 | .64 | .66 | .69 | .71 | .73 | .75 | .77 | .78 | .80 | .82 | .83 | .84 | .85 |
| 500 | .44 | .48 | .51 | .54 | .57 | .60 | .62 | .65 | .67 | .70 | .72 | .74 | .76 | .78 | .79 | .81 | .82 | .84 | .85 | .86 |
| 1 000 | .46 | .49 | .52 | .55 | .58 | .61 | .64 | .66 | .69 | .71 | .73 | .75 | .77 | .79 | .80 | .82 | .83 | .85 | .86 | .87 |
| 2 000 | .49 | .52 | .55 | .58 | .61 | .64 | .66 | .69 | .71 | .73 | .75 | .77 | .79 | .81 | .82 | .84 | .85 | .86 | .87 | .88 |
| 3 000 | .52 | .55 | .58 | .61 | .64 | .66 | .69 | .71 | .73 | .75 | .77 | .79 | .81 | .82 | .84 | .85 | .86 | .87 | .88 | .89 |
| 4 000 | .54 | .58 | .61 | .64 | .66 | .69 | .71 | .73 | .75 | .77 | .79 | .81 | .82 | .84 | .85 | .86 | .87 | .89 | .90 | .90 |

*(Sumber : Doorenbos, 1977)*

## **Tabel B 6** Nilai Ra

Table 10 Extra Terrestrial Radiation (Ra) expressed in equivalent evaporation in mm/day

| Northern Hemisphere | | | | | | | | | | | | | Southern Hemisphere | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Lat | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
| 3.8 | 6.1 | 9.4 | 12.7 | 15.8 | 17.1 | 16.4 | 14.1 | 10.9 | 7.4 | 4.5 | 3.2 | 50° | 17.5 | 14.7 | 10.9 | 7.0 | 4.2 | 3.1 | 3.5 | 5.5 | 8.9 | 12.9 | 16.5 | 18.2 |
| 4.3 | 6.6 | 9.8 | 13.0 | 15.9 | 17.2 | 16.5 | 14.3 | 11.2 | 7.8 | 5.0 | 3.7 | 48 | 17.6 | 14.9 | 11.2 | 7.5 | 4.7 | 3.5 | 4.0 | 6.0 | 9.3 | 13.2 | 16.6 | 18.2 |
| 4.9 | 7.1 | 10.2 | 13.3 | 16.0 | 17.2 | 16.6 | 14.5 | 11.5 | 8.3 | 5.5 | 4.3 | 46 | 17.7 | 15.1 | 11.5 | 7.9 | 5.2 | 4.0 | 4.4 | 6.5 | 9.7 | 13.4 | 16.7 | 18.3 |
| 5.3 | 7.6 | 10.6 | 13.7 | 16.1 | 17.2 | 16.6 | 14.7 | 11.9 | 8.7 | 6.0 | 4.7 | 44 | 17.8 | 15.3 | 11.9 | 8.4 | 5.7 | 4.4 | 4.9 | 6.9 | 10.2 | 13.7 | 16.7 | 18.3 |
| 5.9 | 8.1 | 11.0 | 14.0 | 16.2 | 17.3 | 16.7 | 15.0 | 12.2 | 9.1 | 6.5 | 5.2 | 42 | 17.8 | 15.5 | 12.2 | 8.8 | 6.1 | 4.9 | 5.4 | 7.4 | 10.6 | 14.0 | 16.8 | 18.3 |
| 6.4 | 8.6 | 11.4 | 14.3 | 16.4 | 17.3 | 16.7 | 15.2 | 12.5 | 9.6 | 7.0 | 5.7 | 40 | 17.9 | 15.7 | 12.5 | 9.2 | 6.6 | 5.3 | 5.9 | 7.9 | 11.0 | 14.2 | 16.9 | 18.3 |
| 6.9 | 9.0 | 11.8 | 14.5 | 16.4 | 17.2 | 16.7 | 15.3 | 12.8 | 10.0 | 7.5 | 6.1 | 38 | 17.9 | 15.8 | 12.8 | 9.6 | 7.1 | 5.8 | 6.3 | 8.3 | 11.4 | 14.4 | 17.0 | 18.3 |
| 7.4 | 9.4 | 12.1 | 14.7 | 16.4 | 17.2 | 16.7 | 15.4 | 13.1 | 10.6 | 8.0 | 6.6 | 36 | 17.9 | 16.0 | 13.2 | 10.1 | 7.5 | 6.3 | 6.8 | 8.8 | 11.7 | 14.6 | 17.0 | 18.2 |
| 7.9 | 9.8 | 12.4 | 14.8 | 16.5 | 17.1 | 16.8 | 15.5 | 13.4 | 10.8 | 8.5 | 7.2 | 34 | 17.8 | 16.1 | 13.5 | 10.5 | 8.0 | 6.8 | 7.2 | 9.2 | 12.0 | 14.9 | 17.1 | 18.2 |
| 8.3 | 10.2 | 12.8 | 15.0 | 16.5 | 17.0 | 16.8 | 15.6 | 13.6 | 11.2 | 9.0 | 7.8 | 32 | 17.8 | 16.2 | 13.8 | 10.9 | 8.5 | 7.3 | 7.7 | 9.6 | 12.4 | 15.1 | 17.2 | 18.1 |
| 8.8 | 10.7 | 13.1 | 15.2 | 16.5 | 17.0 | 16.8 | 15.7 | 13.9 | 11.6 | 9.5 | 8.3 | 30 | 17.8 | 16.4 | 14.0 | 11.3 | 8.9 | 7.8 | 8.1 | 10.1 | 12.7 | 15.3 | 17.3 | 18.1 |
| 9.3 | 11.1 | 13.4 | 15.3 | 16.5 | 16.8 | 16.7 | 15.7 | 14.1 | 12.0 | 9.9 | 8.8 | 28 | 17.7 | 16.4 | 14.3 | 11.6 | 9.3 | 8.2 | 8.6 | 10.4 | 13.0 | 15.4 | 17.2 | 17.9 |
| 9.8 | 11.5 | 13.7 | 15.3 | 16.4 | 16.7 | 16.6 | 15.7 | 14.3 | 12.3 | 10.3 | 9.3 | 26 | 17.6 | 16.4 | 14.4 | 12.0 | 9.7 | 8.7 | 9.1 | 10.9 | 13.2 | 15.5 | 17.2 | 17.8 |
| 10.2 | 11.9 | 13.9 | 15.4 | 16.4 | 16.6 | 16.5 | 15.8 | 14.5 | 12.6 | 10.7 | 9.7 | 24 | 17.5 | 16.5 | 14.6 | 12.3 | 10.2 | 9.1 | 9.5 | 11.2 | 13.4 | 15.6 | 17.1 | 17.7 |
| 10.7 | 12.3 | 14.2 | 15.5 | 16.3 | 16.4 | 16.4 | 15.8 | 14.6 | 13.0 | 11.1 | 10.2 | 22 | 17.4 | 16.5 | 14.8 | 12.6 | 10.6 | 9.6 | 10.0 | 11.6 | 13.7 | 15.7 | 17.0 | 17.5 |
| 11.2 | 12.7 | 14.4 | 15.6 | 16.3 | 16.4 | 16.3 | 15.9 | 14.8 | 13.3 | 11.6 | 10.7 | 20 | 17.3 | 16.5 | 15.0 | 13.0 | 11.0 | 10.0 | 10.4 | 12.0 | 13.9 | 15.8 | 17.0 | 17.4 |
| 11.6 | 13.0 | 14.6 | 15.6 | 16.1 | 16.1 | 16.1 | 15.8 | 14.9 | 13.6 | 12.0 | 11.1 | 18 | 17.1 | 16.5 | 15.1 | 13.2 | 11.4 | 10.4 | 10.8 | 12.3 | 14.1 | 15.8 | 16.8 | 17.1 |
| 12.0 | 13.3 | 14.7 | 15.6 | 16.0 | 15.9 | 15.9 | 15.7 | 15.0 | 13.9 | 12.4 | 11.6 | 16 | 16.9 | 16.4 | 15.2 | 13.5 | 11.7 | 10.8 | 11.2 | 12.6 | 14.3 | 15.8 | 16.7 | 16.8 |
| 12.4 | 13.6 | 14.9 | 15.7 | 15.8 | 15.7 | 15.7 | 15.7 | 15.1 | 14.1 | 12.8 | 12.0 | 14 | 16.7 | 16.4 | 15.3 | 13.7 | 12.1 | 11.2 | 11.6 | 12.9 | 14.5 | 15.8 | 16.5 | 16.6 |
| 12.8 | 13.9 | 15.1 | 15.7 | 15.7 | 15.5 | 15.5 | 15.6 | 15.2 | 14.4 | 13.3 | 12.5 | 12 | 16.6 | 16.3 | 15.4 | 14.0 | 12.5 | 11.6 | 12.0 | 13.2 | 14.7 | 15.8 | 16.4 | 16.5 |
| 13.2 | 14.2 | 15.3 | 15.7 | 15.5 | 15.3 | 15.3 | 15.5 | 15.3 | 14.7 | 13.6 | 12.9 | 10 | 16.4 | 16.3 | 15.5 | 14.2 | 12.8 | 12.0 | 12.4 | 13.5 | 14.8 | 15.9 | 16.2 | 16.2 |
| 13.6 | 14.5 | 15.3 | 15.6 | 15.3 | 15.0 | 15.1 | 15.4 | 15.3 | 14.8 | 13.9 | 13.3 | 8 | 16.1 | 16.1 | 15.5 | 14.4 | 13.1 | 12.4 | 12.7 | 13.7 | 14.9 | 15.8 | 16.0 | 16.0 |
| 13.9 | 14.8 | 15.4 | 15.4 | 15.1 | 14.7 | 14.9 | 15.2 | 15.3 | 15.0 | 14.2 | 13.7 | 6 | 15.8 | 16.0 | 15.6 | 14.7 | 13.4 | 12.8 | 13.1 | 14.0 | 15.0 | 15.7 | 15.8 | 15.7 |
| 14.3 | 15.0 | 15.5 | 15.5 | 14.9 | 14.4 | 14.6 | 15.1 | 15.3 | 15.1 | 14.5 | 14.1 | 4 | 15.5 | 15.8 | 15.6 | 14.9 | 13.8 | 13.2 | 13.4 | 14.3 | 15.1 | 15.6 | 15.5 | 15.4 |
| 14.7 | 15.3 | 15.6 | 15.3 | 14.6 | 14.2 | 14.3 | 14.9 | 15.3 | 15.3 | 14.8 | 14.4 | 2 | 15.3 | 15.7 | 15.7 | 15.1 | 14.1 | 13.5 | 13.7 | 14.5 | 15.2 | 15.5 | 15.3 | 15.1 |
| 15.0 | 15.5 | 15.7 | 15.3 | 14.4 | 13.9 | 14.1 | 14.8 | 15.3 | 15.4 | 15.1 | 14.8 | 0 | 15.0 | 15.5 | 15.7 | 15.3 | 14.4 | 13.9 | 14.1 | 14.8 | 15.3 | 15.4 | 15.1 | 14.8 |

*(Sumber : Doorenbos, 1977)*

## ***Tabel B 7*** *Nilai N*

Table 11 Mean Daily Duration of Maximum Possible Sunshine Hours (N) for Different Months and Latitudes

| Northern Lats | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Southern Lats | July | Aug | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | June |
| 50° | 8.5 | 10.1 | 11.8 | 13.8 | 15.4 | 16.3 | 15.9 | 14.5 | 12.7 | 10.8 | 9.1 | 8.1 |
| 48 | 8.8 | 10.2 | 11.8 | 13.6 | 15.2 | 16.0 | 15.6 | 14.3 | 12.6 | 10.9 | 9.3 | 8.3 |
| 46 | 9.1 | 10.4 | 11.9 | 13.5 | 14.9 | 15.7 | 15.4 | 14.2 | 12.6 | 10.9 | 9.5 | 8.7 |
| 44 | 9.3 | 10.5 | 11.9 | 13.4 | 14.7 | 15.4 | 15.2 | 14.0 | 12.6 | 11.0 | 9.7 | 8.9 |
| 42 | 9.4 | 10.6 | 11.9 | 13.4 | 14.6 | 15.2 | 14.9 | 13.9 | 12.6 | 11.1 | 9.8 | 9.1 |
| 40 | 9.6 | 10.7 | 11.9 | 13.3 | 14.4 | 15.0 | 14.7 | 13.7 | 12.5 | 11.2 | 10.0 | 9.3 |
| 35 | 10.1 | 11.0 | 11.9 | 13.1 | 14.0 | 14.5 | 14.3 | 13.5 | 12.4 | 11.3 | 10.3 | 9.8 |
| 30 | 10.4 | 11.1 | 12.0 | 12.9 | 13.6 | 14.0 | 13.9 | 13.2 | 12.4 | 11.5 | 10.6 | 10.2 |
| 25 | 10.7 | 11.3 | 12.0 | 12.7 | 13.3 | 13.7 | 13.5 | 13.0 | 12.3 | 11.6 | 10.9 | 10.6 |
| 20 | 11.0 | 11.5 | 12.0 | 12.6 | 13.1 | 13.3 | 13.2 | 12.8 | 12.3 | 11.7 | 11.2 | 10.9 |
| 15 | 11.3 | 11.6 | 12.0 | 12.5 | 12.8 | 13.0 | 12.9 | 12.6 | 12.2 | 11.8 | 11.4 | 11.2 |
| 10 | 11.6 | 11.8 | 12.0 | 12.3 | 12.6 | 12.7 | 12.6 | 12.4 | 12.1 | 11.8 | 11.6 | 11.5 |
| 5 | 11.8 | 11.9 | 12.0 | 12.2 | 12.3 | 12.4 | 12.3 | 12.3 | 12.1 | 12.0 | 11.9 | 11.8 |
| 0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |

*(Sumber : Doorenbos, 1977)*

## ***Tabel B 8*** *Nilai f(T)*

Table 13 Effect of Temperature (T) on Longwave Radiation (Rnl)

| T°C | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $f(T) = \sigma T k^4$ | 11.0 | 11.4 | 11.7 | 12.0 | 12.4 | 12.7 | 13.1 | 13.5 | 13.8 | 14.2 | 14.6 | 15.0 | 15.4 | 15.9 | 16.3 | 16.7 | 17.2 | 17.7 | 18.1 |

*(Sumber : Doorenbos, 1977)*

## ***Tabel B 9*** *Nilai Angka Koefisien Bulanan (c)*

| Bulan | c |
|---|---|
| Januari | 1.1 |
| Februari | 1.1 |
| Maret | 1 |
| April | 0.9 |
| Mei | 0.9 |
| Juni | 0.9 |
| Juli | 0.9 |
| Agustus | 1 |
| September | 1.1 |
| Oktober | 1.1 |
| November | 1.1 |
| Desember | 1.1 |

*(Sumber : Suhardjono, 1989 : 49)*

**Tabel B. 1** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2001

| No | Parameter | Satuan | Tahun 2001/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara (T) | °C | 29.20 | 26.40 | 29.40 | 29.10 | 29.70 | 28.60 | 28.10 | 29.30 | 29.50 | 30.20 | 29.80 | 29.40 |
| 2 | Kelembapan relatif (RH) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | Kecepatan angin (U) | km/hari | 492.70 | 293.00 | 444.80 | 579.10 | 643.90 | 1387.40 | 1328.90 | 1773.20 | 2226.00 | 2136.00 | 627.30 | 627.30 |
| 4 | Penyinaran Matahari (n/N) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea), | mbar | 40.56 | 34.44 | 41.02 | 40.33 | 41.71 | 39.18 | 38.03 | 40.79 | 41.25 | 42.90 | 41.94 | 41.02 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 40.56 | 34.44 | 41.02 | 40.33 | 41.71 | 39.18 | 38.03 | 40.79 | 41.25 | 42.90 | 41.94 | 41.02 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.60 | 1.06 | 1.47 | 1.83 | 2.01 | 4.02 | 3.86 | 5.06 | 6.28 | 6.04 | 1.96 | 1.96 |
| 9 | Faktor pembobot (1-W) | | 0.22 | 0.25 | 0.22 | 0.22 | 0.22 | 0.23 | 0.23 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 10 | Faktor pengali (W) | | 0.78 | 0.75 | 0.78 | 0.78 | 0.78 | 0.77 | 0.77 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 3.99 | 4.01 | 3.89 | 3.64 | 3.31 | 3.15 | 3.23 | 3.46 | 3.74 | 3.94 | 3.95 | 3.96 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - $\alpha$)Rs | mm/hari | 2.99 | 3.01 | 2.92 | 2.73 | 2.48 | 2.36 | 2.42 | 2.60 | 2.80 | 2.95 | 2.96 | 2.97 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.54 | 15.98 | 16.58 | 16.52 | 16.64 | 16.42 | 16.32 | 16.56 | 16.60 | 16.75 | 16.66 | 16.58 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.56 | 0.54 | 0.56 | 0.56 | 0.57 | 0.56 | 0.55 | 0.56 | 0.56 | 0.57 | 0.57 | 0.56 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 2.43 | 2.47 | 2.35 | 2.17 | 1.92 | 1.80 | 1.86 | 2.03 | 2.24 | 2.38 | 2.40 | 2.41 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 18.07 | 11.93 | 15.28 | 16.45 | 18.04 | 33.40 | 31.60 | 47.69 | 65.32 | 64.16 | 22.07 | 21.82 |
| | | mm/bulan | 541.98 | 358.03 | 458.49 | 493.60 | 541.35 | 1002.03 | 947.93 | 1430.63 | 1959.58 | 1924.73 | 662.23 | 654.53 |

**Tabel B. 3** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2002

| No | Parameter | Satuan | Tahun 2002/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 29.20 | 26.40 | 29.40 | 29.10 | 29.70 | 28.60 | 28.10 | 29.30 | 29.50 | 30.20 | 29.80 | 29.40 |
| 2 | Kelembapan relatif (RH) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | Kecepatan angin (U) | km/hari | 492.70 | 293.00 | 444.80 | 579.10 | 643.90 | 1387.40 | 1328.90 | 1773.20 | 2226.00 | 2136.00 | 627.30 | 627.30 |
| 4 | Penyinaran Matahari (n/N) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 40.56 | 34.44 | 41.02 | 40.33 | 41.71 | 39.18 | 38.03 | 40.79 | 41.25 | 42.90 | 41.94 | 41.02 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 40.56 | 34.44 | 41.02 | 40.33 | 41.71 | 39.18 | 38.03 | 40.79 | 41.25 | 42.90 | 41.94 | 41.02 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.60 | 1.06 | 1.47 | 1.83 | 2.01 | 4.02 | 3.86 | 5.06 | 6.28 | 6.04 | 1.96 | 1.96 |
| 9 | Faktor pembobot (1-W) | | 0.22 | 0.25 | 0.22 | 0.22 | 0.22 | 0.23 | 0.23 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 10 | Faktor pengali (W) | | 0.78 | 0.75 | 0.78 | 0.78 | 0.78 | 0.77 | 0.77 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 3.99 | 4.01 | 3.89 | 3.64 | 3.31 | 3.15 | 3.23 | 3.46 | 3.74 | 3.94 | 3.95 | 3.96 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - $\alpha$)Rs | mm/hari | 2.99 | 3.01 | 2.92 | 2.73 | 2.48 | 2.36 | 2.42 | 2.60 | 2.80 | 2.95 | 2.96 | 2.97 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.54 | 15.98 | 16.58 | 16.52 | 16.64 | 16.42 | 16.32 | 16.56 | 16.60 | 16.75 | 16.66 | 16.58 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.56 | 0.54 | 0.56 | 0.56 | 0.57 | 0.56 | 0.55 | 0.56 | 0.56 | 0.57 | 0.57 | 0.56 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 2.43 | 2.47 | 2.35 | 2.17 | 1.92 | 1.80 | 1.86 | 2.03 | 2.24 | 2.38 | 2.40 | 2.41 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 18.07 | 11.93 | 15.28 | 16.45 | 18.04 | 33.40 | 31.60 | 47.69 | 65.32 | 64.16 | 22.07 | 21.82 |
| | | mm/bulan | 541.98 | 358.03 | 458.49 | 493.60 | 541.35 | 1002.03 | 947.93 | 1430.63 | 1959.58 | 1924.73 | 662.23 | 654.53 |

# **Tabel B. 5** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2003

| No | Parameter | Satuan | Tahun 2003/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 29.10 | 26.90 | 29.80 | 30.00 | 29.50 | 31.40 | 29.00 | 29.20 | 30.40 | 29.40 | 29.50 | 28.70 |
| 2 | Kelembapan relatif (RH) | % | 97.30 | 91.20 | 97.70 | 97.20 | 97.40 | 97.40 | 97.10 | 97.10 | 97.60 | 97.10 | 97.60 | 97.80 |
| 3 | Kecepatan angin (U) | km/hari | 371.20 | 254.50 | 453.70 | 699.80 | 938.10 | 897.70 | 1559.20 | 1698.70 | 2517.20 | 2395.50 | 1374.00 | 516.10 |
| 4 | Penyinaran Matahari (n/N) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.30 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 40.33 | 35.49 | 41.94 | 42.40 | 41.25 | 45.98 | 40.10 | 40.56 | 43.40 | 40.90 | 41.25 | 39.41 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 39.24 | 32.37 | 40.98 | 41.21 | 40.18 | 44.78 | 38.94 | 39.38 | 42.36 | 39.71 | 40.26 | 38.54 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 1.09 | 3.12 | 0.96 | 1.19 | 1.07 | 1.20 | 1.16 | 1.18 | 1.04 | 1.19 | 0.99 | 0.87 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.27 | 0.96 | 1.49 | 2.16 | 2.80 | 2.69 | 4.48 | 4.86 | 7.07 | 6.74 | 3.98 | 1.66 |
| 9 | Faktor pembobot (1-W) | | 0.22 | 0.24 | 0.22 | 0.22 | 0.22 | 0.21 | 0.23 | 0.22 | 0.22 | 0.23 | 0.22 | 0.23 |
| 10 | Faktor pengali (W) | | 0.78 | 0.76 | 0.78 | 0.78 | 0.78 | 0.79 | 0.78 | 0.78 | 0.78 | 0.77 | 0.78 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 3.99 | 4.01 | 3.89 | 3.64 | 3.31 | 3.15 | 3.23 | 3.46 | 3.74 | 3.94 | 3.95 | 4.30 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 2.99 | 3.01 | 2.92 | 2.73 | 2.48 | 2.36 | 2.42 | 2.60 | 2.80 | 2.95 | 2.96 | 3.23 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.52 | 16.08 | 16.66 | 16.70 | 16.60 | 17.05 | 16.50 | 16.54 | 16.80 | 16.55 | 16.60 | 16.44 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.06 | 0.09 | 0.06 | 0.06 | 0.06 | 0.05 | 0.07 | 0.06 | 0.05 | 0.06 | 0.06 | 0.07 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.14 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.11 | 0.14 | 0.10 | 0.10 | 0.10 | 0.08 | 0.11 | 0.11 | 0.09 | 0.10 | 0.10 | 0.15 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 2.88 | 2.87 | 2.82 | 2.63 | 2.38 | 2.28 | 2.31 | 2.49 | 2.71 | 2.85 | 2.86 | 3.08 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.80 | 3.18 | 2.51 | 2.36 | 2.27 | 2.23 | 2.67 | 3.21 | 4.09 | 4.41 | 3.41 | 2.98 |
| | | mm/bulan | 84.08 | 95.54 | 75.43 | 70.66 | 68.08 | 66.89 | 80.00 | 96.38 | 122.66 | 132.38 | 102.35 | 89.27 |

**Tabel B. 7** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2004

| No | Parameter | Satuan | Tahun 2004/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 29.90 | 28.20 | 29.40 | 19.20 | 15.80 | 15.60 | 17.20 | 14.90 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | Kelembapan relatif (RH) | % | 0.00 | 94.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | Kecepatan angin (U) | km/hari | 466.20 | 217.20 | 324.90 | 761.60 | 1052.90 | 1025.70 | 1014.10 | 1487.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | Penyinaran Matahari (n/N) | % | 46.00 | 0.00 | 41.50 | 62.70 | 57.60 | 63.80 | 56.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 42.17 | 38.26 | 41.02 | 22.28 | 17.96 | 17.72 | 19.64 | 16.91 | 6.10 | 6.10 | 6.10 | 6.10 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 0.00 | 36.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 42.17 | 2.10 | 41.02 | 22.28 | 17.96 | 17.72 | 19.64 | 16.91 | 6.10 | 6.10 | 6.10 | 6.10 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.53 | 0.86 | 1.15 | 2.33 | 3.11 | 3.04 | 3.01 | 4.29 | 0.27 | 0.27 | 0.27 | 0.27 |
| 9 | Faktor pembobot (1-W) | | 0.22 | 0.23 | 0.22 | 0.33 | 0.36 | 0.37 | 0.35 | 0.38 | 0.60 | 0.60 | 0.60 | 0.60 |
| 10 | Faktor pengali (W) | | 0.78 | 0.77 | 0.78 | 0.67 | 0.64 | 0.63 | 0.65 | 0.62 | 0.40 | 0.40 | 0.40 | 0.40 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 7.66 | 4.01 | 7.11 | 8.20 | 7.13 | 7.17 | 6.86 | 3.46 | 3.74 | 3.94 | 3.95 | 3.96 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - $\alpha$)Rs | mm/hari | 5.74 | 3.01 | 5.34 | 6.15 | 5.35 | 5.38 | 5.15 | 2.60 | 2.80 | 2.95 | 2.96 | 2.97 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.68 | 16.34 | 16.58 | 14.44 | 13.77 | 13.74 | 14.04 | 13.64 | 11.00 | 11.00 | 11.00 | 11.00 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.34 | 0.08 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.51 | 0.10 | 0.47 | 0.66 | 0.62 | 0.67 | 0.61 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 2.91 | 0.12 | 2.67 | 3.26 | 2.90 | 3.15 | 2.90 | 0.46 | 0.37 | 0.37 | 0.37 | 0.37 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 2.83 | 2.89 | 2.67 | 2.89 | 2.45 | 2.23 | 2.25 | 2.13 | 2.43 | 2.58 | 2.59 | 2.60 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 18.06 | 2.90 | 12.57 | 17.05 | 19.67 | 19.01 | 19.82 | 28.61 | 2.16 | 2.22 | 2.23 | 2.23 |
| | | mm/bulan | 541.81 | 87.05 | 376.98 | 511.41 | 590.10 | 570.35 | 594.65 | 858.42 | 64.68 | 66.66 | 66.78 | 66.90 |

**Tabel B. 9** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2005

| No | Parameter | Satuan | Tahun 2005/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 15.90 | 16.80 | 16.30 | 15.90 | 16.20 | 16.00 | 15.50 | 28.50 | 29.90 | 30.10 | 30.30 | 29.10 |
| 2 | Kelembapan relatif (RH) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 97.40 | 0.00 | 0.00 | 97.60 | 0.00 | 48.20 | 0.00 |
| 3 | Kecepatan angin (U) | km/hari | 478.40 | 388.30 | 475.70 | 530.80 | 569.80 | 739.40 | 1260.70 | 1768.10 | 2066.00 | 1645.43 | 0.00 | 175.40 |
| 4 | Penyinaran Matahari (n/N) | % | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 18.08 | 19.16 | 18.56 | 18.08 | 18.44 | 18.20 | 17.60 | 38.95 | 42.17 | 42.65 | 43.15 | 40.33 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.73 | 0.00 | 0.00 | 41.16 | 0.00 | 20.80 | 0.00 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 18.08 | 19.16 | 18.56 | 18.08 | 18.44 | 0.47 | 17.60 | 38.95 | 1.01 | 42.65 | 22.35 | 40.33 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.56 | 1.32 | 1.55 | 1.70 | 1.81 | 2.27 | 3.67 | 5.04 | 5.85 | 4.71 | 0.27 | 0.74 |
| 9 | Faktor pembobot (1-W) | | 0.36 | 0.35 | 0.36 | 0.36 | 0.36 | 0.36 | 0.37 | 0.23 | 0.22 | 0.22 | 0.22 | 0.22 |
| 10 | Faktor pengali (W) | | 0.64 | 0.65 | 0.64 | 0.64 | 0.64 | 0.64 | 0.63 | 0.77 | 0.78 | 0.78 | 0.78 | 0.78 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 3.99 | 4.01 | 3.89 | 3.64 | 3.31 | 3.15 | 3.23 | 3.46 | 3.74 | 3.94 | 3.95 | 3.96 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 2.99 | 3.01 | 2.92 | 2.73 | 2.48 | 2.36 | 2.42 | 2.60 | 2.80 | 2.95 | 2.96 | 2.97 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 13.79 | 13.96 | 13.86 | 13.78 | 13.84 | 13.80 | 13.70 | 16.40 | 16.68 | 16.73 | 16.78 | 16.52 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.15 | 0.34 | 0.34 | 0.06 | 0.34 | 0.14 | 0.34 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.21 | 0.47 | 0.56 | 0.10 | 0.57 | 0.23 | 0.56 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 2.52 | 2.53 | 2.44 | 2.26 | 2.01 | 2.15 | 1.95 | 2.04 | 2.71 | 2.38 | 2.73 | 2.41 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 13.00 | 11.59 | 11.87 | 11.32 | 11.91 | 1.59 | 22.50 | 46.27 | 3.76 | 50.47 | 3.79 | 9.46 |
| | | mm/bulan | 389.97 | 347.63 | 356.13 | 339.51 | 357.25 | 47.56 | 674.94 | 1388.09 | 112.70 | 1514.05 | 113.72 | 283.85 |

**Tabel B. 11** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2006

| No | Parameter | Satuan | Tahun 2006/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 15.90 | 16.80 | 29.30 | 29.10 | 29.00 | 27.30 | 28.30 | 28.00 | 29.20 | 30.00 | 31.10 | 29.90 |
| 2 | Kelembapan relatif (RH) | % | 96.80 | 90.70 | 96.70 | 98.00 | 96.90 | 97.60 | 97.00 | 98.00 | 97.70 | 97.80 | 98.00 | 95.70 |
| 3 | Kecepatan angin (U) | km/hari | 478.40 | 285.50 | 356.00 | 588.70 | 609.40 | 1461.60 | 1427.40 | 1775.60 | 2108.20 | 2344.00 | 1893.40 | 868.70 |
| 4 | Penyinaran Matahari (n/N) | % | 4.00 | 4.50 | 4.40 | 5.80 | 6.00 | 7.60 | 8.20 | 8.30 | 8.80 | 8.60 | 7.40 | 5.00 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 18.08 | 19.16 | 40.79 | 40.33 | 40.10 | 36.33 | 38.49 | 37.80 | 40.56 | 42.40 | 45.17 | 42.17 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 17.50 | 17.38 | 39.44 | 39.52 | 38.86 | 35.46 | 37.34 | 37.04 | 39.63 | 41.47 | 44.27 | 40.36 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 0.58 | 1.78 | 1.35 | 0.81 | 1.24 | 0.87 | 1.15 | 0.76 | 0.93 | 0.93 | 0.90 | 1.81 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.56 | 1.04 | 1.23 | 1.86 | 1.92 | 4.22 | 4.12 | 5.06 | 5.96 | 6.60 | 5.38 | 2.62 |
| 9 | Faktor pembobot (1-W) | | 0.36 | 0.35 | 0.22 | 0.22 | 0.23 | 0.24 | 0.23 | 0.23 | 0.22 | 0.22 | 0.21 | 0.22 |
| 10 | Faktor pengali (W) | | 0.64 | 0.65 | 0.78 | 0.78 | 0.78 | 0.76 | 0.77 | 0.77 | 0.78 | 0.78 | 0.79 | 0.78 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.31 | 4.37 | 4.23 | 4.06 | 3.71 | 3.63 | 3.75 | 4.04 | 4.40 | 4.61 | 4.53 | 4.36 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.23 | 3.28 | 3.17 | 3.04 | 2.78 | 2.72 | 2.82 | 3.03 | 3.30 | 3.46 | 3.40 | 3.27 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 13.79 | 13.96 | 16.56 | 16.52 | 16.50 | 16.16 | 16.36 | 16.30 | 16.54 | 16.70 | 16.98 | 16.68 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.16 | 0.16 | 0.06 | 0.06 | 0.07 | 0.08 | 0.07 | 0.07 | 0.06 | 0.06 | 0.05 | 0.06 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.14 | 0.14 | 0.14 | 0.15 | 0.15 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 | 0.17 | 0.15 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.29 | 0.31 | 0.15 | 0.16 | 0.17 | 0.21 | 0.20 | 0.21 | 0.19 | 0.17 | 0.13 | 0.15 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 2.94 | 2.97 | 3.03 | 2.89 | 2.62 | 2.51 | 2.61 | 2.82 | 3.11 | 3.29 | 3.27 | 3.12 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.42 | 2.84 | 2.72 | 2.32 | 2.31 | 2.51 | 2.79 | 3.05 | 4.02 | 4.32 | 3.96 | 3.83 |
| | | mm/bulan | 72.67 | 85.12 | 81.58 | 69.50 | 69.19 | 75.22 | 83.81 | 91.61 | 120.75 | 129.45 | 118.82 | 114.84 |

**Tabel B. 13** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2007

| No | Parameter | Satuan | Tahun 2007/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 27.60 | 25.30 | 28.60 | 30.10 | 27.90 | 28.30 | 28.40 | 27.60 | 25.80 | 28.30 | 28.60 | 28.20 |
| 2 | Kelembapan relatif (RH) | % | 97.40 | 91.40 | 90.40 | 96.60 | 97.30 | 96.80 | 97.10 | 96.70 | 96.70 | 96.70 | 96.40 | 96.90 |
| 3 | Kecepatan angin (U) | km/hari | 314.90 | 262.70 | 460.50 | 590.80 | 587.90 | 809.30 | 1331.60 | 1525.70 | 2654.40 | 2033.30 | 1168.10 | 900.90 |
| 4 | Penyinaran Matahari (n/N) | % | 4.10 | 2.80 | 5.80 | 5.20 | 4.90 | 7.00 | 7.80 | 8.20 | 8.20 | 7.20 | 5.80 | 6.30 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 36.96 | 32.27 | 39.18 | 42.65 | 37.59 | 38.49 | 38.72 | 36.96 | 33.22 | 38.49 | 39.18 | 38.26 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 36.00 | 29.49 | 35.42 | 41.20 | 36.58 | 37.26 | 37.60 | 35.74 | 32.12 | 37.22 | 37.77 | 37.07 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 0.96 | 2.78 | 3.76 | 1.45 | 1.01 | 1.23 | 1.12 | 1.22 | 1.10 | 1.27 | 1.41 | 1.19 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.12 | 0.98 | 1.51 | 1.87 | 1.86 | 2.46 | 3.87 | 4.39 | 7.44 | 5.76 | 3.42 | 2.70 |
| 9 | Faktor pembobot (1-W) | | 0.23 | 0.26 | 0.23 | 0.22 | 0.23 | 0.23 | 0.23 | 0.23 | 0.24 | 0.23 | 0.23 | 0.23 |
| 10 | Faktor pengali (W) | | 0.77 | 0.74 | 0.77 | 0.78 | 0.77 | 0.77 | 0.77 | 0.77 | 0.76 | 0.77 | 0.77 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.31 | 4.24 | 4.34 | 4.02 | 3.64 | 3.59 | 3.73 | 4.03 | 4.35 | 4.50 | 4.41 | 4.46 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.24 | 3.18 | 3.25 | 3.01 | 2.73 | 2.69 | 2.80 | 3.02 | 3.26 | 3.38 | 3.31 | 3.35 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.22 | 15.73 | 16.42 | 16.73 | 16.28 | 16.36 | 16.38 | 16.22 | 15.85 | 16.36 | 16.42 | 16.34 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.10 | 0.08 | 0.06 | 0.07 | 0.07 | 0.07 | 0.08 | 0.09 | 0.07 | 0.07 | 0.07 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.14 | 0.13 | 0.15 | 0.15 | 0.14 | 0.16 | 0.17 | 0.17 | 0.17 | 0.16 | 0.15 | 0.16 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.17 | 0.20 | 0.20 | 0.14 | 0.17 | 0.19 | 0.20 | 0.22 | 0.25 | 0.19 | 0.17 | 0.18 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.07 | 2.98 | 3.06 | 2.87 | 2.55 | 2.50 | 2.60 | 2.81 | 3.01 | 3.19 | 3.13 | 3.16 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.86 | 3.20 | 3.66 | 2.55 | 2.16 | 2.36 | 2.70 | 3.40 | 4.68 | 4.54 | 3.88 | 3.49 |
| | | mm/bulan | 85.84 | 96.09 | 109.69 | 76.52 | 64.80 | 70.77 | 80.92 | 101.91 | 140.31 | 136.27 | 116.47 | 104.67 |

## **Tabel B. 15** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2008

| No | Parameter | Satuan | Tahun 2008/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| | **Data** | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 27.80 | 26.30 | 27.40 | 27.70 | 27.70 | 27.80 | 26.90 | 27.70 | 28.10 | 28.60 | 27.70 | 27.40 |
| 2 | Kelembapan relatif (RH) | % | 97.50 | 93.40 | 90.40 | 96.20 | 97.30 | 97.20 | 96.50 | 97.00 | 97.20 | 96.70 | 96.50 | 97.90 |
| 3 | Kecepatan angin (U) | km/hari | 383.30 | 267.30 | 395.80 | 628.00 | 1193.70 | 990.20 | 1616.40 | 1660.80 | 2535.30 | 1499.20 | 464.60 | 582.13 |
| 4 | Penyinaran Matahari (n/N) | % | 6.90 | 4.40 | 4.20 | 4.80 | 5.80 | 7.60 | 8.20 | 8.30 | 8.80 | 8.30 | 5.30 | 3.10 |
| | **Perhitungan** | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 37.38 | 34.23 | 36.54 | 37.17 | 37.17 | 37.38 | 35.49 | 37.17 | 38.03 | 39.18 | 37.17 | 36.54 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 36.45 | 31.97 | 33.03 | 35.76 | 36.17 | 36.33 | 34.25 | 36.05 | 36.97 | 37.89 | 35.87 | 35.77 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 0.93 | 2.26 | 3.51 | 1.41 | 1.00 | 1.05 | 1.24 | 1.12 | 1.06 | 1.29 | 1.30 | 0.77 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.30 | 0.99 | 1.34 | 1.97 | 3.49 | 2.94 | 4.63 | 4.75 | 7.12 | 4.32 | 1.52 | 1.84 |
| 9 | Faktor pembobot (1-W) | | 0.23 | 0.25 | 0.24 | 0.23 | 0.23 | 0.23 | 0.24 | 0.23 | 0.23 | 0.23 | 0.23 | 0.24 |
| 10 | Faktor pengali (W) | | 0.77 | 0.75 | 0.76 | 0.77 | 0.77 | 0.77 | 0.76 | 0.77 | 0.77 | 0.77 | 0.77 | 0.76 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.54 | 4.37 | 4.21 | 3.99 | 3.70 | 3.63 | 3.75 | 4.04 | 4.40 | 4.59 | 4.37 | 4.21 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.40 | 3.27 | 3.16 | 2.99 | 2.77 | 2.72 | 2.82 | 3.03 | 3.30 | 3.44 | 3.28 | 3.16 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.26 | 15.96 | 16.18 | 16.24 | 16.24 | 16.26 | 16.08 | 16.24 | 16.32 | 16.42 | 16.24 | 16.18 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.07 | 0.09 | 0.09 | 0.08 | 0.08 | 0.07 | 0.08 | 0.08 | 0.07 | 0.07 | 0.08 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.16 | 0.14 | 0.14 | 0.14 | 0.15 | 0.17 | 0.17 | 0.17 | 0.18 | 0.17 | 0.15 | 0.13 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.20 | 0.20 | 0.19 | 0.18 | 0.19 | 0.20 | 0.23 | 0.22 | 0.21 | 0.20 | 0.18 | 0.16 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.21 | 3.07 | 2.97 | 2.81 | 2.59 | 2.52 | 2.58 | 2.81 | 3.08 | 3.24 | 3.09 | 3.00 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 3.02 | 3.15 | 3.37 | 2.52 | 2.52 | 2.38 | 3.01 | 3.39 | 4.53 | 4.15 | 3.12 | 2.89 |
| | | mm/bulan | 90.62 | 94.57 | 101.23 | 75.68 | 75.61 | 71.49 | 90.43 | 101.78 | 135.81 | 124.59 | 93.54 | 86.57 |

**Tabel B. 17** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2009

| No | Parameter | Satuan | Tahun 2009/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 27.60 | 25.30 | 28.60 | 30.10 | 27.90 | 28.30 | 28.40 | 27.60 | 25.80 | 28.30 | 28.60 | 28.20 |
| 2 | Kelembapan relatif (RH) | % | 97.40 | 91.40 | 90.40 | 96.60 | 97.30 | 96.80 | 97.10 | 96.70 | 96.70 | 96.70 | 96.40 | 96.90 |
| 3 | Kecepatan angin (U) | km/hari | 314.90 | 262.70 | 460.50 | 590.80 | 587.90 | 809.30 | 1331.60 | 1525.70 | 2654.40 | 2033.30 | 1168.10 | 900.90 |
| 4 | Penyinaran Matahari (n/N) | % | 4.10 | 2.80 | 5.80 | 5.20 | 4.90 | 7.00 | 7.80 | 8.20 | 8.20 | 7.20 | 5.80 | 6.30 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 36.96 | 32.27 | 39.18 | 42.65 | 37.59 | 38.49 | 38.72 | 36.96 | 33.22 | 38.49 | 39.18 | 38.26 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 36.00 | 29.49 | 35.42 | 41.20 | 36.58 | 37.26 | 37.60 | 35.74 | 32.12 | 37.22 | 37.77 | 37.07 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 0.96 | 2.78 | 3.76 | 1.45 | 1.01 | 1.23 | 1.12 | 1.22 | 1.10 | 1.27 | 1.41 | 1.19 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.12 | 0.98 | 1.51 | 1.87 | 1.86 | 2.46 | 3.87 | 4.39 | 7.44 | 5.76 | 3.42 | 2.70 |
| 9 | Faktor pembobot (1-W) | | 0.23 | 0.26 | 0.23 | 0.22 | 0.23 | 0.23 | 0.23 | 0.23 | 0.25 | 0.23 | 0.23 | 0.23 |
| 10 | Faktor pengali (W) | | 0.77 | 0.74 | 0.77 | 0.78 | 0.77 | 0.77 | 0.77 | 0.77 | 0.75 | 0.77 | 0.77 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.31 | 4.24 | 4.34 | 4.02 | 3.64 | 3.59 | 3.73 | 4.03 | 4.35 | 4.50 | 4.41 | 4.46 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.24 | 3.18 | 3.25 | 3.01 | 2.73 | 2.69 | 2.80 | 3.02 | 3.26 | 3.38 | 3.31 | 3.35 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.22 | 15.73 | 16.42 | 16.73 | 16.28 | 16.36 | 16.38 | 16.22 | 15.85 | 16.36 | 16.42 | 16.34 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.10 | 0.08 | 0.06 | 0.07 | 0.07 | 0.07 | 0.08 | 0.09 | 0.07 | 0.07 | 0.07 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.14 | 0.13 | 0.15 | 0.15 | 0.14 | 0.16 | 0.17 | 0.17 | 0.17 | 0.16 | 0.15 | 0.16 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.17 | 0.20 | 0.20 | 0.14 | 0.17 | 0.19 | 0.20 | 0.22 | 0.25 | 0.19 | 0.17 | 0.18 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.07 | 2.98 | 3.06 | 2.87 | 2.55 | 2.50 | 2.60 | 2.81 | 3.01 | 3.19 | 3.13 | 3.16 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.86 | 3.20 | 3.66 | 2.55 | 2.16 | 2.36 | 2.70 | 3.40 | 4.74 | 4.54 | 3.87 | 3.49 |
| | | mm/bulan | 85.84 | 96.09 | 109.69 | 76.52 | 64.80 | 70.79 | 80.92 | 102.06 | 142.18 | 136.27 | 116.08 | 104.67 |

**Tabel B. 19** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2010

| No | Parameter | Satuan | Tahun 2010/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 27.90 | 26.20 | 27.90 | 28.30 | 27.90 | 27.80 | 29.10 | 28.10 | 27.70 | 27.70 | 27.80 | 26.90 |
| 2 | Kelembapan relatif (RH) | % | 97.40 | 91.40 | 90.40 | 96.60 | 97.30 | 96.80 | 97.10 | 96.70 | 96.70 | 96.70 | 96.40 | 96.90 |
| 3 | Kecepatan angin (U) | km/hari | 356.80 | 402.60 | 451.30 | 449.00 | 628.30 | 777.30 | 960.70 | 1165.80 | 885.20 | 1015.50 | 613.20 | 305.10 |
| 4 | Penyinaran Matahari (n/N) | % | 4.10 | 2.80 | 5.80 | 5.20 | 4.90 | 7.00 | 7.80 | 8.20 | 8.20 | 7.20 | 5.80 | 6.30 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 37.59 | 34.02 | 37.59 | 38.49 | 37.59 | 37.38 | 40.11 | 38.03 | 37.17 | 37.17 | 37.38 | 35.49 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 36.61 | 31.09 | 33.98 | 37.18 | 36.58 | 36.18 | 38.95 | 36.78 | 35.94 | 35.94 | 36.03 | 34.39 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 0.98 | 2.93 | 3.61 | 1.31 | 1.01 | 1.20 | 1.16 | 1.25 | 1.23 | 1.23 | 1.35 | 1.10 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.23 | 1.36 | 1.49 | 1.48 | 1.97 | 2.37 | 2.86 | 3.42 | 2.66 | 3.01 | 1.93 | 1.09 |
| 9 | Faktor pembobot (1-W) | | 0.23 | 0.25 | 0.23 | 0.23 | 0.23 | 0.23 | 0.22 | 0.23 | 0.23 | 0.23 | 0.23 | 0.24 |
| 10 | Faktor pengali (W) | | 0.77 | 0.75 | 0.77 | 0.77 | 0.77 | 0.77 | 0.78 | 0.77 | 0.77 | 0.77 | 0.77 | 0.76 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.31 | 4.24 | 4.34 | 4.02 | 3.64 | 3.59 | 3.73 | 4.03 | 4.35 | 4.50 | 4.41 | 4.46 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.24 | 3.18 | 3.25 | 3.01 | 2.73 | 2.69 | 2.80 | 3.02 | 3.26 | 3.38 | 3.31 | 3.35 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.28 | 15.94 | 16.28 | 16.36 | 16.28 | 16.26 | 16.52 | 16.32 | 16.24 | 16.24 | 16.26 | 16.08 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.07 | 0.09 | 0.08 | 0.07 | 0.07 | 0.08 | 0.07 | 0.07 | 0.08 | 0.08 | 0.08 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.14 | 0.13 | 0.15 | 0.15 | 0.14 | 0.16 | 0.17 | 0.17 | 0.17 | 0.16 | 0.15 | 0.16 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.16 | 0.19 | 0.21 | 0.17 | 0.17 | 0.20 | 0.18 | 0.21 | 0.22 | 0.20 | 0.19 | 0.21 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.07 | 2.99 | 3.05 | 2.84 | 2.55 | 2.49 | 2.61 | 2.82 | 3.05 | 3.17 | 3.12 | 3.14 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.90 | 3.56 | 3.58 | 2.37 | 2.18 | 2.32 | 2.50 | 3.15 | 3.41 | 3.63 | 3.30 | 2.94 |
| | | mm/bulan | 87.13 | 106.67 | 107.52 | 71.12 | 65.49 | 69.46 | 74.89 | 94.60 | 102.23 | 108.75 | 98.87 | 88.21 |

**Tabel B. 21** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2011

| No | Parameter | Satuan | Tahun 2011/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 26.80 | 25.20 | 26.90 | 27.20 | 27.70 | 26.90 | 27.50 | 27.10 | 27.00 | 28.20 | 27.80 | 27.60 |
| 2 | Kelembapan relatif (RH) | % | 97.40 | 89.70 | 96.90 | 97.10 | 96.20 | 93.20 | 96.90 | 97.10 | 96.50 | 96.50 | 96.60 | 96.80 |
| 3 | Kecepatan angin (U) | km/hari | 251.00 | 279.50 | 308.30 | 451.70 | 723.60 | 1237.20 | 1111.00 | 1444.60 | 2207.00 | 1676.80 | 865.90 | 483.20 |
| 4 | Penyinaran Matahari (n/N) | % | 3.90 | 3.60 | 4.00 | 4.30 | 6.10 | 7.60 | 7.30 | 7.90 | 0.00 | 7.00 | 4.50 | 4.00 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 35.28 | 32.08 | 35.49 | 36.12 | 37.17 | 35.49 | 36.75 | 35.91 | 35.70 | 38.26 | 37.38 | 36.96 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 34.36 | 28.78 | 34.39 | 35.07 | 35.76 | 33.08 | 35.61 | 34.87 | 34.45 | 36.92 | 36.11 | 35.78 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 0.92 | 3.30 | 1.10 | 1.05 | 1.41 | 2.41 | 1.14 | 1.04 | 1.25 | 1.34 | 1.27 | 1.18 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 0.95 | 1.02 | 1.10 | 1.49 | 2.22 | 3.61 | 3.27 | 4.17 | 6.23 | 4.80 | 2.61 | 1.57 |
| 9 | Faktor pembobot (1-W) | | 0.24 | 0.26 | 0.24 | 0.24 | 0.23 | 0.24 | 0.24 | 0.24 | 0.24 | 0.23 | 0.23 | 0.23 |
| 10 | Faktor pengali (W) | | 0.76 | 0.74 | 0.76 | 0.76 | 0.77 | 0.76 | 0.77 | 0.76 | 0.76 | 0.77 | 0.77 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.30 | 4.30 | 4.20 | 3.95 | 3.72 | 3.63 | 3.70 | 4.01 | 3.74 | 4.49 | 4.31 | 4.28 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.22 | 3.23 | 3.15 | 2.96 | 2.79 | 2.72 | 2.77 | 3.01 | 2.80 | 3.37 | 3.23 | 3.21 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.06 | 15.70 | 16.08 | 16.14 | 16.24 | 16.08 | 16.20 | 16.12 | 16.10 | 16.34 | 16.26 | 16.22 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.10 | 0.08 | 0.08 | 0.08 | 0.09 | 0.08 | 0.08 | 0.08 | 0.07 | 0.08 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.14 | 0.13 | 0.14 | 0.14 | 0.15 | 0.17 | 0.17 | 0.17 | 0.10 | 0.16 | 0.14 | 0.14 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.18 | 0.22 | 0.18 | 0.18 | 0.19 | 0.24 | 0.21 | 0.22 | 0.13 | 0.19 | 0.17 | 0.17 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.05 | 3.01 | 2.97 | 2.78 | 2.59 | 2.49 | 2.56 | 2.79 | 2.67 | 3.17 | 3.06 | 3.04 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.77 | 3.42 | 2.55 | 2.24 | 2.45 | 3.59 | 2.55 | 3.16 | 4.29 | 4.31 | 3.43 | 3.04 |
| | | mm/bulan | 83.13 | 102.53 | 76.39 | 67.32 | 73.48 | 107.65 | 76.60 | 94.74 | 128.64 | 129.28 | 102.84 | 91.23 |

**Tabel B. 23** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2012

| No | Parameter | Satuan | Tahun 2012/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 26.90 | 26.30 | 26.90 | 27.90 | 27.60 | 27.30 | 21.40 | 26.50 | 27.50 | 28.40 | 27.90 | 27.40 |
| 2 | Kelembapan relatif (RH) | % | 95.90 | 91.00 | 96.90 | 95.90 | 96.80 | 96.80 | 97.50 | 96.40 | 96.20 | 96.40 | 96.10 | 96.00 |
| 3 | Kecepatan angin (U) | km/hari | 308.70 | 461.70 | 367.50 | 607.50 | 871.00 | 1078.20 | 1663.90 | 1818.60 | 1675.20 | 1889.20 | 1262.40 | 365.80 |
| 4 | Penyinaran Matahari (n/N) | % | 3.50 | 4.90 | 3.90 | 6.70 | 6.70 | 7.10 | 7.50 | 8.90 | 8.00 | 7.50 | 4.80 | 4.40 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 35.49 | 34.23 | 35.49 | 37.59 | 36.96 | 36.33 | 25.50 | 34.65 | 36.75 | 38.72 | 37.59 | 36.54 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 34.03 | 31.15 | 34.39 | 36.05 | 35.78 | 35.17 | 24.86 | 33.40 | 35.35 | 37.33 | 36.12 | 35.08 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 1.46 | 3.08 | 1.10 | 1.54 | 1.18 | 1.16 | 0.64 | 1.25 | 1.40 | 1.39 | 1.47 | 1.46 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.10 | 1.52 | 1.26 | 1.91 | 2.62 | 3.18 | 4.76 | 5.18 | 4.79 | 5.37 | 3.68 | 1.26 |
| 9 | Faktor pembobot (1-W) | | 0.24 | 0.25 | 0.24 | 0.23 | 0.23 | 0.24 | 0.30 | 0.25 | 0.24 | 0.23 | 0.23 | 0.24 |
| 10 | Faktor pengali (W) | | 0.76 | 0.75 | 0.76 | 0.77 | 0.77 | 0.76 | 0.70 | 0.76 | 0.77 | 0.77 | 0.77 | 0.76 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.27 | 4.41 | 4.19 | 4.12 | 3.76 | 3.60 | 3.71 | 4.08 | 4.34 | 4.53 | 4.33 | 4.31 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.20 | 3.30 | 3.14 | 3.09 | 2.82 | 2.70 | 2.78 | 3.06 | 3.25 | 3.40 | 3.25 | 3.23 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.08 | 15.96 | 16.08 | 16.28 | 16.22 | 16.16 | 14.88 | 16.00 | 16.20 | 16.38 | 16.28 | 16.18 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.09 | 0.08 | 0.08 | 0.08 | 0.08 | 0.12 | 0.09 | 0.08 | 0.07 | 0.08 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.13 | 0.14 | 0.14 | 0.16 | 0.16 | 0.16 | 0.17 | 0.18 | 0.17 | 0.17 | 0.14 | 0.14 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.18 | 0.22 | 0.18 | 0.20 | 0.20 | 0.21 | 0.30 | 0.25 | 0.22 | 0.20 | 0.18 | 0.18 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.02 | 3.09 | 2.96 | 2.90 | 2.62 | 2.49 | 2.48 | 2.81 | 3.03 | 3.20 | 3.07 | 3.05 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.95 | 3.83 | 2.59 | 2.62 | 2.46 | 2.50 | 2.38 | 3.71 | 4.28 | 4.60 | 3.97 | 3.04 |
| | | mm/bulan | 88.51 | 114.79 | 77.55 | 78.49 | 73.73 | 74.93 | 71.47 | 111.19 | 128.48 | 137.87 | 119.04 | 91.31 |

**Tabel B. 25** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2013

| No | Parameter | Satuan | Tahun 2013/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 27.50 | 26.00 | 28.20 | 28.40 | 28.40 | 27.80 | 26.80 | 27.10 | 27.60 | 28.40 | 27.80 | 26.90 |
| 2 | Kelembapan relatif (RH) | % | 93.20 | 67.10 | 95.10 | 94.90 | 95.30 | 94.60 | 95.90 | 96.10 | 96.50 | 95.50 | 95.70 | 95.20 |
| 3 | Kecepatan angin (U) | km/hari | 243.60 | 301.70 | 436.90 | 437.90 | 331.60 | 335.80 | 1176.50 | 1516.00 | 2099.80 | 1764.00 | 743.80 | 556.10 |
| 4 | Penyinaran Matahari (n/N) | % | 4.30 | 40.50 | 51.60 | 5.20 | 4.80 | 4.70 | 6.00 | 8.00 | 8.60 | 8.00 | 6.10 | 4.50 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 36.75 | 33.60 | 38.26 | 38.72 | 38.72 | 37.38 | 35.28 | 35.91 | 36.96 | 38.72 | 37.38 | 35.49 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 34.25 | 22.55 | 36.39 | 36.75 | 36.90 | 35.36 | 33.83 | 34.51 | 35.67 | 36.98 | 35.77 | 33.79 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 2.50 | 11.05 | 1.87 | 1.97 | 1.82 | 2.02 | 1.45 | 1.40 | 1.29 | 1.74 | 1.61 | 1.70 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 0.93 | 1.08 | 1.45 | 1.45 | 1.17 | 1.18 | 3.45 | 4.36 | 5.94 | 5.03 | 2.28 | 1.77 |
| 9 | Faktor pembobot (1-W) | | 0.24 | 0.25 | 0.23 | 0.23 | 0.23 | 0.23 | 0.24 | 0.24 | 0.23 | 0.23 | 0.23 | 0.24 |
| 10 | Faktor pengali (W) | | 0.77 | 0.75 | 0.77 | 0.77 | 0.77 | 0.77 | 0.76 | 0.76 | 0.77 | 0.77 | 0.77 | 0.76 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.33 | 7.26 | 7.90 | 4.02 | 3.63 | 3.45 | 3.61 | 4.02 | 4.38 | 4.57 | 4.43 | 4.32 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.25 | 5.45 | 5.92 | 3.01 | 2.72 | 2.58 | 2.71 | 3.01 | 3.29 | 3.43 | 3.32 | 3.24 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.20 | 15.90 | 16.34 | 16.38 | 16.38 | 16.26 | 16.06 | 16.12 | 16.22 | 16.38 | 16.26 | 16.08 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.13 | 0.07 | 0.07 | 0.07 | 0.08 | 0.08 | 0.08 | 0.08 | 0.07 | 0.08 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.14 | 0.46 | 0.56 | 0.15 | 0.14 | 0.14 | 0.15 | 0.17 | 0.18 | 0.17 | 0.15 | 0.14 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.19 | 0.97 | 0.69 | 0.18 | 0.17 | 0.18 | 0.21 | 0.23 | 0.22 | 0.20 | 0.19 | 0.19 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.06 | 4.48 | 5.24 | 2.84 | 2.55 | 2.40 | 2.50 | 2.79 | 3.06 | 3.22 | 3.13 | 3.05 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 3.18 | 6.99 | 4.66 | 2.56 | 2.21 | 2.16 | 2.79 | 3.58 | 4.56 | 4.94 | 3.58 | 3.35 |
| | | mm/bulan | 95.29 | 209.77 | 139.79 | 76.76 | 66.26 | 64.71 | 83.76 | 107.43 | 136.76 | 148.05 | 107.37 | 100.37 |

**Tabel B. 27** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2014

| No | Parameter | Satuan | Tahun 2014/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 27.00 | 25.90 | 17.90 | 28.40 | 28.90 | 28.30 | 26.90 | 27.40 | 27.20 | 28.80 | 28.50 | 27.30 |
| 2 | Kelembapan relatif (RH) | % | 94.70 | 88.60 | 95.90 | 96.00 | 96.10 | 97.00 | 96.80 | 96.10 | 95.50 | 93.00 | 95.00 | 95.90 |
| 3 | Kecepatan angin (U) | km/hari | 213.40 | 251.50 | 448.90 | 397.20 | 444.90 | 604.70 | 1233.50 | 1320.60 | 1609.40 | 1946.40 | 1163.20 | 391.40 |
| 4 | Penyinaran Matahari (n/N) | % | 3.80 | 4.00 | 5.80 | 6.40 | 6.20 | 6.80 | 5.70 | 8.90 | 8.40 | 8.30 | 5.60 | 3.60 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 35.70 | 33.41 | 20.48 | 38.72 | 39.87 | 38.49 | 35.49 | 36.54 | 36.12 | 39.64 | 38.95 | 36.33 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 33.81 | 29.60 | 19.64 | 37.17 | 38.32 | 37.34 | 34.35 | 35.11 | 34.49 | 36.87 | 37.00 | 34.84 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 1.89 | 3.81 | 0.84 | 1.55 | 1.55 | 1.15 | 1.14 | 1.43 | 1.63 | 2.77 | 1.95 | 1.49 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 0.85 | 0.95 | 1.48 | 1.34 | 1.47 | 1.90 | 3.60 | 3.84 | 4.62 | 5.53 | 3.41 | 1.33 |
| 9 | Faktor pembobot (1-W) | | 0.24 | 0.25 | 0.34 | 0.23 | 0.23 | 0.23 | 0.24 | 0.24 | 0.24 | 0.23 | 0.23 | 0.24 |
| 10 | Faktor pengali (W) | | 0.76 | 0.75 | 0.66 | 0.77 | 0.77 | 0.77 | 0.76 | 0.76 | 0.76 | 0.77 | 0.77 | 0.76 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.29 | 4.33 | 4.34 | 4.10 | 3.72 | 3.58 | 3.59 | 4.08 | 4.37 | 4.59 | 4.39 | 4.25 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.22 | 3.25 | 3.25 | 3.08 | 2.79 | 2.68 | 2.69 | 3.06 | 3.27 | 3.44 | 3.29 | 3.19 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.10 | 15.88 | 14.18 | 16.38 | 16.48 | 16.36 | 16.08 | 16.18 | 16.14 | 16.46 | 16.40 | 16.16 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.10 | 0.15 | 0.07 | 0.07 | 0.07 | 0.08 | 0.08 | 0.08 | 0.07 | 0.07 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.13 | 0.14 | 0.15 | 0.16 | 0.16 | 0.16 | 0.15 | 0.18 | 0.18 | 0.17 | 0.15 | 0.13 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.18 | 0.22 | 0.31 | 0.19 | 0.17 | 0.19 | 0.20 | 0.23 | 0.23 | 0.21 | 0.18 | 0.17 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.04 | 3.03 | 2.94 | 2.89 | 2.62 | 2.50 | 2.49 | 2.83 | 3.04 | 3.23 | 3.12 | 3.01 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 2.96 | 3.50 | 2.36 | 2.44 | 2.29 | 2.19 | 2.59 | 3.45 | 4.51 | 6.56 | 4.31 | 3.04 |
| | | mm/bulan | 88.82 | 104.90 | 70.87 | 73.08 | 68.69 | 65.55 | 77.73 | 103.52 | 135.43 | 196.94 | 129.30 | 91.35 |

# **Tabel B. 29** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2015

| No | Parameter | Satuan | Tahun 2015/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 28.00 | 26.00 | 27.90 | 27.80 | 28.30 | 27.90 | 27.90 | 27.70 | 28.30 | 30.10 | 29.30 | 28.00 |
| 2 | Kelembapan relatif (RH) | % | 95.60 | 88.70 | 96.40 | 95.40 | 96.70 | 97.20 | 96.20 | 96.80 | 96.40 | 96.20 | 96.40 | 95.80 |
| 3 | Kecepatan angin (U) | km/hari | 268.00 | 331.20 | 337.30 | 283.20 | 516.20 | 998.40 | 1005.20 | 1298.20 | 1515.90 | 1387.30 | 1176.00 | 485.20 |
| 4 | Penyinaran Matahari (n/N) | % | 5.60 | 5.60 | 5.10 | 5.50 | 6.20 | 7.60 | 7.90 | 8.60 | 9.10 | 8.70 | 6.70 | 5.90 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 37.80 | 33.60 | 37.59 | 37.38 | 38.49 | 37.59 | 37.59 | 37.17 | 38.49 | 42.65 | 40.79 | 37.80 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 36.14 | 29.80 | 36.24 | 35.66 | 37.22 | 36.54 | 36.16 | 35.98 | 37.10 | 41.03 | 39.32 | 36.21 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 1.66 | 3.80 | 1.35 | 1.72 | 1.27 | 1.05 | 1.43 | 1.19 | 1.39 | 1.62 | 1.47 | 1.59 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 0.99 | 1.16 | 1.18 | 1.03 | 1.66 | 2.97 | 2.98 | 3.78 | 4.36 | 4.02 | 3.45 | 1.58 |
| 9 | Faktor pembobot (1-W) | | 0.23 | 0.25 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.22 | 0.22 | 0.23 |
| 10 | Faktor pengali (W) | | 0.77 | 0.75 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.78 | 0.78 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 4.43 | 4.46 | 4.28 | 4.04 | 3.72 | 3.63 | 3.73 | 4.06 | 4.42 | 4.62 | 4.48 | 4.43 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 3.33 | 3.35 | 3.21 | 3.03 | 2.79 | 2.72 | 2.80 | 3.04 | 3.31 | 3.47 | 3.36 | 3.32 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.30 | 15.90 | 16.28 | 16.26 | 16.36 | 16.28 | 16.28 | 16.24 | 16.36 | 16.72 | 16.56 | 16.30 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.10 | 0.08 | 0.08 | 0.07 | 0.07 | 0.08 | 0.08 | 0.07 | 0.06 | 0.06 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.15 | 0.15 | 0.15 | 0.15 | 0.16 | 0.17 | 0.17 | 0.18 | 0.18 | 0.18 | 0.16 | 0.15 |
| 16 | Radiasi gelombang panjang netto ( Rn1), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.19 | 0.24 | 0.18 | 0.19 | 0.18 | 0.20 | 0.21 | 0.22 | 0.21 | 0.17 | 0.17 | 0.19 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.14 | 3.11 | 3.03 | 2.84 | 2.61 | 2.52 | 2.59 | 2.82 | 3.10 | 3.29 | 3.19 | 3.13 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 3.08 | 3.78 | 2.70 | 2.33 | 2.25 | 2.39 | 2.68 | 3.21 | 4.15 | 4.40 | 3.97 | 3.29 |
| | | mm/bulan | 92.34 | 113.39 | 81.08 | 70.04 | 67.41 | 71.76 | 80.38 | 96.38 | 124.49 | 131.97 | 119.04 | 98.70 |

**Tabel B. 31** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2016

| No | Parameter | Satuan | Tahun 2016/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 28.70 | 26.60 | 28.30 | 28.40 | 28.40 | 27.70 | 27.80 | 27.10 | 27.40 | 27.50 | 27.50 | 27.00 |
| 2 | Kelembapan relatif (RH) | % | 92.20 | 88.70 | 92.30 | 92.60 | 93.90 | 93.10 | 93.50 | 92.30 | 91.60 | 93.90 | 92.50 | 94.00 |
| 3 | Kecepatan angin (U) | km/hari | 430.10 | 293.70 | 340.50 | 311.10 | 344.00 | 551.00 | 602.20 | 1011.50 | 858.60 | 539.10 | 634.50 | 254.60 |
| 4 | Penyinaran Matahari (n/N) | % | 42.50 | 30.60 | 39.30 | 51.20 | 48.70 | 52.60 | 49.80 | 56.10 | 50.70 | 42.50 | 36.10 | 25.40 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 39.41 | 34.86 | 38.49 | 38.72 | 38.72 | 37.17 | 37.38 | 35.91 | 36.54 | 36.75 | 36.75 | 35.70 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 36.34 | 30.92 | 35.53 | 35.85 | 36.36 | 34.61 | 34.95 | 33.14 | 33.47 | 34.51 | 33.99 | 33.56 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 3.07 | 3.94 | 2.96 | 2.87 | 2.36 | 2.56 | 2.43 | 2.77 | 3.07 | 2.24 | 2.76 | 2.14 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.43 | 1.06 | 1.19 | 1.11 | 1.20 | 1.76 | 1.90 | 3.00 | 2.59 | 1.73 | 1.98 | 0.96 |
| 9 | Faktor pembobot (1-W) | | 0.23 | 0.24 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| 10 | Faktor pengali (W) | | 0.77 | 0.76 | 0.77 | 0.77 | 0.77 | 0.77 | 0.77 | 0.76 | 0.76 | 0.77 | 0.77 | 0.76 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 7.38 | 6.47 | 6.94 | 7.36 | 6.54 | 6.46 | 6.44 | 7.35 | 7.53 | 7.28 | 6.80 | 5.98 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 5.53 | 4.85 | 5.21 | 5.52 | 4.90 | 4.85 | 4.83 | 5.51 | 5.65 | 5.46 | 5.10 | 4.48 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.44 | 16.02 | 16.36 | 16.38 | 16.38 | 16.24 | 16.26 | 16.12 | 16.18 | 16.20 | 16.20 | 16.10 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.07 | 0.10 | 0.08 | 0.08 | 0.07 | 0.08 | 0.08 | 0.09 | 0.09 | 0.08 | 0.08 | 0.09 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.48 | 0.38 | 0.45 | 0.56 | 0.54 | 0.57 | 0.55 | 0.60 | 0.56 | 0.48 | 0.42 | 0.33 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.59 | 0.57 | 0.58 | 0.70 | 0.66 | 0.76 | 0.71 | 0.85 | 0.77 | 0.64 | 0.57 | 0.45 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 4.94 | 4.28 | 4.63 | 4.82 | 4.25 | 4.09 | 4.12 | 4.67 | 4.88 | 4.83 | 4.53 | 4.03 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 5.30 | 4.68 | 4.38 | 4.00 | 3.53 | 3.77 | 3.81 | 5.53 | 6.16 | 5.06 | 5.22 | 3.91 |
| | | mm/bulan | 158.97 | 140.44 | 131.33 | 120.02 | 105.93 | 113.10 | 114.20 | 166.01 | 184.81 | 151.83 | 156.67 | 117.35 |

**Tabel B. 33** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2017

| No | Parameter | Satuan | Tahun 2017/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara | °C | 26.50 | 25.10 | 27.80 | 28.20 | 27.90 | 28.00 | 26.50 | 26.60 | 27.60 | 27.70 | 27.00 | 27.70 |
| 2 | Kelembapan relatif (RH) | % | 95.10 | 88.80 | 94.90 | 94.90 | 95.00 | 95.10 | 95.30 | 95.00 | 94.60 | 91.70 | 94.50 | 94.00 |
| 3 | Kecepatan angin (U) | km/hari | 231.80 | 315.60 | 311.10 | 587.80 | 895.80 | 644.80 | 1453.10 | 1606.00 | 1627.20 | 1639.60 | 597.60 | 355.50 |
| 4 | Penyinaran Matahari (n/N) | % | 29.70 | 36.90 | 48.50 | 53.60 | 66.10 | 57.70 | 56.80 | 71.40 | 66.90 | 53.70 | 23.40 | 25.40 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 34.65 | 31.89 | 37.38 | 38.26 | 37.59 | 37.80 | 34.65 | 34.86 | 36.96 | 37.17 | 35.70 | 37.17 |
| 6 | Tekanan uap nyata (ed), ed = ea x Rh/100 | mbar | 32.95 | 28.32 | 35.47 | 36.31 | 35.71 | 35.95 | 33.02 | 33.12 | 34.96 | 34.08 | 33.74 | 34.94 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 1.70 | 3.57 | 1.91 | 1.95 | 1.88 | 1.85 | 1.63 | 1.74 | 2.00 | 3.09 | 1.96 | 2.23 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 0.90 | 1.12 | 1.11 | 1.86 | 2.69 | 2.01 | 4.19 | 4.61 | 4.66 | 4.70 | 1.88 | 1.23 |
| 9 | Faktor pembobot (1-W) | | 0.25 | 0.26 | 0.23 | 0.23 | 0.23 | 0.23 | 0.25 | 0.24 | 0.23 | 0.23 | 0.24 | 0.23 |
| 10 | Faktor pengali (W) | | 0.76 | 0.74 | 0.77 | 0.77 | 0.77 | 0.77 | 0.76 | 0.76 | 0.77 | 0.77 | 0.76 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 6.36 | 6.97 | 7.66 | 7.54 | 7.69 | 6.79 | 6.89 | 8.41 | 8.74 | 8.17 | 5.80 | 5.98 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 4.77 | 5.23 | 5.74 | 5.65 | 5.77 | 5.09 | 5.17 | 6.31 | 6.55 | 6.12 | 4.35 | 4.48 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.00 | 15.68 | 16.26 | 16.34 | 16.28 | 16.30 | 16.00 | 16.02 | 16.22 | 16.24 | 16.10 | 16.24 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.09 | 0.11 | 0.08 | 0.07 | 0.08 | 0.08 | 0.09 | 0.09 | 0.08 | 0.08 | 0.08 | 0.08 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.37 | 0.43 | 0.54 | 0.58 | 0.69 | 0.62 | 0.61 | 0.74 | 0.70 | 0.58 | 0.31 | 0.33 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.51 | 0.72 | 0.68 | 0.71 | 0.87 | 0.77 | 0.85 | 1.03 | 0.91 | 0.79 | 0.42 | 0.43 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 4.25 | 4.51 | 5.06 | 4.94 | 4.90 | 4.32 | 4.31 | 5.27 | 5.64 | 5.34 | 3.93 | 4.06 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 3.94 | 4.82 | 4.38 | 4.17 | 4.44 | 3.76 | 4.44 | 5.95 | 7.15 | 8.22 | 4.26 | 4.12 |
| | | mm/bulan | 118.27 | 144.62 | 131.40 | 125.24 | 133.19 | 112.94 | 133.12 | 178.35 | 214.56 | 246.51 | 127.77 | 123.73 |

**Tabel B. 35** Perhitungan Evapotrasnpirasi Metode Penman Tahun 2019

| No | Parameter | Satuan | Tahun 2019/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Mar | Apr | Mei | Jun | Jul | Agt | Sep | Okt | Nov | Des |
| **Data** | | | | | | | | | | | | | | |
| 1 | Temperatur Udara (T) | °C | 27.70 | 25.90 | 27.10 | 30.00 | 28.50 | 27.10 | 26.60 | 26.80 | 27.40 | 29.10 | 29.30 | 28.40 |
| 2 | Kelembapan relatif (RH) | % | 93.10 | 87.00 | 93.70 | 93.60 | 88.50 | 92.50 | 89.00 | 88.70 | 85.90 | 80.70 | 0.00 | 0.00 |
| 3 | Kecepatan angin (U) | km/hari | 394.30 | 438.60 | 395.50 | 573.90 | 964.70 | 1125.90 | 1377.40 | 1635.10 | 1652.80 | 2077.80 | 1303.60 | 1474.40 |
| 4 | Penyinaran Matahari (n/N) | % | 21.60 | 42.90 | 0.00 | 56.90 | 65.40 | 68.40 | 68.40 | 76.10 | 0.00 | 8.90 | 7.70 | 4.20 |
| **Perhitungan** | | | | | | | | | | | | | | |
| 5 | Tekanan uap jenuh (ea) | mbar | 37.17 | 33.41 | 35.91 | 42.40 | 38.95 | 35.91 | 34.86 | 35.28 | 36.54 | 40.33 | 40.79 | 38.72 |
| 6 | Tekanan uap nyata (ed), ed = ea x RH/100 | mbar | 34.61 | 29.07 | 33.65 | 39.69 | 34.47 | 33.22 | 31.03 | 31.29 | 31.39 | 32.55 | 0.00 | 0.00 |
| 7 | Perbedaan tekanan uap (ea - ed) | mbar | 2.56 | 4.34 | 2.26 | 2.71 | 4.48 | 2.69 | 3.83 | 3.99 | 5.15 | 7.78 | 40.79 | 38.72 |
| 8 | fungsi angin (f(u)), f(U) = 0.27*(1+U/100) | km/hari | 1.33 | 1.45 | 1.34 | 1.82 | 2.87 | 3.31 | 3.99 | 4.68 | 4.73 | 5.88 | 3.79 | 4.25 |
| 9 | Faktor pembobot (1-W) | | 0.23 | 0.25 | 0.24 | 0.22 | 0.23 | 0.24 | 0.24 | 0.24 | 0.24 | 0.22 | 0.22 | 0.23 |
| 10 | Faktor pengali (W) | | 0.77 | 0.75 | 0.76 | 0.78 | 0.77 | 0.76 | 0.76 | 0.76 | 0.76 | 0.78 | 0.78 | 0.77 |
| 11 | Radiasi ekstra teretrial (Ra) | mm/hari | 15.95 | 16.05 | 15.55 | 14.55 | 13.25 | 12.60 | 12.90 | 13.85 | 14.95 | 15.75 | 15.80 | 15.85 |
| 12 | Maksimum penyinaran (N) | | 12.42 | 12.34 | 12.10 | 11.92 | 11.78 | 11.68 | 11.72 | 11.86 | 12.00 | 12.24 | 12.42 | 12.52 |
| 13 | Radiasi sinar matahari (Rs), Rs = (0.25 + 0.5 n/N)Ra | mm/hari | 5.71 | 7.46 | 3.89 | 7.78 | 7.65 | 7.46 | 7.64 | 8.73 | 3.74 | 4.64 | 4.56 | 4.30 |
| 14 | Radiasi netto gel pendek (Rns), Rns = (1 - α)Rs | mm/hari | 4.28 | 5.59 | 2.92 | 5.83 | 5.73 | 5.59 | 5.73 | 6.55 | 2.80 | 3.48 | 3.42 | 3.22 |
| 15 | Efek radiasi gel panjang : | | | | | | | | | | | | | |
| | a. Fungsi suhu (f(T)) | | 16.24 | 15.88 | 16.12 | 16.70 | 16.40 | 16.12 | 16.02 | 16.06 | 16.18 | 16.52 | 16.56 | 16.38 |
| | b. Fungsi tekanan uap nyata (f(ed)), f(ed) = 0.34 - 0.044 x (ed^0.5) | | 0.08 | 0.10 | 0.08 | 0.06 | 0.08 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.34 | 0.34 |
| | c. Fungsi penyinaran (f(n/N)), f(n/N) = 0.1 + 0.9 x n/N | | 0.29 | 0.49 | 0.10 | 0.61 | 0.69 | 0.72 | 0.72 | 0.78 | 0.10 | 0.18 | 0.17 | 0.14 |
| 16 | Radiasi gelombang panjang netto ( Rn1 ), Rn1 = f(T) x f(ed) x f(n/N) | mm/hari | 0.39 | 0.79 | 0.14 | 0.64 | 0.92 | 1.00 | 1.09 | 1.18 | 0.15 | 0.26 | 0.95 | 0.77 |
| 17 | Radiasi netto (Rn), Rn = Rns - Rn1 | mm/hari | 3.89 | 4.80 | 2.78 | 5.19 | 4.81 | 4.60 | 4.64 | 5.37 | 2.65 | 3.21 | 2.47 | 2.45 |
| 18 | Faktor koreksi, C | | 1.10 | 1.10 | 1.00 | 0.90 | 0.90 | 0.90 | 0.90 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 |
| 19 | **Evaporasitranspirasi Penman Modifikasi** | | | | | | | | | | | | | |
| | **ETo = *C*.(W.Rn + (1-W).f(u).(ea-ed))** | mm/hari | 4.16 | 5.70 | 2.84 | 4.62 | 5.98 | 5.07 | 6.52 | 8.59 | 8.56 | 14.04 | 40.11 | 43.36 |
| | | mm/bulan | 124.89 | 170.92 | 85.15 | 138.64 | 179.45 | 151.99 | 195.47 | 257.62 | 256.75 | 421.33 | 1203.30 | 1300.93 |

**Tabel C. 1** Hasil Perhitungan Debit Metode FJ Mock Tahun 2001

| No | Uraian | Satuan | Hitungan | Tahun 2001/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 31 | 217 | 268 | 39 | 135 | 139 | 179 | 32 | 0 | 23 | 116 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 5 | 10 | 12 | 3 | 7 | 13 | 10 | 10 | 0 | 2 | 8 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 270.99 | 270.99 | 179.01 | 179.01 | 1757.54 | 1757.54 | 246.80 | 246.80 | 270.67 | 270.67 | 501.02 | 501.02 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.195 | 0.12 | 0.09 | 0.225 | 0.165 | 0.075 | 0.12 | 0.12 | 0.27 | 0.24 | 0.15 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 52.843 | 32.519 | 16.111 | 40.278 | 289.995 | 131.816 | 29.616 | 29.616 | 73.082 | 64.962 | 75.152 | 135.274 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 218.15 | 238.47 | 162.90 | 138.74 | 1467.55 | 1625.73 | 217.18 | 217.18 | 197.59 | 205.71 | 425.86 | 365.74 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah $\Delta S = P - Et$ | mm/15 hari | (1) - (7) | 0 | 0 | 105.10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 15.5 | 108.5 | 134 | 19.5 | 67.5 | 69.5 | 89.5 | 16 | 0 | 11.5 | 58 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -15.50 | -108.50 | -28.90 | -19.50 | -67.50 | -69.50 | -89.50 | -16.00 | 0.00 | -11.50 | -58.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 184.50 | 91.50 | 171.10 | 180.50 | 132.50 | 130.50 | 110.50 | 184.00 | 200.00 | 188.50 | 142.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 15.50 | 108.50 | 134.00 | 19.50 | 67.50 | 69.50 | 89.50 | 16.00 | 0.00 | 11.50 | 58.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 6.2 | 43.4 | 53.6 | 7.8 | 27 | 27.8 | 35.8 | 6.4 | 0 | 4.6 | 23.2 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 4.96 | 34.72 | 42.88 | 6.24 | 21.6 | 22.24 | 28.64 | 5.12 | 0 | 3.68 | 18.56 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 60 | 38.976 | 44.218 | 52.259 | 35.099 | 34.019 | 33.756 | 37.437 | 25.534 | 15.321 | 11.400 | 17.976 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 64.96 | 73.696 | 87.098 | 58.499 | 56.699 | 56.259 | 62.396 | 42.557 | 25.534 | 19.001 | 29.960 | 17.976 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -35.04 | 8.74 | 13.40 | -28.60 | -1.80 | -0.44 | 6.14 | -19.84 | -17.02 | -6.53 | 10.96 | -11.98 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 41.24 | 34.664 | 40.198 | 36.399 | 28.799 | 28.240 | 29.664 | 26.238 | 17.023 | 11.134 | 12.240 | 11.984 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 9.30 | 65.10 | 80.40 | 11.70 | 40.50 | 41.70 | 53.70 | 9.60 | 0.00 | 6.90 | 34.80 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 50.54 | 99.76 | 120.60 | 48.10 | 69.30 | 69.94 | 83.36 | 35.84 | 17.02 | 18.03 | 47.04 | 11.98 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 2.145 | 4.234 | 5.118 | 2.041 | 2.941 | 2.968 | 3.538 | 1.521 | 0.722 | 0.765 | 1.996 | 0.509 |

**Tabel C. 3** Hasil Perhitungan Debit Metode FJ Mock Tahun 2001

| No | Uraian | Satuan | Hitungan | Tahun 2001/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 159 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 8 | 1 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 473.97 | 473.97 | 715.31 | 715.31 | 979.79 | 979.79 | 962.36 | 962.36 | 331.12 | 331.12 | 327.26 | 327.26 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.255 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.225 | 0.15 | 0.255 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 127.971 | 120.861 | 193.135 | 193.135 | 264.543 | 264.543 | 259.838 | 259.838 | 74.50 | 49.67 | 83.452 | 88.361 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 345.99 | 353.10 | 522.18 | 522.18 | 715.24 | 715.24 | 702.53 | 702.53 | 256.62 | 281.45 | 243.81 | 238.90 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 79.5 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | -2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -44.00 | -79.50 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 198.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 156.00 | 120.50 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 44.00 | 79.50 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 17.6 | 31.8 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0.64 | 0 | 0 | 0 | 0 | 0 | 0 | 14.08 | 25.44 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 10.786 | 6.471 | 4.267 | 2.560 | 1.536 | 0.922 | 0.553 | 0.332 | 0.199 | 8.567 | 20.404 | 12.243 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 10.786 | 7.111 | 4.267 | 2.560 | 1.536 | 0.922 | 0.553 | 0.332 | 14.279 | 34.007 | 20.404 | 12.243 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -7.19 | -3.67 | -2.84 | -1.71 | -1.02 | -0.61 | -0.37 | -0.22 | 13.95 | 19.73 | -13.60 | -8.16 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 7.190 | 4.474 | 2.845 | 1.707 | 1.024 | 0.614 | 0.369 | 0.221 | 3.653 | 12.072 | 13.603 | 8.162 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 1.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 26.40 | 47.70 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 7.19 | 5.67 | 2.84 | 1.71 | 1.02 | 0.61 | 0.37 | 0.22 | 30.05 | 59.77 | 13.60 | 8.16 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.305 | 0.241 | 0.121 | 0.072 | 0.043 | 0.026 | 0.016 | 0.009 | 1.275 | 2.537 | 0.577 | 0.346 |

# **Tabel C. 5** Hasil Perhitungan Debit Metode FJ Mock Tahun 2002

| No | Uraian | Satuan | Hitungan | Tahun 2002/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 135 | 97 | 72 | 0 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 6 | 3 | 0 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 270.99 | 270.99 | 179.01 | 179.01 | 1757.54 | 1757.54 | 246.80 | 246.80 | 270.67 | 270.67 | 501.02 | 501.02 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.165 | 0.18 | 0.225 | 0.27 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 73.167 | 73.167 | 48.334 | 48.334 | 474.536 | 474.536 | 40.722 | 44.424 | 60.902 | 73.082 | 135.274 | 135.274 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 197.82 | 197.82 | 130.68 | 130.68 | 1283.01 | 1283.01 | 206.08 | 202.37 | 209.77 | 197.59 | 365.74 | 365.74 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 67.5 | 48.5 | 36 | 0 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -67.50 | -48.50 | -36.00 | 0.00 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 132.50 | 151.50 | 164.00 | 200.00 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 67.50 | 48.50 | 36.00 | 0.00 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 19.4 | 14.4 | 0 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 21.6 | 15.52 | 11.52 | 0 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 7.346 | 4.407 | 2.644 | 1.587 | 0.952 | 0.571 | 0.343 | 13.166 | 17.211 | 17.239 | 10.343 | 6.206 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 7.346 | 4.407 | 2.644 | 1.587 | 0.952 | 0.571 | 21.943 | 28.686 | 28.731 | 17.239 | 10.343 | 6.206 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -4.897 | -2.94 | -1.76 | -1.06 | -0.63 | -0.38 | 21.37 | 6.74 | 0.05 | -11.49 | -6.90 | -4.14 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 4.90 | 2.938 | 1.763 | 1.058 | 0.635 | 0.381 | 5.628 | 12.657 | 14.354 | 11.493 | 6.896 | 4.137 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 40.50 | 29.10 | 21.60 | 0.00 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 4.90 | 2.94 | 1.76 | 1.06 | 0.63 | 0.38 | 46.13 | 41.76 | 35.95 | 11.49 | 6.90 | 4.14 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.208 | 0.125 | 0.075 | 0.045 | 0.027 | 0.016 | 1.958 | 1.772 | 1.526 | 0.488 | 0.293 | 0.176 |

**Tabel C. 7** Hasil Perhitungan Debit Metode FJ Mock Tahun 2002

| No | Uraian | Satuan | Hitungan | Tahun 2002/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 34 | 108 | 81 | 170 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 6 | 13 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 473.97 | 473.97 | 715.31 | 715.31 | 979.79 | 979.79 | 962.36 | 962.36 | 331.12 | 331.12 | 327.26 | 327.26 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.255 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.225 | 0.195 | 0.18 | 0.075 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 127.971 | 127.971 | 182.405 | 193.135 | 264.543 | 264.543 | 259.838 | 259.838 | 74.50 | 64.57 | 58.907 | 24.545 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 345.99 | 345.99 | 532.91 | 522.18 | 715.24 | 715.24 | 702.53 | 702.53 | 256.62 | 266.55 | 268.36 | 302.72 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | $\Delta S$ = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 1.5 | 0 | 0 | 0 | 0 | 0 | 17 | 54 | 40.5 | 85 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | -1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -17.00 | -54.00 | -40.50 | -85.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 198.50 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 183.00 | 146.00 | 159.50 | 115.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.00 | 54.00 | 40.50 | 85.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0.6 | 0 | 0 | 0 | 0 | 0 | 6.8 | 21.6 | 16.2 | 34 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0.48 | 0 | 0 | 0 | 0 | 0 | 5.44 | 17.28 | 12.96 | 27.2 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 3.724 | 2.234 | 1.340 | 1.092 | 0.655 | 0.393 | 0.236 | 0.142 | 0.085 | 3.315 | 12.357 | 15.190 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 3.724 | 2.234 | 1.820 | 1.092 | 0.655 | 0.393 | 0.236 | 0.142 | 5.525 | 20.595 | 25.317 | 42.390 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -2.48 | -1.49 | -0.41 | -0.73 | -0.44 | -0.26 | -0.16 | -0.09 | 5.38 | 15.07 | 4.72 | 17.07 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 2.482 | 1.489 | 1.014 | 0.728 | 0.437 | 0.262 | 0.157 | 0.094 | 1.417 | 6.530 | 11.478 | 16.927 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.20 | 32.40 | 24.30 | 51.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 2.48 | 1.49 | 1.91 | 0.73 | 0.44 | 0.26 | 0.16 | 0.09 | 11.62 | 38.93 | 35.78 | 67.93 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.105 | 0.063 | 0.081 | 0.031 | 0.019 | 0.011 | 0.007 | 0.004 | 0.493 | 1.652 | 1.518 | 2.883 |

# **Tabel C. 9** Hasil Perhitungan Debit Metode FJ Mock Tahun 2003

| No | Uraian | Satuan | Hitungan | Tahun 2003/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 212 | 143 | 248 | 278 | 202 | 95 | 4 | 20 | 37 | 0 | 0 | 7 |
| | 2. Jumlah Hari (h) | hari | data | 9 | 7 | 11 | 11 | 11 | 5 | 2 | 4 | 3 | 0 | 0 | 2 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 42.04 | 42.04 | 47.77 | 47.77 | 289.14 | 289.14 | 35.33 | 35.33 | 34.04 | 34.04 | 33.45 | 33.45 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.135 | 0.165 | 0.105 | 0.105 | 0.105 | 0.195 | 0.24 | 0.21 | 0.225 | 0.27 | 0.27 | 0.24 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 5.675 | 6.936 | 5.016 | 5.016 | 30.360 | 56.382 | 8.479 | 7.419 | 7.659 | 9.191 | 9.031 | 8.027 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 36.36 | 35.10 | 42.75 | 42.75 | 258.78 | 232.76 | 26.85 | 27.91 | 26.38 | 24.85 | 24.42 | 25.42 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 175.64 | 107.90 | 205.25 | 235.25 | 0 | 0 | 0 | 0 | 10.62 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 106 | 71.5 | 124 | 139 | 101 | 47.5 | 2 | 10 | 18.5 | 0 | 0 | 3.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 69.64 | 36.40 | 81.25 | 96.25 | -101.00 | -47.50 | -2.00 | -10.00 | -7.88 | 0.00 | 0.00 | -3.50 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 269.64 | 236.40 | 281.25 | 296.25 | 99.00 | 152.50 | 198.00 | 190.00 | 192.12 | 200.00 | 200.00 | 196.50 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 106.00 | 71.50 | 124.00 | 139.00 | 101.00 | 47.50 | 2.00 | 10.00 | 18.50 | 0.00 | 0.00 | 3.50 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 42.4 | 28.6 | 49.6 | 55.6 | 40.4 | 19 | 0.8 | 4 | 7.4 | 0 | 0 | 1.4 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 33.92 | 22.88 | 39.68 | 44.48 | 32.32 | 15.2 | 0.64 | 3.2 | 5.92 | 0 | 0 | 1.12 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 25.434 | 35.612 | 35.095 | 44.865 | 53.607 | 51.556 | 40.054 | 24.416 | 16.570 | 13.494 | 8.096 | 4.858 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 59.354 | 58.492 | 74.775 | 89.345 | 85.927 | 66.756 | 40.694 | 27.616 | 22.490 | 13.494 | 8.096 | 5.978 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 16.964 | -0.86 | 16.28 | 14.57 | -3.42 | -19.17 | -26.06 | -13.08 | -5.13 | -9.00 | -5.40 | -2.12 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 25.44 | 29.462 | 33.317 | 41.030 | 43.818 | 38.171 | 26.863 | 17.078 | 12.527 | 8.996 | 5.398 | 3.519 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 63.60 | 42.90 | 74.40 | 83.40 | 60.60 | 28.50 | 1.20 | 6.00 | 11.10 | 0.00 | 0.00 | 2.10 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 89.04 | 72.36 | 107.72 | 124.43 | 104.42 | 66.67 | 28.06 | 23.08 | 23.63 | 9.00 | 5.40 | 5.62 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 3.779 | 3.071 | 4.571 | 5.281 | 4.431 | 2.829 | 1.191 | 0.979 | 1.003 | 0.382 | 0.229 | 0.238 |

**Tabel C. 11** Hasil Perhitungan Debit Metode FJ Mock Tahun 2003

| No | Uraian | Satuan | Hitungan | Tahun 2003/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 89 | 0 | 0 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 40.00 | 40.00 | 48.19 | 48.19 | 61.33 | 61.33 | 66.19 | 66.19 | 51.17 | 51.17 | 44.64 | 44.64 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.225 | 0.27 | 0.27 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 10.800 | 10.800 | 13.012 | 13.012 | 16.559 | 16.559 | 17.871 | 14.893 | 13.82 | 13.82 | 12.052 | 12.052 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 29.20 | 29.20 | 35.18 | 35.18 | 44.77 | 44.77 | 48.32 | 51.30 | 37.36 | 37.36 | 32.58 | 32.58 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37.70 | 0 | 0 | 0 | 0 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44.5 | 0 | 0 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -6.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 193.20 | 200.00 | 200.00 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 44.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17.8 | 0 | 0 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14.24 | 0 | 0 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 3.587 | 2.152 | 1.291 | 0.775 | 0.465 | 0.279 | 0.167 | 0.100 | 8.604 | 5.163 | 3.098 | 1.859 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 3.587 | 2.152 | 1.291 | 0.775 | 0.465 | 0.279 | 0.167 | 14.340 | 8.604 | 5.163 | 3.098 | 1.859 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -2.39 | -1.43 | -0.86 | -0.52 | -0.31 | -0.19 | -0.11 | 14.17 | -5.74 | -3.44 | -2.07 | -1.24 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 2.391 | 1.435 | 0.861 | 0.516 | 0.310 | 0.186 | 0.112 | 3.627 | 5.736 | 3.442 | 2.065 | 1.239 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 26.70 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 2.39 | 1.43 | 0.86 | 0.52 | 0.31 | 0.19 | 0.11 | 30.33 | 5.74 | 3.44 | 2.07 | 1.24 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.101 | 0.061 | 0.037 | 0.022 | 0.013 | 0.008 | 0.005 | 1.287 | 0.243 | 0.146 | 0.088 | 0.053 |

# **Tabel C. 13** Hasil Perhitungan Debit Metode FJ Mock Tahun 2004

| No | Uraian | Satuan | Hitungan | Tahun 2004/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 61 | 44 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 2 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 270.91 | 270.91 | 43.53 | 43.53 | 1445.09 | 1445.09 | 255.70 | 255.70 | 295.05 | 295.05 | 285.18 | 285.18 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.15 | 0.24 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 73.145 | 73.145 | 11.752 | 11.752 | 390.175 | 390.175 | 69.040 | 69.040 | 79.663 | 44.257 | 68.443 | 76.998 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 197.76 | 197.76 | 31.77 | 31.77 | 1054.92 | 1054.92 | 186.66 | 186.66 | 215.39 | 250.79 | 216.73 | 208.18 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30.5 | 22 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -30.50 | -22.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 169.50 | 178.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30.50 | 22.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.2 | 8.8 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.76 | 7.04 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 1.115 | 0.669 | 0.401 | 0.241 | 0.145 | 0.087 | 0.052 | 0.031 | 0.019 | 0.011 | 5.863 | 7.742 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 1.115 | 0.669 | 0.401 | 0.241 | 0.145 | 0.087 | 0.052 | 0.031 | 0.019 | 9.771 | 12.903 | 7.742 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -0.743 | -0.45 | -0.27 | -0.16 | -0.10 | -0.06 | -0.03 | -0.02 | -0.01 | 9.75 | 3.13 | -5.16 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 0.74 | 0.446 | 0.268 | 0.161 | 0.096 | 0.058 | 0.035 | 0.021 | 0.012 | 2.447 | 5.668 | 5.161 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.30 | 13.20 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 0.74 | 0.45 | 0.27 | 0.16 | 0.10 | 0.06 | 0.03 | 0.02 | 0.01 | 20.75 | 18.87 | 5.16 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.032 | 0.019 | 0.011 | 0.007 | 0.004 | 0.002 | 0.001 | 0.001 | 0.001 | 0.880 | 0.801 | 0.219 |

## **Tabel C. 15** Hasil Perhitungan Debit Metode FJ Mock Tahun 2004

| No | Uraian | Satuan | Hitungan | Tahun 2004/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 297.33 | 297.33 | 429.21 | 429.21 | 32.34 | 32.34 | 33.33 | 33.33 | 33.39 | 33.39 | 33.45 | 33.45 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.21 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 62.438 | 80.278 | 115.886 | 115.886 | 8.731 | 8.731 | 8.998 | 8.998 | 9.02 | 9.02 | 9.032 | 9.032 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 234.89 | 217.05 | 313.32 | 313.32 | 23.61 | 23.61 | 24.33 | 24.33 | 24.37 | 24.37 | 24.42 | 24.42 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 10.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -10.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 189.50 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 10.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 4.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 3.36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 4.645 | 4.803 | 2.882 | 1.729 | 1.037 | 0.622 | 0.373 | 0.224 | 0.134 | 0.081 | 0.048 | 0.029 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 8.005 | 4.803 | 2.882 | 1.729 | 1.037 | 0.622 | 0.373 | 0.224 | 0.134 | 0.081 | 0.048 | 0.029 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 0.26 | -3.20 | -1.92 | -1.15 | -0.69 | -0.41 | -0.25 | -0.15 | -0.09 | -0.05 | -0.03 | -0.02 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 3.937 | 3.202 | 1.921 | 1.153 | 0.692 | 0.415 | 0.249 | 0.149 | 0.090 | 0.054 | 0.032 | 0.019 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 6.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 10.24 | 3.20 | 1.92 | 1.15 | 0.69 | 0.41 | 0.25 | 0.15 | 0.09 | 0.05 | 0.03 | 0.02 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.434 | 0.136 | 0.082 | 0.049 | 0.029 | 0.018 | 0.011 | 0.006 | 0.004 | 0.002 | 0.001 | 0.001 |

# **Tabel C. 17** Hasil Perhitungan Debit Metode FJ Mock Tahun 2005

| No | Uraian | Satuan | Hitungan | Tahun 2005/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 52 | 239 | 119 | 177 | 138 | 162 | 121 | 23 | 5 | 0 | 4 | 135 |
| | 2. Jumlah Hari (h) | hari | data | 7 | 14 | 7 | 10 | 11 | 8 | 9 | 4 | 2 | 0 | 2 | 7 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 194.98 | 194.98 | 173.82 | 173.82 | 1365.17 | 1365.17 | 169.76 | 169.76 | 178.62 | 178.62 | 23.78 | 23.78 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.165 | 0.06 | 0.165 | 0.12 | 0.105 | 0.15 | 0.135 | 0.21 | 0.24 | 0.27 | 0.24 | 0.165 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 32.173 | 11.699 | 28.680 | 20.858 | 143.342 | 204.775 | 22.917 | 35.649 | 42.870 | 48.229 | 5.707 | 3.924 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 162.81 | 183.29 | 145.14 | 152.96 | 1221.82 | 1160.39 | 146.84 | 134.11 | 135.75 | 130.40 | 18.07 | 19.86 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 0 | 55.71 | 0 | 24.04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 115.14 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 26 | 119.5 | 59.5 | 88.5 | 69 | 81 | 60.5 | 11.5 | 2.5 | 0 | 2 | 67.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -26.00 | -63.79 | -59.50 | -64.46 | -69.00 | -81.00 | -60.50 | -11.50 | -2.50 | 0.00 | -2.00 | 47.64 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 174.00 | 136.21 | 140.50 | 135.54 | 131.00 | 119.00 | 139.50 | 188.50 | 197.50 | 200.00 | 198.00 | 247.64 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 26.00 | 119.50 | 59.50 | 88.50 | 69.00 | 81.00 | 60.50 | 11.50 | 2.50 | 0.00 | 2.00 | 67.50 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 10.4 | 47.8 | 23.8 | 35.4 | 27.6 | 32.4 | 24.2 | 4.6 | 1 | 0 | 0.8 | 27 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 8.32 | 38.24 | 19.04 | 28.32 | 22.08 | 25.92 | 19.36 | 3.68 | 0.8 | 0 | 0.64 | 21.6 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 0.017 | 5.002 | 25.945 | 26.991 | 33.187 | 33.160 | 35.448 | 32.885 | 21.939 | 13.643 | 8.186 | 5.296 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 8.337 | 43.242 | 44.985 | 55.311 | 55.267 | 59.080 | 54.808 | 36.565 | 22.739 | 13.643 | 8.826 | 26.896 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 8.308 | 34.91 | 1.74 | 10.33 | -0.04 | 3.81 | -4.27 | -18.24 | -13.83 | -9.10 | -4.82 | 18.07 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 2.09 | 12.895 | 22.057 | 25.074 | 27.645 | 28.587 | 28.472 | 22.843 | 14.826 | 9.096 | 5.617 | 8.930 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 15.60 | 71.70 | 35.70 | 53.10 | 41.40 | 48.60 | 36.30 | 6.90 | 1.50 | 0.00 | 1.20 | 40.50 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 17.69 | 84.59 | 57.76 | 78.17 | 69.04 | 77.19 | 64.77 | 29.74 | 16.33 | 9.10 | 6.82 | 49.43 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.751 | 3.590 | 2.451 | 3.318 | 2.930 | 3.276 | 2.749 | 1.262 | 0.693 | 0.386 | 0.289 | 2.098 |

**Tabel C. 19** Hasil Perhitungan Debit Metode FJ Mock Tahun 2005

| No | Uraian | Satuan | Hitungan | Tahun 2005/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 124 | 10 | 0 | 0 | 0 | 14 | 3 | 41 | 39 | 43 | 261 | 172 |
| | 2. Jumlah Hari (h) | hari | data | 5 | 1 | 0 | 0 | 0 | 2 | 1 | 3 | 2 | 3 | 10 | 15 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 337.47 | 337.47 | 694.05 | 694.05 | 56.35 | 56.35 | 757.02 | 757.02 | 56.86 | 56.86 | 141.93 | 141.93 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.195 | 0.255 | 0.27 | 0.27 | 0.27 | 0.24 | 0.255 | 0.225 | 0.24 | 0.225 | 0.12 | 0.045 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 65.807 | 86.055 | 187.392 | 187.392 | 15.214 | 13.524 | 193.041 | 170.330 | 13.65 | 12.79 | 17.031 | 6.387 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 271.67 | 251.42 | 506.65 | 506.65 | 41.13 | 42.83 | 563.98 | 586.69 | 43.22 | 44.07 | 124.89 | 135.54 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 136.11 | 36.46 |
| | $\Delta S = P - Et$ | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 62 | 5 | 0 | 0 | 0 | 7 | 1.5 | 20.5 | 19.5 | 21.5 | 130.5 | 86 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -62.00 | -5.00 | 0.00 | 0.00 | 0.00 | -7.00 | -1.50 | -20.50 | -19.50 | -21.50 | 5.61 | -49.54 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 138.00 | 195.00 | 200.00 | 200.00 | 200.00 | 193.00 | 198.50 | 179.50 | 180.50 | 178.50 | 205.61 | 150.46 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 62.00 | 5.00 | 0.00 | 0.00 | 0.00 | 7.00 | 1.50 | 20.50 | 19.50 | 21.50 | 130.50 | 86.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 24.8 | 2 | 0 | 0 | 0 | 2.8 | 0.6 | 8.2 | 7.8 | 8.6 | 52.2 | 34.4 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 19.84 | 1.6 | 0 | 0 | 0 | 2.24 | 0.48 | 6.56 | 6.24 | 6.88 | 41.76 | 27.52 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 16.137 | 21.586 | 13.912 | 8.347 | 5.008 | 3.005 | 3.147 | 2.176 | 5.242 | 6.889 | 8.261 | 30.013 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 35.977 | 23.186 | 13.912 | 8.347 | 5.008 | 5.245 | 3.627 | 8.736 | 11.482 | 13.769 | 50.021 | 57.533 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 9.08 | -12.79 | -9.27 | -5.56 | -3.34 | 0.24 | -1.62 | 5.11 | 2.75 | 2.29 | 36.25 | 7.51 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 15.718 | 14.791 | 9.275 | 5.565 | 3.339 | 2.563 | 2.218 | 3.091 | 5.054 | 6.313 | 15.948 | 26.889 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 37.20 | 3.00 | 0.00 | 0.00 | 0.00 | 4.20 | 0.90 | 12.30 | 11.70 | 12.90 | 78.30 | 51.60 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 52.92 | 17.79 | 9.27 | 5.56 | 3.34 | 6.76 | 3.12 | 15.39 | 16.75 | 19.21 | 94.25 | 78.49 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 2.246 | 0.755 | 0.394 | 0.236 | 0.142 | 0.287 | 0.132 | 0.653 | 0.711 | 0.815 | 4.000 | 3.331 |

# **Tabel C. 21** Hasil Perhitungan Debit Metode FJ Mock Tahun 2006

| No | Uraian | Satuan | Hitungan | Tahun 2006/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 172 | 181 | 0 | 0 | 206 | 95 | 0 | 0 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 8 | 9 | 0 | 0 | 13 | 5 | 0 | 0 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 36.34 | 36.34 | 42.56 | 42.56 | 312.72 | 312.72 | 34.75 | 34.75 | 34.60 | 34.60 | 37.61 | 37.61 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.15 | 0.135 | 0.27 | 0.27 | 0.075 | 0.195 | 0.27 | 0.27 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 9.811 | 9.811 | 6.384 | 5.746 | 84.435 | 84.435 | 2.606 | 6.777 | 9.341 | 9.341 | 10.155 | 10.155 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 26.53 | 26.53 | 36.18 | 36.81 | 228.29 | 228.29 | 32.15 | 27.98 | 25.26 | 25.26 | 27.46 | 27.46 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 0 | 0 | 135.82 | 144.19 | 0 | 0 | 173.85 | 67.02 | 0 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 86 | 90.5 | 0 | 0 | 103 | 47.5 | 0 | 0 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 49.82 | 53.69 | 0.00 | 0.00 | 70.85 | 19.52 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 249.82 | 253.69 | 200.00 | 200.00 | 270.85 | 219.52 | 200.00 | 200.00 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 86.00 | 90.50 | 0.00 | 0.00 | 103.00 | 47.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 34.4 | 36.2 | 0 | 0 | 41.2 | 19 | 0 | 0 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 27.52 | 28.96 | 0 | 0 | 32.96 | 15.2 | 0 | 0 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 34.520 | 20.712 | 12.427 | 23.968 | 31.757 | 19.054 | 11.433 | 26.636 | 25.101 | 15.061 | 9.036 | 5.422 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 34.520 | 20.712 | 39.947 | 52.928 | 31.757 | 19.054 | 44.393 | 41.836 | 25.101 | 15.061 | 9.036 | 5.422 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -23.013 | -13.81 | 19.24 | 12.98 | -21.17 | -12.70 | 25.34 | -2.56 | -16.73 | -10.04 | -6.02 | -3.61 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 23.01 | 13.808 | 15.165 | 23.219 | 21.171 | 12.703 | 15.862 | 21.557 | 16.734 | 10.041 | 6.024 | 3.615 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 51.60 | 54.30 | 0.00 | 0.00 | 61.80 | 28.50 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 23.01 | 13.81 | 66.76 | 77.52 | 21.17 | 12.70 | 77.66 | 50.06 | 16.73 | 10.04 | 6.02 | 3.61 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.977 | 0.586 | 2.833 | 3.290 | 0.898 | 0.539 | 3.296 | 2.124 | 0.710 | 0.426 | 0.256 | 0.153 |

**Tabel C. 23** Hasil Perhitungan Debit Metode FJ Mock Tahun 2006

| No | Uraian | Satuan | Hitungan | Tahun 2006/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 319 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 13 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 41.91 | 41.91 | 45.81 | 45.81 | 60.37 | 60.37 | 64.73 | 64.73 | 59.41 | 59.41 | 57.42 | 57.42 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.195 | 0.075 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 11.315 | 11.315 | 12.368 | 12.368 | 16.301 | 16.301 | 17.476 | 17.476 | 16.04 | 16.04 | 11.197 | 4.306 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 30.59 | 30.59 | 33.44 | 33.44 | 44.07 | 44.07 | 47.25 | 47.25 | 43.37 | 43.37 | 46.22 | 53.11 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 52.78 | 265.89 |
| | $\Delta S = P - Et$ | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49.5 | 159.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.28 | 106.39 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 203.28 | 306.39 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 49.50 | 159.50 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19.8 | 63.8 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15.84 | 51.04 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 3.253 | 1.952 | 1.171 | 0.703 | 0.422 | 0.253 | 0.152 | 0.091 | 0.055 | 0.033 | 0.020 | 9.516 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 3.253 | 1.952 | 1.171 | 0.703 | 0.422 | 0.253 | 0.152 | 0.091 | 0.055 | 0.033 | 15.860 | 60.556 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -2.17 | -1.30 | -0.78 | -0.47 | -0.28 | -0.17 | -0.10 | -0.06 | -0.04 | -0.02 | 15.83 | 44.70 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 2.169 | 1.301 | 0.781 | 0.468 | 0.281 | 0.169 | 0.101 | 0.061 | 0.036 | 0.022 | 3.973 | 19.104 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 29.70 | 95.70 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 2.17 | 1.30 | 0.78 | 0.47 | 0.28 | 0.17 | 0.10 | 0.06 | 0.04 | 0.02 | 33.67 | 114.80 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.092 | 0.055 | 0.033 | 0.020 | 0.012 | 0.007 | 0.004 | 0.003 | 0.002 | 0.001 | 1.429 | 4.872 |

# **Tabel C. 25** Hasil Perhitungan Debit Metode FJ Mock Tahun 2007

| No | Uraian | Satuan | Hitungan | Tahun 2007/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 23 | 68 | 140 | 203 | 82 | 270 | 280 | 202 | 14 | 73 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 3 | 8 | 9 | 13 | 7 | 13 | 12 | 7 | 7 | 6 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 42.92 | 42.92 | 48.05 | 48.05 | 420.48 | 420.48 | 38.26 | 38.26 | 32.40 | 32.40 | 35.38 | 35.38 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.225 | 0.15 | 0.135 | 0.075 | 0.165 | 0.075 | 0.09 | 0.165 | 0.165 | 0.18 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 9.657 | 6.438 | 6.486 | 3.603 | 69.380 | 31.536 | 3.444 | 6.313 | 5.346 | 5.832 | 9.554 | 9.554 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 33.26 | 36.48 | 41.56 | 44.44 | 351.10 | 388.95 | 34.82 | 31.95 | 27.06 | 26.57 | 25.83 | 25.83 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 0 | 31.52 | 98.44 | 158.56 | 0 | 0 | 245.18 | 170.05 | 0 | 46.43 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 11.5 | 34 | 70 | 101.5 | 41 | 135 | 140 | 101 | 7 | 36.5 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -11.50 | -2.48 | 28.44 | 57.06 | -41.00 | -135.00 | 105.18 | 69.05 | -7.00 | 9.93 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 188.50 | 197.52 | 228.44 | 257.06 | 159.00 | 65.00 | 305.18 | 269.05 | 193.00 | 209.93 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 11.50 | 34.00 | 70.00 | 101.50 | 41.00 | 135.00 | 140.00 | 101.00 | 7.00 | 36.50 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 4.6 | 13.6 | 28 | 40.6 | 16.4 | 54 | 56 | 40.4 | 2.8 | 14.6 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 3.68 | 10.88 | 22.4 | 32.48 | 13.12 | 43.2 | 44.8 | 32.32 | 2.24 | 11.68 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 36.333 | 24.008 | 20.933 | 26.000 | 35.088 | 28.925 | 43.275 | 52.845 | 51.099 | 32.003 | 26.210 | 15.726 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 40.013 | 34.888 | 43.333 | 58.480 | 48.208 | 72.125 | 88.075 | 85.165 | 53.339 | 43.683 | 26.210 | 15.726 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -20.542 | -5.13 | 8.44 | 15.15 | -10.27 | 23.92 | 15.95 | -2.91 | -31.83 | -9.66 | -17.47 | -10.48 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 25.14 | 18.725 | 19.555 | 25.453 | 26.672 | 30.083 | 40.050 | 43.310 | 34.626 | 24.256 | 17.473 | 10.484 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 6.90 | 20.40 | 42.00 | 60.90 | 24.60 | 81.00 | 84.00 | 60.60 | 4.20 | 21.90 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 32.04 | 39.13 | 61.56 | 86.35 | 51.27 | 111.08 | 124.05 | 103.91 | 38.83 | 46.16 | 17.47 | 10.48 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 1.360 | 1.660 | 2.612 | 3.665 | 2.176 | 4.714 | 5.264 | 4.410 | 1.648 | 1.959 | 0.742 | 0.445 |

**Tabel C. 27** Hasil Perhitungan Debit Metode FJ Mock Tahun 2007

| No | Uraian | Satuan | Hitungan | Tahun 2007/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 114 | 344 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 14 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 40.46 | 40.46 | 50.95 | 50.95 | 70.16 | 70.16 | 68.13 | 68.13 | 58.23 | 58.23 | 52.33 | 52.33 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.105 | 0.06 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 10.924 | 10.924 | 13.758 | 13.758 | 18.942 | 18.942 | 18.396 | 18.396 | 15.72 | 15.72 | 5.495 | 3.140 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 29.54 | 29.54 | 37.20 | 37.20 | 51.21 | 51.21 | 49.74 | 49.74 | 42.51 | 42.51 | 46.84 | 49.19 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 67.16 | 294.81 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 57 | 172 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.16 | 122.81 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 210.16 | 322.81 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 57.00 | 172.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22.8 | 68.8 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18.24 | 55.04 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 9.436 | 5.661 | 3.397 | 2.038 | 1.223 | 0.734 | 0.440 | 0.264 | 0.158 | 0.095 | 0.057 | 10.978 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 9.436 | 5.661 | 3.397 | 2.038 | 1.223 | 0.734 | 0.440 | 0.264 | 0.158 | 0.095 | 18.297 | 66.018 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -6.29 | -3.77 | -2.26 | -1.36 | -0.82 | -0.49 | -0.29 | -0.18 | -0.11 | -0.06 | 18.20 | 47.72 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 6.290 | 3.774 | 2.265 | 1.359 | 0.815 | 0.489 | 0.293 | 0.176 | 0.106 | 0.063 | 4.598 | 21.079 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 34.20 | 103.20 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 6.29 | 3.77 | 2.26 | 1.36 | 0.82 | 0.49 | 0.29 | 0.18 | 0.11 | 0.06 | 38.80 | 124.28 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.267 | 0.160 | 0.096 | 0.058 | 0.035 | 0.021 | 0.012 | 0.007 | 0.004 | 0.003 | 1.647 | 5.274 |

# **Tabel C. 29** Hasil Perhitungan Debit Metode FJ Mock Tahun 2008

| No | Uraian | Satuan | Hitungan | Tahun 2008/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 124 | 148 | 405 | 285 | 204 | 165 | 184 | 54 | 7 | 8 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 11 | 7 | 14 | 12 | 11 | 10 | 11 | 6 | 2 | 1 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 45.31 | 45.31 | 47.29 | 47.29 | 388.06 | 388.06 | 37.84 | 37.84 | 37.81 | 37.81 | 35.74 | 35.74 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.105 | 0.165 | 0.06 | 0.09 | 0.105 | 0.12 | 0.105 | 0.18 | 0.24 | 0.255 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 4.758 | 7.476 | 2.837 | 4.256 | 40.747 | 46.568 | 3.973 | 6.811 | 9.073 | 9.640 | 9.651 | 9.651 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 40.55 | 37.83 | 44.45 | 43.03 | 347.32 | 341.50 | 33.87 | 31.03 | 28.73 | 28.17 | 26.09 | 26.09 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 83.45 | 110.17 | 360.55 | 241.97 | 0 | 0 | 150.13 | 22.97 | 0 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 62 | 74 | 202.5 | 142.5 | 102 | 82.5 | 92 | 27 | 3.5 | 4 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 21.45 | 36.17 | 158.05 | 99.47 | -102.00 | -82.50 | 58.13 | -4.03 | -3.50 | -4.00 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 221.45 | 236.17 | 358.05 | 299.47 | 98.00 | 117.50 | 258.13 | 195.97 | 196.50 | 196.00 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 62.00 | 74.00 | 202.50 | 142.50 | 102.00 | 82.50 | 92.00 | 27.00 | 3.50 | 4.00 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 24.8 | 29.6 | 81 | 57 | 40.8 | 33 | 36.8 | 10.8 | 1.4 | 1.6 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 19.84 | 23.68 | 64.8 | 45.6 | 32.64 | 26.4 | 29.44 | 8.64 | 1.12 | 1.28 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 39.611 | 35.671 | 35.610 | 60.246 | 63.508 | 57.689 | 50.453 | 47.936 | 33.946 | 21.039 | 13.392 | 8.035 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 59.451 | 59.351 | 100.410 | 105.846 | 96.148 | 84.089 | 79.893 | 56.576 | 35.066 | 22.319 | 13.392 | 8.035 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -6.567 | -0.10 | 41.06 | 5.44 | -9.70 | -12.06 | -4.20 | -23.32 | -21.51 | -12.75 | -8.93 | -5.36 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 31.37 | 29.700 | 39.940 | 51.564 | 50.498 | 45.059 | 40.995 | 34.117 | 22.910 | 14.346 | 8.928 | 5.357 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 37.20 | 44.40 | 121.50 | 85.50 | 61.20 | 49.50 | 55.20 | 16.20 | 2.10 | 2.40 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 68.57 | 74.10 | 161.44 | 137.06 | 111.70 | 94.56 | 96.20 | 50.32 | 25.01 | 16.75 | 8.93 | 5.36 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 2.910 | 3.145 | 6.851 | 5.817 | 4.740 | 4.013 | 4.082 | 2.135 | 1.061 | 0.711 | 0.379 | 0.227 |

**Tabel C. 31** Hasil Perhitungan Debit Metode FJ Mock Tahun 2008

| No | Uraian | Satuan | Hitungan | Tahun 2008/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 99 | 98 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 10 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 45.21 | 45.21 | 50.89 | 50.89 | 67.90 | 67.90 | 62.30 | 62.30 | 46.77 | 46.77 | 43.29 | 43.29 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.15 | 0.12 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 12.208 | 12.208 | 13.741 | 13.741 | 18.334 | 18.334 | 16.820 | 16.820 | 12.63 | 12.63 | 6.493 | 5.194 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 33.01 | 33.01 | 37.15 | 37.15 | 49.57 | 49.57 | 45.48 | 45.48 | 34.14 | 34.14 | 36.79 | 38.09 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 62.21 | 59.91 |
| | $\Delta S = P - Et$ | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 49.5 | 49 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 12.71 | 10.91 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 212.71 | 210.91 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 49.50 | 49.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19.8 | 19.6 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15.84 | 15.68 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 4.821 | 2.893 | 1.736 | 1.041 | 0.625 | 0.375 | 0.225 | 0.135 | 0.081 | 0.049 | 0.029 | 9.521 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 4.821 | 2.893 | 1.736 | 1.041 | 0.625 | 0.375 | 0.225 | 0.135 | 0.081 | 0.049 | 15.869 | 25.201 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -3.21 | -1.93 | -1.16 | -0.69 | -0.42 | -0.25 | -0.15 | -0.09 | -0.05 | -0.03 | 15.82 | 9.33 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 3.214 | 1.928 | 1.157 | 0.694 | 0.417 | 0.250 | 0.150 | 0.090 | 0.054 | 0.032 | 3.979 | 10.268 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 29.70 | 29.40 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 3.21 | 1.93 | 1.16 | 0.69 | 0.42 | 0.25 | 0.15 | 0.09 | 0.05 | 0.03 | 33.68 | 39.67 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.136 | 0.082 | 0.049 | 0.029 | 0.018 | 0.011 | 0.006 | 0.004 | 0.002 | 0.001 | 1.429 | 1.683 |

# **Tabel C. 33** Hasil Perhitungan Debit Metode FJ Mock Tahun 2009

| No | Uraian | Satuan | Hitungan | Tahun 2009/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 116 | 204 | 210 | 103 | 0 | 0 | 0 | 178 | 80 | 100 | 20 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 11 | 14 | 10 | 8 | 0 | 0 | 0 | 7 | 10 | 5 | 2 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 42.92 | 42.92 | 48.05 | 48.05 | 420.48 | 420.48 | 38.26 | 38.26 | 32.40 | 32.40 | 35.40 | 35.40 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.105 | 0.06 | 0.12 | 0.15 | 0.27 | 0.27 | 0.27 | 0.165 | 0.12 | 0.195 | 0.24 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 4.507 | 2.575 | 5.765 | 7.207 | 113.531 | 113.531 | 10.330 | 6.313 | 3.888 | 6.318 | 8.495 | 9.557 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 38.41 | 40.35 | 42.28 | 40.84 | 306.95 | 306.95 | 27.93 | 31.95 | 28.51 | 26.08 | 26.90 | 25.84 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 77.59 | 163.65 | 167.72 | 62.16 | 0 | 0 | 0 | 146.05 | 51.49 | 73.92 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 58 | 102 | 105 | 51.5 | 0 | 0 | 0 | 89 | 40 | 50 | 10 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 19.59 | 61.65 | 62.72 | 10.66 | 0.00 | 0.00 | 0.00 | 57.05 | 11.49 | 23.92 | -10.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 219.59 | 261.65 | 262.72 | 210.66 | 200.00 | 200.00 | 200.00 | 257.05 | 211.49 | 223.92 | 190.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 58.00 | 102.00 | 105.00 | 51.50 | 0.00 | 0.00 | 0.00 | 89.00 | 40.00 | 50.00 | 10.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 23.2 | 40.8 | 42 | 20.6 | 0 | 0 | 0 | 35.6 | 16 | 20 | 4 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 18.56 | 32.64 | 33.6 | 16.48 | 0 | 0 | 0 | 28.48 | 12.8 | 16 | 3.2 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 15.121 | 20.209 | 31.709 | 39.185 | 33.399 | 20.040 | 12.024 | 7.214 | 21.417 | 20.530 | 21.918 | 15.071 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 33.681 | 52.849 | 65.309 | 55.665 | 33.399 | 20.040 | 12.024 | 35.694 | 34.217 | 36.530 | 25.118 | 15.071 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 8.479 | 19.17 | 12.46 | -9.64 | -22.27 | -13.36 | -8.02 | 23.67 | -1.48 | 2.31 | -11.41 | -10.05 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 14.72 | 21.632 | 29.539 | 30.244 | 22.266 | 13.360 | 8.016 | 11.929 | 17.478 | 17.687 | 15.412 | 10.047 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 34.80 | 61.20 | 63.00 | 30.90 | 0.00 | 0.00 | 0.00 | 53.40 | 24.00 | 30.00 | 6.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 49.52 | 82.83 | 92.54 | 61.14 | 22.27 | 13.36 | 8.02 | 65.33 | 41.48 | 47.69 | 21.41 | 10.05 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 2.102 | 3.515 | 3.927 | 2.595 | 0.945 | 0.567 | 0.340 | 2.772 | 1.760 | 2.024 | 0.909 | 0.426 |

## **Tabel C. 35** Hasil Perhitungan Debit Metode FJ Mock Tahun 2009

| No | Uraian | Satuan | Hitungan | Tahun 2009/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 120 | 31 | 100 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 9 | 3 | 9 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 40.46 | 40.46 | 51.03 | 51.03 | 71.09 | 71.09 | 68.13 | 68.13 | 58.04 | 58.04 | 52.33 | 52.33 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.225 | 0.135 | 0.225 | 0.135 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 10.924 | 10.924 | 13.778 | 13.778 | 19.194 | 19.194 | 18.396 | 18.396 | 13.06 | 7.84 | 11.775 | 7.065 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 29.54 | 29.54 | 37.25 | 37.25 | 51.89 | 51.89 | 49.74 | 49.74 | 44.98 | 50.20 | 40.56 | 45.27 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10.02 | 69.80 | 0 | 54.73 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27.5 | 60 | 15.5 | 50 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -17.48 | 9.80 | -15.50 | 4.73 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 182.52 | 209.80 | 184.50 | 204.73 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 27.50 | 60.00 | 15.50 | 50.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 24 | 6.2 | 20 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8.8 | 19.2 | 4.96 | 16 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 9.042 | 5.425 | 3.255 | 1.953 | 1.172 | 0.703 | 0.422 | 0.253 | 0.152 | 5.371 | 14.743 | 11.822 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 9.042 | 5.425 | 3.255 | 1.953 | 1.172 | 0.703 | 0.422 | 0.253 | 8.952 | 24.571 | 19.703 | 27.822 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -6.03 | -3.62 | -2.17 | -1.30 | -0.78 | -0.47 | -0.28 | -0.17 | 8.70 | 15.62 | -4.87 | 8.12 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 6.028 | 3.617 | 2.170 | 1.302 | 0.781 | 0.469 | 0.281 | 0.169 | 2.301 | 8.381 | 11.068 | 11.881 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.50 | 36.00 | 9.30 | 30.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 6.03 | 3.62 | 2.17 | 1.30 | 0.78 | 0.47 | 0.28 | 0.17 | 18.80 | 44.38 | 20.37 | 41.88 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.256 | 0.153 | 0.092 | 0.055 | 0.033 | 0.020 | 0.012 | 0.007 | 0.798 | 1.883 | 0.864 | 1.777 |

# **Tabel C. 37** Hasil Perhitungan Debit Metode FJ Mock Tahun 2010

| No | Uraian | Satuan | Hitungan | Tahun 2010/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 112 | 178 | 167 | 115 | 391 | 184 | 35 | 58 | 230 | 26 | 52 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 11 | 13 | 5 | 6 | 10 | 11 | 8 | 9 | 12 | 4 | 6 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 43.57 | 43.57 | 53.33 | 53.33 | 412.15 | 412.15 | 35.56 | 35.56 | 32.74 | 32.74 | 34.73 | 34.73 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.105 | 0.075 | 0.195 | 0.18 | 0.12 | 0.105 | 0.15 | 0.135 | 0.09 | 0.21 | 0.18 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 4.574 | 3.267 | 10.400 | 9.600 | 49.458 | 43.276 | 5.334 | 4.801 | 2.947 | 6.876 | 6.251 | 9.376 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 38.99 | 40.30 | 42.93 | 43.73 | 362.69 | 368.87 | 30.23 | 30.76 | 29.80 | 25.87 | 28.48 | 25.35 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 73.01 | 137.70 | 124.07 | 71.27 | 28.31 | 0 | 4.77 | 27.24 | 200.20 | 0.13 | 23.52 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 56 | 89 | 83.5 | 57.5 | 195.5 | 92 | 17.5 | 29 | 115 | 13 | 26 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 17.01 | 48.70 | 40.57 | 13.77 | -167.19 | -92.00 | -12.73 | -1.76 | 85.20 | -12.87 | -2.48 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 217.01 | 248.70 | 240.57 | 213.77 | 32.81 | 108.00 | 187.27 | 198.24 | 285.20 | 187.13 | 197.52 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 56.00 | 89.00 | 83.50 | 57.50 | 195.50 | 92.00 | 17.50 | 29.00 | 115.00 | 13.00 | 26.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 22.4 | 35.6 | 33.4 | 23 | 78.2 | 36.8 | 7 | 11.6 | 46 | 5.2 | 10.4 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 17.92 | 28.48 | 26.72 | 18.4 | 62.56 | 29.44 | 5.6 | 9.28 | 36.8 | 4.16 | 8.32 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 16.693 | 20.768 | 29.549 | 33.761 | 31.297 | 56.314 | 51.452 | 34.231 | 26.107 | 37.744 | 25.142 | 20.077 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 34.613 | 49.248 | 56.269 | 52.161 | 93.857 | 85.754 | 57.052 | 43.511 | 62.907 | 41.904 | 33.462 | 20.077 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 6.791 | 14.63 | 7.02 | -4.11 | 41.70 | -8.10 | -28.70 | -13.54 | 19.40 | -21.00 | -8.44 | -13.38 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 15.61 | 20.965 | 26.379 | 27.107 | 36.504 | 44.903 | 35.702 | 25.141 | 26.605 | 26.203 | 18.842 | 13.385 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 33.60 | 53.40 | 50.10 | 34.50 | 117.30 | 55.20 | 10.50 | 17.40 | 69.00 | 7.80 | 15.60 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 49.21 | 74.37 | 76.48 | 61.61 | 153.80 | 100.10 | 46.20 | 42.54 | 95.60 | 34.00 | 34.44 | 13.38 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 2.088 | 3.156 | 3.246 | 2.615 | 6.527 | 4.248 | 1.961 | 1.805 | 4.057 | 1.443 | 1.462 | 0.568 |

**Tabel C. 39** Hasil Perhitungan Debit Metode FJ Mock Tahun 2010

| No | Uraian | Satuan | Hitungan | Tahun 2010/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 31 | 34 | 0 | 31 | 218 | 238 | 48 | 195 | 43 | 117 | 261 | 168 |
| | 2. Jumlah Hari (h) | hari | data | 3 | 4 | 0 | 4 | 5 | 10 | 3 | 10 | 2 | 7 | 13 | 13 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 37.44 | 37.44 | 47.30 | 47.30 | 51.11 | 51.11 | 54.38 | 54.38 | 49.44 | 49.44 | 44.11 | 44.11 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.225 | 0.21 | 0.27 | 0.21 | 0.195 | 0.12 | 0.225 | 0.12 | 0.24 | 0.165 | 0.075 | 0.075 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 8.425 | 7.863 | 12.772 | 9.933 | 9.967 | 6.134 | 12.235 | 6.525 | 11.86 | 8.16 | 3.308 | 3.308 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 29.02 | 29.58 | 34.53 | 37.37 | 41.15 | 44.98 | 42.14 | 47.85 | 37.57 | 41.28 | 40.80 | 40.80 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 1.98 | 4.42 | 0 | 0 | 176.85 | 193.02 | 5.86 | 147.15 | 5.43 | 75.72 | 220.20 | 127.20 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 15.5 | 17 | 0 | 15.5 | 109 | 119 | 24 | 97.5 | 21.5 | 58.5 | 130.5 | 84 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -13.52 | -12.58 | 0.00 | -15.50 | 67.85 | 74.02 | -18.14 | 49.65 | -16.07 | 17.22 | 89.70 | 43.20 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 186.48 | 187.42 | 200.00 | 184.50 | 267.85 | 274.02 | 181.86 | 249.65 | 183.93 | 217.22 | 289.70 | 243.20 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 15.50 | 17.00 | 0.00 | 15.50 | 109.00 | 119.00 | 24.00 | 97.50 | 21.50 | 58.50 | 130.50 | 84.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 6.2 | 6.8 | 0 | 6.2 | 43.6 | 47.6 | 9.6 | 39 | 8.6 | 23.4 | 52.2 | 33.6 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 4.96 | 5.44 | 0 | 4.96 | 34.88 | 38.08 | 7.68 | 31.2 | 6.88 | 18.72 | 41.76 | 26.88 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 12.046 | 10.204 | 9.386 | 5.632 | 6.355 | 24.741 | 37.693 | 27.224 | 35.054 | 25.160 | 26.328 | 40.853 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 17.006 | 15.644 | 9.386 | 10.592 | 41.235 | 62.821 | 45.373 | 58.424 | 41.934 | 43.880 | 68.088 | 67.733 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -3.07 | -1.36 | -6.26 | 1.21 | 30.64 | 21.59 | -17.45 | 13.05 | -16.49 | 1.95 | 24.21 | -0.36 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 9.271 | 8.163 | 6.258 | 4.995 | 12.957 | 26.014 | 27.048 | 25.949 | 25.089 | 21.454 | 27.992 | 33.955 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 9.30 | 10.20 | 0.00 | 9.30 | 65.40 | 71.40 | 14.40 | 58.50 | 12.90 | 35.10 | 78.30 | 50.40 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 18.57 | 18.36 | 6.26 | 14.29 | 78.36 | 97.41 | 41.45 | 84.45 | 37.99 | 56.55 | 106.29 | 84.36 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.788 | 0.779 | 0.266 | 0.607 | 3.325 | 4.134 | 1.759 | 3.584 | 1.612 | 2.400 | 4.511 | 3.580 |

# **Tabel C. 41** Hasil Perhitungan Debit Metode FJ Mock Tahun 2011

| No | Uraian | Satuan | Hitungan | Tahun 2011/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 277 | 194 | 228 | 169 | 87 | 179 | 127 | 32 | 0 | 0 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 12 | 15 | 12 | 11 | 12 | 12 | 12 | 6 | 0 | 0 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 41.57 | 41.57 | 51.26 | 51.26 | 292.82 | 292.82 | 33.66 | 33.66 | 36.74 | 36.74 | 53.82 | 53.82 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.09 | 0.045 | 0.09 | 0.105 | 0.09 | 0.09 | 0.09 | 0.18 | 0.27 | 0.27 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 3.741 | 1.870 | 4.614 | 5.383 | 26.354 | 26.354 | 3.030 | 6.059 | 9.920 | 9.920 | 14.532 | 14.532 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 37.82 | 39.69 | 46.65 | 45.88 | 266.46 | 266.46 | 30.63 | 27.60 | 26.82 | 26.82 | 39.29 | 39.29 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 239.18 | 154.31 | 181.35 | 123.12 | 0 | 0 | 96.37 | 4.40 | 0 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 138.5 | 97 | 114 | 84.5 | 43.5 | 89.5 | 63.5 | 16 | 0 | 0 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 100.68 | 57.31 | 67.35 | 38.62 | -43.50 | -89.50 | 32.87 | -11.60 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 300.68 | 257.31 | 267.35 | 238.62 | 156.50 | 110.50 | 232.87 | 188.40 | 200.00 | 200.00 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 138.50 | 97.00 | 114.00 | 84.50 | 43.50 | 89.50 | 63.50 | 16.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 55.4 | 38.8 | 45.6 | 33.8 | 17.4 | 35.8 | 25.4 | 6.4 | 0 | 0 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 44.32 | 31.04 | 36.48 | 27.04 | 13.92 | 28.64 | 20.32 | 5.12 | 0 | 0 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 40.640 | 50.976 | 49.210 | 51.414 | 47.072 | 36.595 | 39.141 | 35.677 | 24.478 | 14.687 | 8.812 | 5.287 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 84.960 | 82.016 | 85.690 | 78.454 | 60.992 | 65.235 | 59.461 | 40.797 | 24.478 | 14.687 | 8.812 | 5.287 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 17.227 | -2.94 | 3.67 | -7.24 | -17.46 | 4.24 | -5.77 | -18.66 | -16.32 | -9.79 | -5.87 | -3.52 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 38.17 | 41.744 | 41.926 | 41.036 | 34.861 | 31.557 | 31.174 | 25.064 | 16.319 | 9.791 | 5.875 | 3.525 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 83.10 | 58.20 | 68.40 | 50.70 | 26.10 | 53.70 | 38.10 | 9.60 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 121.27 | 99.94 | 110.33 | 91.74 | 60.96 | 85.26 | 69.27 | 34.66 | 16.32 | 9.79 | 5.87 | 3.52 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 5.147 | 4.241 | 4.682 | 3.893 | 2.587 | 3.618 | 2.940 | 1.471 | 0.693 | 0.416 | 0.249 | 0.150 |

**Tabel C. 43** Hasil Perhitungan Debit Metode FJ Mock Tahun 2011

| No | Uraian | Satuan | Hitungan | Tahun 2011/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 75 | 180 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 12 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 38.30 | 38.30 | 47.37 | 47.37 | 64.32 | 64.32 | 64.64 | 64.64 | 51.42 | 51.42 | 45.62 | 45.62 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.135 | 0.09 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 10.340 | 10.340 | 12.791 | 12.791 | 17.367 | 17.367 | 17.453 | 17.453 | 13.88 | 13.88 | 6.158 | 4.105 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 27.96 | 27.96 | 34.58 | 34.58 | 46.95 | 46.95 | 47.19 | 47.19 | 37.54 | 37.54 | 39.46 | 41.51 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 35.54 | 138.49 |
| | $\Delta S = P - Et$ | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 37.5 | 90 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.96 | 48.49 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 198.04 | 248.49 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 37.50 | 90.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 36 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 28.8 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 3.172 | 1.903 | 1.142 | 0.685 | 0.411 | 0.247 | 0.148 | 0.089 | 0.053 | 0.032 | 0.019 | 7.212 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 3.172 | 1.903 | 1.142 | 0.685 | 0.411 | 0.247 | 0.148 | 0.089 | 0.053 | 0.032 | 12.019 | 36.012 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -2.11 | -1.27 | -0.76 | -0.46 | -0.27 | -0.16 | -0.10 | -0.06 | -0.04 | -0.02 | 11.99 | 23.99 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 2.115 | 1.269 | 0.761 | 0.457 | 0.274 | 0.164 | 0.099 | 0.059 | 0.036 | 0.021 | 3.013 | 12.008 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.50 | 54.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 2.11 | 1.27 | 0.76 | 0.46 | 0.27 | 0.16 | 0.10 | 0.06 | 0.04 | 0.02 | 25.51 | 66.01 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.090 | 0.054 | 0.032 | 0.019 | 0.012 | 0.007 | 0.004 | 0.003 | 0.002 | 0.001 | 1.083 | 2.801 |

# **Tabel C. 45** Hasil Perhitungan Debit Metode FJ Mock Tahun 2012

| No | Uraian | Satuan | Hitungan | Tahun 2012/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 273 | 88 | 193 | 212 | 279 | 197 | 0 | 0 | 117 | 59 | 4 | 5 |
| | 2. Jumlah Hari (h) | hari | data | 14 | 9 | 9 | 9 | 13 | 9 | 0 | 0 | 7 | 2 | 2 | 1 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 44.25 | 44.25 | 57.40 | 57.40 | 297.29 | 297.29 | 39.24 | 39.24 | 36.86 | 36.86 | 37.47 | 37.47 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.06 | 0.135 | 0.135 | 0.135 | 0.075 | 0.135 | 0.27 | 0.27 | 0.165 | 0.24 | 0.24 | 0.255 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 2.655 | 5.974 | 7.749 | 7.749 | 22.296 | 40.134 | 10.596 | 10.596 | 6.082 | 8.847 | 8.992 | 9.554 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 41.60 | 38.28 | 49.65 | 49.65 | 274.99 | 257.15 | 28.65 | 28.65 | 30.78 | 28.02 | 28.47 | 27.91 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 231.40 | 49.72 | 143.35 | 162.35 | 4.01 | 0 | 0 | 0 | 86.22 | 30.98 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 136.5 | 44 | 96.5 | 106 | 139.5 | 98.5 | 0 | 0 | 58.5 | 29.5 | 2 | 2.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 94.90 | 5.72 | 46.85 | 56.35 | -135.49 | -98.50 | 0.00 | 0.00 | 27.72 | 1.48 | -2.00 | -2.50 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 294.90 | 205.72 | 246.85 | 256.35 | 64.51 | 101.50 | 200.00 | 200.00 | 227.72 | 201.48 | 198.00 | 197.50 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 136.50 | 44.00 | 96.50 | 106.00 | 139.50 | 98.50 | 0.00 | 0.00 | 58.50 | 29.50 | 2.00 | 2.50 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 54.6 | 17.6 | 38.6 | 42.4 | 55.8 | 39.4 | 0 | 0 | 23.4 | 11.8 | 0.8 | 1 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 43.68 | 14.08 | 30.88 | 33.92 | 44.64 | 31.52 | 0 | 0 | 18.72 | 9.44 | 0.64 | 0.8 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 21.607 | 39.172 | 31.951 | 37.699 | 42.971 | 52.567 | 50.452 | 30.271 | 18.163 | 22.130 | 18.942 | 11.749 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 65.287 | 53.252 | 62.831 | 71.619 | 87.611 | 84.087 | 50.452 | 30.271 | 36.883 | 31.570 | 19.582 | 12.549 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 29.275 | -12.03 | 9.58 | 8.79 | 15.99 | -3.52 | -33.63 | -20.18 | 6.61 | -5.31 | -11.99 | -7.03 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 25.32 | 29.635 | 29.021 | 33.613 | 39.808 | 42.925 | 33.635 | 20.181 | 16.788 | 17.113 | 12.788 | 8.033 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 81.90 | 26.40 | 57.90 | 63.60 | 83.70 | 59.10 | 0.00 | 0.00 | 35.10 | 17.70 | 1.20 | 1.50 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 107.22 | 56.03 | 86.92 | 97.21 | 123.51 | 102.02 | 33.63 | 20.18 | 51.89 | 34.81 | 13.99 | 9.53 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 4.550 | 2.378 | 3.689 | 4.126 | 5.241 | 4.330 | 1.427 | 0.856 | 2.202 | 1.477 | 0.594 | 0.405 |

**Tabel C. 47** Hasil Perhitungan Debit Metode FJ Mock Tahun 2012

| No | Uraian | Satuan | Hitungan | Tahun 2012/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 18 | 64 | 252 | 171 | 220 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 4 | 9 | 11 | 13 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 35.73 | 35.73 | 55.59 | 55.59 | 64.24 | 64.24 | 68.94 | 68.94 | 59.52 | 59.52 | 45.66 | 45.66 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.225 | 0.255 | 0.21 | 0.135 | 0.105 | 0.075 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 9.648 | 9.648 | 15.011 | 15.011 | 17.345 | 17.345 | 15.511 | 17.579 | 12.50 | 8.03 | 4.794 | 3.424 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 26.09 | 26.09 | 40.58 | 40.58 | 46.90 | 46.90 | 53.43 | 51.36 | 47.02 | 51.48 | 40.86 | 42.23 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16.98 | 200.52 | 130.14 | 177.77 |
| | $\Delta S = P - Et$ | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 5.5 | 9 | 32 | 126 | 85.5 | 110 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -5.50 | -9.00 | -15.02 | 74.52 | 44.64 | 67.77 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 194.50 | 191.00 | 184.98 | 274.52 | 244.64 | 267.77 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.50 | 9.00 | 32.00 | 126.00 | 85.50 | 110.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 2.2 | 3.6 | 12.8 | 50.4 | 34.2 | 44 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 1.76 | 2.88 | 10.24 | 40.32 | 27.36 | 35.2 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 7.529 | 4.518 | 2.711 | 1.626 | 0.976 | 0.585 | 0.351 | 1.267 | 2.488 | 7.637 | 28.774 | 33.680 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 7.529 | 4.518 | 2.711 | 1.626 | 0.976 | 0.585 | 2.111 | 4.147 | 12.728 | 47.957 | 56.134 | 68.880 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -5.02 | -3.01 | -1.81 | -1.08 | -0.65 | -0.39 | 1.53 | 2.04 | 8.58 | 35.23 | 8.18 | 12.75 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 5.020 | 3.012 | 1.807 | 1.084 | 0.651 | 0.390 | 0.674 | 1.565 | 4.219 | 15.171 | 26.023 | 31.254 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.30 | 5.40 | 19.20 | 75.60 | 51.30 | 66.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 5.02 | 3.01 | 1.81 | 1.08 | 0.65 | 0.39 | 3.97 | 6.96 | 23.42 | 90.77 | 77.32 | 97.25 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.213 | 0.128 | 0.077 | 0.046 | 0.028 | 0.017 | 0.169 | 0.296 | 0.994 | 3.852 | 3.281 | 4.127 |

# **Tabel C. 49** Hasil Perhitungan Debit Metode FJ Mock Tahun 2013

| No | Uraian | Satuan | Hitungan | Tahun 2013/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 273 | 186 | 145 | 185 | 76 | 135 | 91 | 90 | 34 | 40 | 125 | 124 |
| | 2. Jumlah Hari (h) | hari | data | 14 | 13 | 12 | 8 | 11 | 8 | 9 | 4 | 13 | 11 | 12 | 6 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 47.65 | 47.65 | 104.88 | 104.88 | 535.88 | 535.88 | 38.38 | 38.38 | 33.13 | 33.13 | 32.36 | 32.36 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.06 | 0.075 | 0.09 | 0.15 | 0.105 | 0.15 | 0.135 | 0.21 | 0.075 | 0.105 | 0.09 | 0.18 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 2.859 | 3.573 | 9.439 | 15.732 | 56.267 | 80.382 | 5.181 | 8.060 | 2.485 | 3.478 | 2.912 | 5.824 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 44.79 | 44.07 | 95.44 | 89.15 | 479.61 | 455.50 | 33.20 | 30.32 | 30.64 | 29.65 | 29.44 | 26.53 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 228.21 | 141.93 | 49.56 | 95.85 | 0 | 0 | 57.80 | 59.68 | 3.36 | 10.35 | 95.56 | 97.47 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 136.5 | 93 | 72.5 | 92.5 | 38 | 67.5 | 45.5 | 45 | 17 | 20 | 62.5 | 62 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 91.71 | 48.93 | -22.94 | 3.35 | -38.00 | -67.50 | 12.30 | 14.68 | -13.64 | -9.65 | 33.06 | 35.47 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 291.71 | 248.93 | 177.06 | 203.35 | 162.00 | 132.50 | 212.30 | 214.68 | 186.36 | 190.35 | 233.06 | 235.47 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 136.50 | 93.00 | 72.50 | 92.50 | 38.00 | 67.50 | 45.50 | 45.00 | 17.00 | 20.00 | 62.50 | 62.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 54.6 | 37.2 | 29 | 37 | 15.2 | 27 | 18.2 | 18 | 6.8 | 8 | 25 | 24.8 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 43.68 | 29.76 | 23.2 | 29.6 | 12.16 | 21.6 | 14.56 | 14.4 | 5.44 | 6.4 | 20 | 19.84 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 41.328 | 51.005 | 48.459 | 42.995 | 43.557 | 33.430 | 33.018 | 28.547 | 25.768 | 18.725 | 15.075 | 21.045 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 85.008 | 80.765 | 71.659 | 72.595 | 55.717 | 55.030 | 47.578 | 42.947 | 31.208 | 25.125 | 35.075 | 40.885 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | 16.128 | -4.24 | -9.11 | 0.94 | -16.88 | -0.69 | -7.45 | -4.63 | -11.74 | -6.08 | 9.95 | 5.81 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 38.47 | 41.443 | 38.106 | 36.064 | 32.078 | 27.687 | 25.652 | 22.631 | 18.539 | 14.083 | 15.050 | 18.990 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 81.90 | 55.80 | 43.50 | 55.50 | 22.80 | 40.50 | 27.30 | 27.00 | 10.20 | 12.00 | 37.50 | 37.20 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 120.37 | 97.24 | 81.61 | 91.56 | 54.88 | 68.19 | 52.95 | 49.63 | 28.74 | 26.08 | 52.55 | 56.19 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 5.108 | 4.127 | 3.463 | 3.886 | 2.329 | 2.894 | 2.247 | 2.106 | 1.220 | 1.107 | 2.230 | 2.385 |

**Tabel C. 51** Hasil Perhitungan Debit Metode FJ Mock Tahun 2013

| No | Uraian | Satuan | Hitungan | Tahun 2013/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 51 | 0 | 0 | 0 | 0 | 0 | 0 | 35 | 101 | 33 | 118 | 386 |
| | 2. Jumlah Hari (h) | hari | data | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 7 | 4 | 8 | 11 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 41.88 | 41.88 | 53.71 | 53.71 | 68.38 | 68.38 | 74.03 | 74.03 | 53.69 | 53.69 | 50.18 | 50.18 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.18 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.225 | 0.165 | 0.21 | 0.15 | 0.105 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 7.539 | 11.308 | 14.502 | 14.502 | 18.462 | 18.462 | 19.987 | 16.656 | 8.86 | 11.27 | 7.528 | 5.269 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 34.34 | 30.57 | 39.21 | 39.21 | 49.92 | 49.92 | 54.04 | 57.37 | 44.83 | 42.41 | 42.66 | 44.91 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 16.66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 56.17 | 0 | 75.34 | 341.09 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 25.5 | 0 | 0 | 0 | 0 | 0 | 0 | 17.5 | 50.5 | 16.5 | 59 | 193 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -8.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -17.50 | 5.67 | -16.50 | 16.34 | 148.09 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 191.16 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 182.50 | 205.67 | 183.50 | 216.34 | 348.09 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 25.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 17.50 | 50.50 | 16.50 | 59.00 | 193.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 10.2 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 20.2 | 6.6 | 23.6 | 77.2 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 8.16 | 0 | 0 | 0 | 0 | 0 | 0 | 5.6 | 16.16 | 5.28 | 18.88 | 61.76 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 24.531 | 19.615 | 11.769 | 7.061 | 4.237 | 2.542 | 1.525 | 0.915 | 3.909 | 12.041 | 10.393 | 17.564 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 32.691 | 19.615 | 11.769 | 7.061 | 4.237 | 2.542 | 1.525 | 6.515 | 20.069 | 17.321 | 29.273 | 79.324 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -8.19 | -13.08 | -7.85 | -4.71 | -2.82 | -1.69 | -1.02 | 4.99 | 13.55 | -2.75 | 11.95 | 50.05 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 18.394 | 13.076 | 7.846 | 4.708 | 2.825 | 1.695 | 1.017 | 2.010 | 6.646 | 9.348 | 11.649 | 27.149 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 15.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10.50 | 30.30 | 9.90 | 35.40 | 115.80 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 33.69 | 13.08 | 7.85 | 4.71 | 2.82 | 1.69 | 1.02 | 12.51 | 36.95 | 19.25 | 47.05 | 142.95 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 1.430 | 0.555 | 0.333 | 0.200 | 0.120 | 0.072 | 0.043 | 0.531 | 1.568 | 0.817 | 1.997 | 6.067 |

# **Tabel C. 53** Hasil Perhitungan Debit Metode FJ Mock Tahun 2014

| No | Uraian | Satuan | Hitungan | Tahun 2014/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 167 | 309 | 100 | 87 | 114 | 120 | 184 | 7 | 55 | 42 | 0 | 94 |
| | 2. Jumlah Hari (h) | hari | data | 10 | 15 | 9 | 7 | 3 | 7 | 12 | 4 | 5 | 3 | 0 | 5 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 44.41 | 44.41 | 52.45 | 52.45 | 271.68 | 271.68 | 36.54 | 36.54 | 34.35 | 34.35 | 32.78 | 32.78 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.12 | 0.045 | 0.135 | 0.165 | 0.225 | 0.165 | 0.09 | 0.21 | 0.195 | 0.225 | 0.27 | 0.195 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 5.329 | 1.999 | 7.081 | 8.655 | 61.127 | 44.827 | 3.289 | 7.674 | 6.697 | 7.728 | 8.849 | 6.391 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 39.08 | 42.41 | 45.37 | 43.80 | 210.55 | 226.85 | 33.25 | 28.87 | 27.65 | 26.62 | 23.93 | 26.38 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 127.92 | 266.59 | 54.63 | 43.20 | 0 | 0 | 150.75 | 0 | 27.35 | 15.38 | 0 | 67.62 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 83.5 | 154.5 | 50 | 43.5 | 57 | 60 | 92 | 3.5 | 27.5 | 21 | 0 | 47 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 44.42 | 112.09 | 4.63 | -0.30 | -57.00 | -60.00 | 58.75 | -3.50 | -0.15 | -5.62 | 0.00 | 20.62 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 244.42 | 312.09 | 204.63 | 199.70 | 143.00 | 140.00 | 258.75 | 196.50 | 199.85 | 194.38 | 200.00 | 220.62 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 83.50 | 154.50 | 50.00 | 43.50 | 57.00 | 60.00 | 92.00 | 3.50 | 27.50 | 21.00 | 0.00 | 47.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 33.4 | 61.8 | 20 | 17.4 | 22.8 | 24 | 36.8 | 1.4 | 11 | 8.4 | 0 | 18.8 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 26.72 | 49.44 | 16 | 13.92 | 18.24 | 19.2 | 29.44 | 1.12 | 8.8 | 6.72 | 0 | 15.04 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 47.594 | 44.589 | 56.417 | 43.450 | 34.422 | 31.597 | 30.478 | 35.951 | 22.243 | 18.626 | 15.207 | 9.124 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 74.314 | 94.029 | 72.417 | 57.370 | 52.662 | 50.797 | 59.918 | 37.071 | 31.043 | 25.346 | 15.207 | 24.164 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -5.009 | 19.71 | -21.61 | -15.05 | -4.71 | -1.86 | 9.12 | -22.85 | -6.03 | -5.70 | -10.14 | 8.96 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 38.41 | 42.086 | 41.611 | 32.447 | 27.508 | 25.865 | 27.679 | 24.247 | 17.028 | 14.097 | 10.138 | 9.843 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 50.10 | 92.70 | 30.00 | 26.10 | 34.20 | 36.00 | 55.20 | 2.10 | 16.50 | 12.60 | 0.00 | 28.20 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 88.51 | 134.79 | 71.61 | 58.55 | 61.71 | 61.86 | 82.88 | 26.35 | 33.53 | 26.70 | 10.14 | 38.04 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 3.756 | 5.720 | 3.039 | 2.485 | 2.619 | 2.625 | 3.517 | 1.118 | 1.423 | 1.133 | 0.430 | 1.614 |

**Tabel C. 55** Hasil Perhitungan Debit Metode FJ Mock Tahun 2014

| No | Uraian | Satuan | Hitungan | Tahun 2014/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 193 | 180 | 258 |
| | 2. Jumlah Hari (h) | hari | data | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 9 | 11 | 12 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 38.87 | 38.87 | 51.76 | 51.76 | 67.72 | 67.72 | 98.47 | 98.47 | 64.65 | 64.65 | 45.67 | 45.67 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.24 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.21 | 0.135 | 0.105 | 0.09 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 9.328 | 10.494 | 13.975 | 13.975 | 18.284 | 18.284 | 26.587 | 26.587 | 13.58 | 8.73 | 4.796 | 4.111 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 29.54 | 28.37 | 37.78 | 37.78 | 49.43 | 49.43 | 71.88 | 71.88 | 51.07 | 55.92 | 40.88 | 41.56 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 137.08 | 139.12 | 216.44 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 96.5 | 90 | 129 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -12.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -7.00 | 40.58 | 49.12 | 87.44 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 188.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 193.00 | 240.58 | 249.12 | 287.44 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 12.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.00 | 96.50 | 90.00 | 129.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 4.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.8 | 38.6 | 36 | 51.6 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 3.84 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.24 | 30.88 | 28.8 | 41.28 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 14.499 | 11.003 | 6.602 | 3.961 | 2.377 | 1.426 | 0.856 | 0.513 | 0.308 | 1.529 | 19.445 | 28.947 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 18.339 | 11.003 | 6.602 | 3.961 | 2.377 | 1.426 | 0.856 | 0.513 | 2.548 | 32.409 | 48.245 | 70.227 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -5.83 | -7.34 | -4.40 | -2.64 | -1.58 | -0.95 | -0.57 | -0.34 | 2.03 | 29.86 | 15.84 | 21.98 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 10.626 | 7.335 | 4.401 | 2.641 | 1.584 | 0.951 | 0.570 | 0.342 | 0.765 | 8.739 | 20.164 | 29.618 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 7.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.20 | 57.90 | 54.00 | 77.40 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 17.83 | 7.34 | 4.40 | 2.64 | 1.58 | 0.95 | 0.57 | 0.34 | 4.97 | 66.64 | 74.16 | 107.02 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.756 | 0.311 | 0.187 | 0.112 | 0.067 | 0.040 | 0.024 | 0.015 | 0.211 | 2.828 | 3.147 | 4,542 |

# **Tabel C. 57** Hasil Perhitungan Debit Metode FJ Mock Tahun 2015

| No | Uraian | Satuan | Hitungan | Tahun 2015/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 139 | 331 | 182 | 63 | 215 | 103 | 55 | 172 | 55 | 0 | 15 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 9 | 12 | 12 | 3 | 12 | 6 | 10 | 11 | 4 | 0 | 1 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 46.17 | 46.17 | 56.69 | 56.69 | 310.81 | 310.81 | 35.02 | 35.02 | 33.70 | 33.70 | 35.88 | 35.88 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.135 | 0.09 | 0.09 | 0.225 | 0.09 | 0.18 | 0.12 | 0.105 | 0.21 | 0.27 | 0.255 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 6.233 | 4.155 | 5.102 | 12.756 | 27.973 | 55.945 | 4.203 | 3.677 | 7.078 | 9.100 | 9.150 | 9.688 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 39.94 | 42.02 | 51.59 | 43.94 | 282.83 | 254.86 | 30.82 | 31.34 | 26.63 | 24.60 | 26.73 | 26.19 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 99.06 | 288.98 | 130.41 | 19.06 | 0 | 0 | 24.18 | 140.66 | 28.37 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 69.5 | 165.5 | 91 | 31.5 | 107.5 | 51.5 | 27.5 | 86 | 27.5 | 0 | 7.5 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 29.56 | 123.48 | 39.41 | -12.44 | -107.50 | -51.50 | -3.32 | 54.66 | 0.87 | 0.00 | -7.50 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 229.56 | 323.48 | 239.41 | 187.56 | 92.50 | 148.50 | 196.68 | 254.66 | 200.87 | 200.00 | 192.50 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 69.50 | 165.50 | 91.00 | 31.50 | 107.50 | 51.50 | 27.50 | 86.00 | 27.50 | 0.00 | 7.50 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 27.8 | 66.2 | 36.4 | 12.6 | 43 | 20.6 | 11 | 34.4 | 11 | 0 | 3 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 22.24 | 52.96 | 29.12 | 10.08 | 34.4 | 16.48 | 8.8 | 27.52 | 8.8 | 0 | 2.4 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 42.136 | 38.626 | 54.951 | 50.443 | 36.314 | 42.428 | 35.345 | 26.487 | 32.404 | 24.723 | 14.834 | 10.340 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 64.376 | 91.586 | 84.071 | 60.523 | 70.714 | 58.908 | 44.145 | 54.007 | 41.204 | 24.723 | 17.234 | 10.340 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -5.851 | 27.21 | -7.51 | -23.55 | 10.19 | -11.81 | -14.76 | 9.86 | -12.80 | -16.48 | -7.49 | -6.89 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 33.65 | 38.991 | 43.914 | 36.149 | 32.809 | 32.405 | 25.763 | 24.538 | 23.803 | 16.482 | 10.489 | 6.893 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 41.70 | 99.30 | 54.60 | 18.90 | 64.50 | 30.90 | 16.50 | 51.60 | 16.50 | 0.00 | 4.50 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 75.35 | 138.29 | 98.51 | 55.05 | 97.31 | 63.31 | 42.26 | 76.14 | 40.30 | 16.48 | 14.99 | 6.89 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 3.198 | 5.869 | 4.181 | 2.336 | 4.130 | 2.687 | 1.794 | 3.231 | 1.710 | 0.699 | 0.636 | 0.293 |

**Tabel C. 59** Hasil Perhitungan Debit Metode FJ Mock Tahun 2015

| No | Uraian | Satuan | Hitungan | Tahun 2015/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 103 | 103 | 77 | 220 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 11 | 9 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 40.19 | 40.19 | 48.19 | 48.19 | 62.24 | 62.24 | 65.99 | 65.99 | 59.52 | 59.52 | 49.35 | 49.35 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.27 | 0.195 | 0.195 | 0.105 | 0.135 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 10.851 | 10.851 | 13.011 | 13.011 | 16.806 | 16.806 | 17.816 | 17.816 | 11.61 | 11.61 | 5.182 | 6.662 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 29.34 | 29.34 | 35.18 | 35.18 | 45.44 | 45.44 | 48.17 | 48.17 | 47.91 | 47.91 | 44.17 | 42.69 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55.09 | 55.09 | 32.83 | 177.31 |
| | ΔS = P - Et | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 51.5 | 51.5 | 38.5 | 110 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.59 | 3.59 | -5.67 | 67.31 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 200.00 | 203.59 | 203.59 | 194.33 | 267.31 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 51.50 | 51.50 | 38.50 | 110.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20.6 | 20.6 | 15.4 | 44 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16.48 | 16.48 | 12.32 | 35.2 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 6.204 | 3.722 | 2.233 | 1.340 | 0.804 | 0.482 | 0.289 | 0.174 | 0.104 | 9.951 | 15.858 | 16.907 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 6.204 | 3.722 | 2.233 | 1.340 | 0.804 | 0.482 | 0.289 | 0.174 | 16.584 | 26.431 | 28.178 | 52.107 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -4.14 | -2.48 | -1.49 | -0.89 | -0.54 | -0.32 | -0.19 | -0.12 | 16.41 | 9.85 | 1.75 | 23.93 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 4.136 | 2.482 | 1.489 | 0.893 | 0.536 | 0.322 | 0.193 | 0.116 | 4.189 | 10.754 | 13.652 | 20.071 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30.90 | 30.90 | 23.10 | 66.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 4.14 | 2.48 | 1.49 | 0.89 | 0.54 | 0.32 | 0.19 | 0.12 | 35.09 | 41.65 | 36.75 | 86.07 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.176 | 0.105 | 0.063 | 0.038 | 0.023 | 0.014 | 0.008 | 0.005 | 1.489 | 1.768 | 1.560 | 3.653 |

# **Tabel C. 61** Hasil Perhitungan Debit Metode FJ Mock Tahun 2016

| No | Uraian | Satuan | Hitungan | Tahun 2016/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 76 | 220 | 239 | 90 | 158 | 172 | 247 | 112 | 86 | 96 | 77 | 24 |
| | 2. Jumlah Hari (h) | hari | data | 9 | 11 | 14 | 10 | 10 | 12 | 14 | 6 | 8 | 5 | 6 | 3 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 79.49 | 79.49 | 70.22 | 70.22 | 503.43 | 503.43 | 60.01 | 60.01 | 52.96 | 52.96 | 56.55 | 56.55 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.135 | 0.105 | 0.06 | 0.12 | 0.12 | 0.09 | 0.06 | 0.18 | 0.15 | 0.195 | 0.18 | 0.225 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 10.730 | 8.346 | 4.213 | 8.426 | 60.412 | 45.309 | 3.601 | 10.802 | 7.944 | 10.328 | 10.179 | 12.724 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 68.75 | 71.14 | 66.01 | 61.79 | 443.02 | 458.12 | 56.41 | 49.21 | 45.02 | 42.64 | 46.37 | 43.83 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah $\Delta S = P - Et$ | mm/15 hari | (1) - (7) | 7.25 | 148.86 | 172.99 | 28.21 | 0 | 0 | 190.59 | 62.79 | 40.98 | 53.36 | 30.63 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 38 | 110 | 119.5 | 45 | 79 | 86 | 123.5 | 56 | 43 | 48 | 38.5 | 12 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -30.75 | 38.86 | 53.49 | -16.79 | -79.00 | -86.00 | 67.09 | 6.79 | -2.02 | 5.36 | -7.87 | -12.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 169.25 | 238.86 | 253.49 | 183.21 | 121.00 | 114.00 | 267.09 | 206.79 | 197.98 | 205.36 | 192.13 | 188.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 38.00 | 110.00 | 119.50 | 45.00 | 79.00 | 86.00 | 123.50 | 56.00 | 43.00 | 48.00 | 38.50 | 12.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 15.2 | 44 | 47.8 | 18 | 31.6 | 34.4 | 49.4 | 22.4 | 17.2 | 19.2 | 15.4 | 4.8 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 12.16 | 35.2 | 38.24 | 14.4 | 25.28 | 27.52 | 39.52 | 17.92 | 13.76 | 15.36 | 12.32 | 3.84 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 31.264 | 26.055 | 36.753 | 44.996 | 35.637 | 36.550 | 38.442 | 46.777 | 38.818 | 31.547 | 28.144 | 24.279 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 43.424 | 61.255 | 74.993 | 59.396 | 60.917 | 64.070 | 77.962 | 64.697 | 52.578 | 46.907 | 40.464 | 28.119 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -8.683 | 17.83 | 13.74 | -15.60 | 1.52 | 3.15 | 13.89 | -13.26 | -12.12 | -5.67 | -6.44 | -12.35 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 23.88 | 26.170 | 34.062 | 33.597 | 30.078 | 31.247 | 35.508 | 35.665 | 29.319 | 24.871 | 21.843 | 17.146 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 22.80 | 66.00 | 71.70 | 27.00 | 47.40 | 51.60 | 74.10 | 33.60 | 25.80 | 28.80 | 23.10 | 7.20 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 46.68 | 92.17 | 105.76 | 60.60 | 77.48 | 82.85 | 109.61 | 69.26 | 55.12 | 53.67 | 44.94 | 24.35 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 1.981 | 3.912 | 4.488 | 2.572 | 3.288 | 3.516 | 4.652 | 2.939 | 2.339 | 2.278 | 1.907 | 1.033 |

**Tabel C. 63** Hasil Perhitungan Debit Metode FJ Mock Tahun 2016

| No | Uraian | Satuan | Hitungan | Tahun 2016/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 17 | 50 | 110 | 11 | 20 | 284 | 0 | 0 | 178 | 128 | 221 | 113 |
| | 2. Jumlah Hari (h) | hari | data | 3 | 6 | 8 | 3 | 2 | 12 | 0 | 0 | 11 | 10 | 12 | 12 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 57.10 | 57.10 | 83.00 | 83.00 | 92.41 | 92.41 | 75.92 | 75.92 | 78.34 | 78.34 | 58.67 | 58.67 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.225 | 0.18 | 0.15 | 0.225 | 0.24 | 0.09 | 0.27 | 0.27 | 0.105 | 0.12 | 0.09 | 0.09 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 12.848 | 10.278 | 12.450 | 18.676 | 22.178 | 8.317 | 20.497 | 20.497 | 8.23 | 9.40 | 5.281 | 5.281 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 44.25 | 46.82 | 70.55 | 64.33 | 70.23 | 84.09 | 55.42 | 55.42 | 70.11 | 68.94 | 53.39 | 53.39 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah | mm/15 hari | (1) - (7) | 0 | 3.18 | 39.45 | 0 | 0 | 199.91 | 0 | 0 | 107.89 | 59.06 | 167.61 | 59.61 |
| | $\Delta S = P - Et$ | | | | | | | | 0 | | | | | | |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 8.5 | 25 | 55 | 5.5 | 10 | 142 | 0 | 0 | 89 | 64 | 110.5 | 56.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | -8.50 | -21.82 | -15.55 | -5.50 | -10.00 | 57.91 | 0.00 | 0.00 | 18.89 | -4.94 | 57.11 | 3.11 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 191.50 | 178.18 | 184.45 | 194.50 | 190.00 | 257.91 | 200.00 | 200.00 | 218.89 | 195.06 | 257.11 | 203.11 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 8.50 | 25.00 | 55.00 | 5.50 | 10.00 | 142.00 | 0.00 | 0.00 | 89.00 | 64.00 | 110.50 | 56.50 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 3.4 | 10 | 22 | 2.2 | 4 | 56.8 | 0 | 0 | 35.6 | 25.6 | 44.2 | 22.6 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 2.72 | 8 | 17.6 | 1.76 | 3.2 | 45.44 | 0 | 0 | 28.48 | 20.48 | 35.36 | 18.08 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 16.871 | 11.755 | 11.853 | 17.672 | 11.659 | 8.915 | 32.613 | 19.568 | 11.741 | 24.132 | 26.767 | 37.276 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 19.591 | 19.755 | 29.453 | 19.432 | 14.859 | 54.355 | 32.613 | 19.568 | 40.221 | 44.612 | 62.127 | 55.356 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -8.53 | 0.16 | 9.70 | -10.02 | -4.57 | 39.50 | -21.74 | -13.05 | 20.65 | 4.39 | 17.52 | -6.77 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 11.927 | 9.836 | 12.302 | 12.221 | 8.573 | 17.304 | 21.742 | 13.045 | 14.947 | 21.208 | 26.685 | 29.371 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 5.10 | 15.00 | 33.00 | 3.30 | 6.00 | 85.20 | 0.00 | 0.00 | 53.40 | 38.40 | 66.30 | 33.90 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 17.03 | 24.84 | 45.30 | 15.52 | 14.57 | 102.50 | 21.74 | 13.05 | 68.35 | 59.61 | 92.98 | 63.27 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.723 | 1.054 | 1.923 | 0.659 | 0.618 | 4.350 | 0.923 | 0.554 | 2.901 | 2.530 | 3.946 | 2.685 |

# **Tabel C. 65** Hasil Perhitungan Debit Metode FJ Mock Tahun 2017

| No | Uraian | Satuan | Hitungan | Tahun 2017/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 106 | 200 | 296 | 63 | 134 | 84 | 220 | 124 | 75 | 24 | 13 | 37 |
| | 2. Jumlah Hari (h) | hari | data | 9 | 14 | 20 | 8 | 10 | 9 | 4 | 9 | 4 | 2 | 3 | 1 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 59.13 | 59.13 | 72.31 | 72.31 | 503.70 | 503.70 | 62.62 | 62.62 | 66.60 | 66.60 | 56.47 | 56.47 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.135 | 0.06 | -0.03 | 0.15 | 0.12 | 0.135 | 0.21 | 0.135 | 0.21 | 0.24 | 0.225 | 0.255 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 7.983 | 3.548 | -2.169 | 10.846 | 60.444 | 67.999 | 13.151 | 8.454 | 13.985 | 15.983 | 12.705 | 14.399 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 51.15 | 55.59 | 74.48 | 61.46 | 443.26 | 435.70 | 49.47 | 54.17 | 52.61 | 50.61 | 43.76 | 42.07 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 54.85 | 144.41 | 221.52 | 1.54 | 0 | 0 | 170.53 | 69.83 | 22.39 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 53 | 100 | 148 | 31.5 | 67 | 42 | 110 | 62 | 37.5 | 12 | 6.5 | 18.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 1.85 | 44.41 | 73.52 | -29.96 | -67.00 | -42.00 | 60.53 | 7.83 | -15.11 | -12.00 | -6.50 | -18.50 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 201.85 | 244.41 | 273.52 | 170.04 | 133.00 | 158.00 | 260.53 | 207.83 | 184.89 | 188.00 | 193.50 | 181.50 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 53.00 | 100.00 | 148.00 | 31.50 | 67.00 | 42.00 | 110.00 | 62.00 | 37.50 | 12.00 | 6.50 | 18.50 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 21.2 | 40 | 59.2 | 12.6 | 26.8 | 16.8 | 44 | 24.8 | 15 | 4.8 | 2.6 | 7.4 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 16.96 | 32 | 47.36 | 10.08 | 21.44 | 13.44 | 35.2 | 19.84 | 12 | 3.84 | 2.08 | 5.92 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 33.214 | 30.104 | 37.263 | 50.774 | 36.512 | 34.771 | 28.927 | 38.476 | 34.990 | 28.194 | 19.220 | 12.780 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 50.174 | 62.104 | 84.623 | 60.854 | 57.952 | 48.211 | 64.127 | 58.316 | 46.990 | 32.034 | 21.300 | 18.700 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -5.183 | 11.93 | 22.52 | -23.77 | -2.90 | -9.74 | 15.92 | -5.81 | -11.33 | -14.96 | -10.73 | -2.60 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 26.38 | 28.070 | 36.682 | 36.369 | 29.701 | 26.541 | 28.085 | 30.611 | 26.326 | 19.756 | 13.334 | 10.000 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 31.80 | 60.00 | 88.80 | 18.90 | 40.20 | 25.20 | 66.00 | 37.20 | 22.50 | 7.20 | 3.90 | 11.10 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 58.18 | 88.07 | 125.48 | 55.27 | 69.90 | 51.74 | 94.08 | 67.81 | 48.83 | 26.96 | 17.23 | 21.10 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 2.469 | 3.738 | 5.325 | 2.346 | 2.966 | 2.196 | 3.993 | 2.878 | 2.072 | 1.144 | 0.731 | 0.895 |

**Tabel C. 67** Hasil Perhitungan Debit Metode FJ Mock Tahun 2017

| No | Uraian | Satuan | Hitungan | Tahun 2017/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jul | | Agt | | Sept | | Okt | | Nov | | Des | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 24 | 0 | 0 | 0 | 92.5 | 63 | 16 | 35 | 678 | 30 | 217 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 2 | 0 | 0 | 0 | 5 | 5 | 3 | 7 | 13 | 6 | 11 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 66.56 | 66.56 | 89.18 | 89.18 | 107.28 | 107.28 | 123.26 | 123.26 | 63.89 | 63.89 | 61.86 | 61.86 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.24 | 0.27 | 0.27 | 0.27 | 0.195 | 0.195 | 0.225 | 0.165 | 0.075 | 0.18 | 0.105 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 17.971 | 15.974 | 24.078 | 24.078 | 28.965 | 20.919 | 24.035 | 27.733 | 10.54 | 4.79 | 11.136 | 6.496 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 48.59 | 50.58 | 65.10 | 65.10 | 78.31 | 86.36 | 99.22 | 95.52 | 53.35 | 59.09 | 50.73 | 55.37 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 0 | 6.14<br>0 | 0 | 0 | 0 | 618.91 | 0 | 161.63 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 12 | 0 | 0 | 0 | 46.25 | 31.5 | 8 | 17.5 | 339 | 15 | 108.5 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | -12.00 | 0.00 | 0.00 | 0.00 | -40.11 | -31.50 | -8.00 | -17.50 | 279.91 | -15.00 | 53.13 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 188.00 | 200.00 | 200.00 | 200.00 | 159.89 | 168.50 | 192.00 | 182.50 | 479.91 | 185.00 | 253.13 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 12.00 | 0.00 | 0.00 | 0.00 | 46.25 | 31.50 | 8.00 | 17.50 | 339.00 | 15.00 | 108.50 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I = 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 4.8 | 0 | 0 | 0 | 18.5 | 12.6 | 3.2 | 7 | 135.6 | 6 | 43.4 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 3.84 | 0 | 0 | 0 | 14.8 | 10.08 | 2.56 | 5.6 | 108.48 | 4.8 | 34.72 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 11.220 | 6.732 | 6.343 | 3.806 | 2.284 | 1.370 | 9.702 | 11.869 | 8.658 | 8.555 | 70.221 | 45.012 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 11.220 | 10.572 | 6.343 | 3.806 | 2.284 | 16.170 | 19.782 | 14.429 | 14.258 | 117.035 | 75.021 | 79.732 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -7.48 | -0.65 | -4.23 | -2.54 | -1.52 | 13.89 | 3.61 | -5.35 | -0.17 | 102.78 | -42.01 | 4.71 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 7.480 | 5.448 | 4.229 | 2.537 | 1.522 | 4.613 | 8.988 | 8.553 | 7.172 | 32.823 | 48.014 | 38.688 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 7.20 | 0.00 | 0.00 | 0.00 | 27.75 | 18.90 | 4.80 | 10.50 | 203.40 | 9.00 | 65.10 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 7.48 | 12.65 | 4.23 | 2.54 | 1.52 | 32.36 | 27.89 | 13.35 | 17.67 | 236.22 | 57.01 | 103.79 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.317 | 0.537 | 0.179 | 0.108 | 0.065 | 1.373 | 1.184 | 0.567 | 0.750 | 10.025 | 2.420 | 4.405 |

# **Tabel C. 69** Hasil Perhitungan Debit Metode FJ Mock Tahun 2019

| No | Uraian | Satuan | Hitungan | Tahun 2019/Bulan | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | | Feb | | Mar | | Apr | | Mei | | Jun | |
| | Periode | | | I | II | I | II | I | II | I | II | I | II | I | II |
| **I.** | **Data Meteorologi** | | | | | | | | | | | | | | |
| | 1. Curah Hujan (P) | mm/15 hari | data | 0 | 0 | 0 | 0 | 260 | 276 | 49 | 42 | 13 | 0 | 0 | 0 |
| | 2. Jumlah Hari (h) | hari | data | 0 | 0 | 0 | 0 | 8 | 10 | 3 | 4 | 1 | 0 | 0 | 0 |
| **II.** | **Evapotranspirasi Terbatas (Et)** | | | | | | | | | | | | | | |
| | 3. Evapotranspirasi Potensial (Eto) | mm/15 hari | | 62.45 | 85.46 | 42.57 | 69.32 | 89.73 | 76.00 | 97.74 | 128.81 | 128.38 | 210.66 | 601.65 | 650.46 |
| | 4. Permukaan lahan terbuka (m) | % | ditetapkan | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | 5. (m/20) x ( 18-h) | | hitungan | 0.27 | 0.27 | 0.27 | 0.27 | 0.15 | 0.12 | 0.225 | 0.21 | 0.255 | 0.27 | 0.27 | 0.27 |
| | 6. E = (Eto) (m/20) (18-h) | mm/15 hari | (3) x (5) | 16.861 | 23.074 | 11.495 | 18.717 | 13.459 | 9.120 | 21.991 | 27.050 | 32.736 | 56.879 | 162.446 | 175.625 |
| | 7. Et = (Eto) - E | mm/15 hari | (3) - (6) | 45.586 | 62.384 | 31.078 | 50.605 | 76.267 | 66.877 | 75.745 | 101.759 | 95.640 | 153.785 | 439.205 | 474.838 |
| **III** | **Keseimbangan Air di Permukaan Tanah** | | | | | | | | | | | | | | |
| | 8. Perubahan kandungan air tanah<br>ΔS = P - Et | mm/15 hari | (1) - (7) | 0 | 0 | 0 | 0 | 183.73 | 209.12 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 9. Aliran permukaan (hujan lebat) | mm/15 hari | (PF X 1) | 0 | 0 | 0 | 0 | 130 | 138 | 24.5 | 21 | 6.5 | 0 | 0 | 0 |
| | 10. Kandungan air tanah (SS) | mm/15 hari | (8) - (9) | 0.00 | 0.00 | 0.00 | 0.00 | 53.73 | 71.12 | -24.50 | -21.00 | -6.50 | 0.00 | 0.00 | 0.00 |
| | 11. Kapasitas kelembaban air tanah (SMC) | mm/15 hari | SMC + (10) | 200.00 | 200.00 | 200.00 | 200.00 | 253.73 | 271.12 | 175.50 | 179.00 | 193.50 | 200.00 | 200.00 | 200.00 |
| | 12 Kelebihan air (Ws) | mm/15 hari | (8) - (10) | 0.00 | 0.00 | 0.00 | 0.00 | 130.00 | 138.00 | 24.50 | 21.00 | 6.50 | 0.00 | 0.00 | 0.00 |
| **VI** | **Limpasan dan Penyimpanan Air Tanah** | | | | | | | | | | | | | | |
| | 13. Koefisien infiltrasi (i) | | I= 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | 14. Infiltrasi (I) | mm/15 hari | (12 x 13) | 0 | 0 | 0 | 0 | 52 | 55.2 | 9.8 | 8.4 | 2.6 | 0 | 0 | 0 |
| | 15. 0.5 (1+k)(I) | hitungan | k = 0.6 | 0 | 0 | 0 | 0 | 41.6 | 44.16 | 7.84 | 6.72 | 2.08 | 0 | 0 | 0 |
| | 16. k x V(n-1) | hitungan | k = 0.6 | 23.122 | 13.873 | 8.324 | 4.994 | 2.997 | 26.758 | 42.551 | 30.234 | 22.173 | 14.552 | 8.731 | 5.239 |
| | 17. Volume Penyimpanan Vn | mm/15 hari | (15) + (16) | 23.122 | 13.873 | 8.324 | 4.994 | 44.597 | 70.918 | 50.391 | 36.954 | 24.253 | 14.552 | 8.731 | 5.239 |
| | 18 Perubahan volume DVn | mm/15 hari | (Vn - Vn-1) | -15.415 | -9.25 | -5.55 | -3.33 | 39.60 | 26.32 | -20.53 | -13.44 | -12.70 | -9.70 | -5.82 | -3.49 |
| | 19. Aliran Dasar (Base Flow) | mm/15 hari | (14) - (18) | 15.41 | 9.249 | 5.549 | 3.330 | 12.398 | 28.879 | 30.327 | 21.836 | 15.302 | 9.701 | 5.821 | 3.492 |
| | 20. Aliran langsung (Direct Run-Off) | mm/15 hari | (12) - (14) | 0.00 | 0.00 | 0.00 | 0.00 | 78.00 | 82.80 | 14.70 | 12.60 | 3.90 | 0.00 | 0.00 | 0.00 |
| | 21. Aliran (Run off) | mm/15 hari | (19) + (20) | 15.41 | 9.25 | 5.55 | 3.33 | 90.40 | 111.68 | 45.03 | 34.44 | 19.20 | 9.70 | 5.82 | 3.49 |
| | 22. Luas Daerah Tangkapan (A) | $km^2$ | data | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | 23. Debit Aliran Sungai (x^106) | $m^3$/detik | (21) x (22) | 0.654 | 0.393 | 0.236 | 0.141 | 3.836 | 4.739 | 1.911 | 1.461 | 0.815 | 0.412 | 0.247 | 0.148 |

# LAMPIRAN D

**Tabel D. 1** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan November Periode II

| Mulai Tanam Bulan November Periode II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Nov | II | 7.841 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 0.000 |
| Des | I | 7.796 | 1.437 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.477 | 15.039 | 1.741 | 2.678 | 1338.971 |
| | II | 7.796 | 4.648 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.477 | 11.829 | 1.369 | 2.106 | 2106.241 |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.616 | 8.857 | 1.025 | 1.577 | 2365.683 |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.514 | 7.075 | 0.819 | 1.260 | 1889.780 |
| Feb | I | 5.210 | 5.376 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.297 | 4.121 | 0.477 | 0.734 | 1100.765 |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.474 | 3.858 | 0.446 | 0.687 | 686.897 |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.762 | 2.548 | 0.295 | 0.454 | 226.809 |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 500 | LP | LP | LP | LP | 13.032 | 13.688 | 1.584 | 2.437 | 1218.647 |
| | II | 5.548 | 1.045 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.032 | 13.987 | 1.619 | 2.490 | 2490.476 |
| Mei | I | 5.863 | 0.187 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.015 | 14.828 | 1.716 | 2.640 | 3960.490 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.352 | 9.452 | 1.094 | 1.683 | 2524.564 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 7.406 | 10.506 | 1.216 | 1.871 | 2806.179 |
| | II | 6.943 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.059 | 11.259 | 1.303 | 2.005 | 3007.255 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.496 | 8.596 | 0.995 | 1.531 | 1530.608 |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.611 | 5.711 | 0.661 | 1.017 | 508.418 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 2** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Desember Periode I

| Mulai Tanam Bulan Desember Periode I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.477 | 15.039 | 1.741 | 2.678 | 0.000 |
| | II | 7.796 | 4.648 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.477 | 11.829 | 1.369 | 2.106 | 1053.121 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.194 | 14.336 | 1.659 | 2.553 | 2552.671 |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.616 | 7.177 | 0.831 | 1.278 | 1916.965 |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.558 | 3.282 | 0.380 | 0.584 | 876.545 |
| | II | 5.210 | 2.716 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.297 | 6.781 | 0.785 | 1.207 | 1811.235 |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.710 | 4.495 | 0.520 | 0.800 | 800.429 |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.762 | 1.726 | 0.200 | 0.307 | 153.685 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 |
| | II | 5.548 | 1.045 | 2.00 | | 500 | LP | LP | LP | LP | 13.032 | 13.987 | 1.619 | 2.490 | 1245.238 |
| Mei | I | 5.863 | 0.187 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.015 | 14.828 | 1.716 | 2.640 | 2640.327 |
| | II | 5.863 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.015 | 15.015 | 1.738 | 2.674 | 4010.347 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 7.522 | 10.622 | 1.229 | 1.891 | 2837.088 |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 7.406 | 10.506 | 1.216 | 1.871 | 2806.179 |
| Jul | I | 8.244 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 8.381 | 12.581 | 1.456 | 2.240 | 3360.374 |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.496 | 8.596 | 0.995 | 1.531 | 1530.608 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.935 | 7.035 | 0.814 | 1.253 | 626.376 |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 3** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Desember Periode II

| Mulai Tanam Bulan Desember Periode II | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Des | II | 7.796 | 4.648 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.477 | 11.829 | 1.369 | 2.106 | 0.000 | |
| Jan | I | 6.107 | 0.859 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.194 | 14.336 | 1.659 | 2.553 | 1276.336 | |
| | II | 6.107 | 2.539 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.194 | 12.656 | 1.465 | 2.254 | 2253.526 | |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 5.645 | 3.369 | 0.390 | 0.600 | 899.740 | |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.558 | 5.942 | 0.688 | 1.058 | 1587.015 | |
| Mar | I | 5.565 | 2.315 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.658 | 7.543 | 0.873 | 1.343 | 2014.661 | |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.710 | 3.674 | 0.425 | 0.654 | 654.180 | |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.757 | 3.513 | 0.407 | 0.626 | 312.750 | |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 | |
| Mei | I | 5.863 | 0.187 | 2.00 | | 500 | LP | LP | LP | LP | 13.015 | 14.828 | 1.716 | 2.640 | 1320.163 | |
| | II | 5.863 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.015 | 15.015 | 1.738 | 2.674 | 2673.565 | |
| Jun | I | 6.943 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 4290.010 | |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 7.522 | 10.622 | 1.229 | 1.891 | 2837.088 | |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.793 | 11.893 | 1.377 | 2.118 | 3176.665 | |
| | II | 8.244 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 8.381 | 12.581 | 1.456 | 2.240 | 3360.374 | |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 8.285 | 11.385 | 1.318 | 2.027 | 2027.275 | |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.935 | 7.035 | 0.814 | 1.253 | 626.376 | |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 | |

**Tabel D. 4** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Januari Periode I

| Mulai Tanam Bulan Januari Periode I | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.194 | 14.336 | 1.659 | 2.553 | 0.000 | |
| | II | 6.107 | 2.539 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.194 | 12.656 | 1.465 | 2.254 | 1126.763 | |
| Feb | I | 5.210 | 5.376 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.057 | 9.681 | 1.121 | 1.724 | 1723.912 | |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 5.645 | 6.029 | 0.698 | 1.073 | 1610.210 | |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.936 | 6.721 | 0.778 | 1.197 | 1795.174 | |
| | II | 5.565 | 3.136 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.658 | 6.722 | 0.778 | 1.197 | 1795.288 | |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.699 | 5.455 | 0.631 | 0.971 | 971.253 | |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.757 | 3.811 | 0.441 | 0.679 | 339.341 | |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 | |
| | II | 5.863 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 13.015 | 15.015 | 1.738 | 2.674 | 1336.782 | |
| Jun | I | 6.943 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 2860.007 | |
| | II | 6.943 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 4290.010 | |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.931 | 12.031 | 1.392 | 2.142 | 3213.363 | |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.793 | 11.893 | 1.377 | 2.118 | 3176.665 | |
| Agu | I | 12.428 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 12.635 | 16.835 | 1.948 | 2.998 | 4496.499 | |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 8.285 | 11.385 | 1.318 | 2.027 | 2027.275 | |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.621 | 6.721 | 0.778 | 1.197 | 598.337 | |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 | |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 | |

**Tabel D. 5** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Januari Periode II

**Mulai Tanam Bulan Januari Periode II**

| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Jan | II | 6.107 | 2.539 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.194 | 12.656 | 1.465 | 2.254 | 0.000 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.057 | 9.681 | 1.121 | 1.724 | 861.956 |
| | II | 5.210 | 2.716 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.057 | 12.341 | 1.428 | 2.198 | 2197.559 |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.029 | 6.814 | 0.789 | 1.213 | 1819.946 |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.936 | 5.900 | 0.683 | 1.051 | 1575.801 |
| Apr | I | 5.548 | 1.344 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.640 | 8.496 | 0.983 | 1.513 | 2269.310 |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.699 | 5.753 | 0.666 | 1.024 | 1024.434 |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.857 | 4.770 | 0.552 | 0.849 | 424.685 |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 1430.003 |
| | II | 6.943 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 2860.007 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 4494.444 |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.931 | 12.031 | 1.392 | 2.142 | 3213.363 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 13.256 | 16.356 | 1.893 | 2.912 | 4368.665 |
| | II | 12.428 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 12.635 | 16.835 | 1.948 | 2.998 | 4496.499 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 7.622 | 10.722 | 1.241 | 1.909 | 1909.213 |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.621 | 6.721 | 0.778 | 1.197 | 598.337 |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 |

**Tabel D. 6** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Februari Periode I

**Mulai Tanam Bulan Februari Periode I**

| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.057 | 9.681 | 1.121 | 1.724 | 0.000 |
| | II | 5.210 | 2.716 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.057 | 12.341 | 1.428 | 2.198 | 1098.779 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 12.796 | 12.482 | 1.445 | 2.222 | 2222.499 |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.029 | 5.993 | 0.694 | 1.067 | 1600.573 |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.918 | 7.674 | 0.888 | 1.366 | 2049.596 |
| | II | 5.548 | 1.045 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.640 | 8.795 | 1.018 | 1.566 | 2349.082 |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.909 | 6.822 | 0.790 | 1.215 | 1214.786 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.857 | 4.957 | 0.574 | 0.883 | 441.304 |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 1430.003 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 2996.296 |
| | II | 8.244 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 4494.444 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 13.463 | 16.563 | 1.917 | 2.949 | 4423.988 |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 13.256 | 16.356 | 1.893 | 2.912 | 4368.665 |
| Sep | I | 11.433 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 11.624 | 15.824 | 1.831 | 2.818 | 4226.432 |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 7.622 | 10.722 | 1.241 | 1.909 | 1909.213 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 4.547 | 7.647 | 0.885 | 1.362 | 680.865 |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 |

**Tabel D. 7** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Februari Periode II

| Mulai Tanam Bulan Februari Periode II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Feb | II | 5.210 | 2.716 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.057 | 12.341 | 1.428 | 2.198 | 0.000 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 500 | 1.1 | LP | LP | LP | 12.796 | 12.482 | 1.445 | 2.222 | 1111.250 |
| | II | 5.565 | 3.136 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 12.796 | 11.660 | 1.350 | 2.076 | 2076.250 |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.010 | 7.766 | 0.899 | 1.383 | 2074.292 |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.918 | 7.972 | 0.923 | 1.420 | 2129.368 |
| Mei | I | 5.863 | 0.187 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.961 | 9.974 | 1.154 | 1.776 | 2664.105 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.909 | 7.009 | 0.811 | 1.248 | 1248.024 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.199 | 5.299 | 0.613 | 0.944 | 471.755 |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 1498.148 |
| | II | 8.244 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 2996.296 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 5419.698 |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 13.463 | 16.563 | 1.917 | 2.949 | 4423.988 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 12.195 | 15.295 | 1.770 | 2.724 | 4085.316 |
| | II | 11.433 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 11.624 | 15.824 | 1.831 | 2.818 | 4226.432 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 9.574 | 12.674 | 1.467 | 2.257 | 2256.701 |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 4.547 | 7.647 | 0.885 | 1.362 | 680.865 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 |

**Tabel D. 8** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Maret Periode I

| Mulai Tanam Bulan Maret Periode I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | LP | LP | LP | LP | 12.796 | 12.482 | 1.445 | 2.222 | 0.000 |
| | II | 5.565 | 3.136 | 2.00 | | 500 | 1.1 | LP | LP | LP | 12.796 | 11.660 | 1.350 | 2.076 | 1038.125 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.032 | 13.688 | 1.584 | 2.437 | 2437.295 |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.010 | 8.065 | 0.933 | 1.436 | 2154.064 |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.254 | 9.168 | 1.061 | 1.632 | 2448.605 |
| | II | 5.863 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.961 | 10.161 | 1.176 | 1.809 | 2713.963 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.629 | 7.729 | 0.895 | 1.376 | 1376.239 |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.199 | 5.299 | 0.613 | 0.944 | 471.755 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 1498.148 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 3613.132 |
| | II | 12.428 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 5419.698 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 12.386 | 15.486 | 1.792 | 2.757 | 4136.211 |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 12.195 | 15.295 | 1.770 | 2.724 | 4085.316 |
| Okt | I | 14.360 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 14.600 | 18.800 | 2.176 | 3.348 | 5021.312 |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 9.574 | 12.674 | 1.467 | 2.257 | 2256.701 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.483 | 5.583 | 0.646 | 0.994 | 497.070 |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 |

**Tabel D. 9** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Maret Periode II

| Mulai Tanam Bulan Maret Periode II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Mar | II | 5.565 | 3.136 | 2.00 | | 0.00 | LP | LP | LP | LP | 12.796 | 11.660 | 1.350 | 2.076 | 0.000 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.032 | 13.688 | 1.584 | 2.437 | 1218.647 |
| | II | 5.548 | 1.045 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.032 | 13.987 | 1.619 | 2.490 | 2490.476 |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.352 | 9.265 | 1.072 | 1.650 | 2474.706 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.254 | 9.354 | 1.083 | 1.666 | 2498.463 |
| Jun | I | 6.943 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.059 | 11.259 | 1.303 | 2.005 | 3007.255 |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.629 | 7.729 | 0.895 | 1.376 | 1376.239 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.611 | 5.711 | 0.661 | 1.017 | 508.418 |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 1806.566 |
| | II | 12.428 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 3613.132 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 5247.331 |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 12.386 | 15.486 | 1.792 | 2.757 | 4136.211 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 15.318 | 18.418 | 2.132 | 3.280 | 4919.288 |
| | II | 14.360 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 14.600 | 18.800 | 2.176 | 3.348 | 5021.312 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.228 | 8.328 | 0.964 | 1.483 | 1482.828 |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.483 | 5.583 | 0.646 | 0.994 | 497.070 |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 |

**Tabel D. 10** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan April Periode I

| Mulai Tanam Bulan April Periode I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.032 | 13.688 | 1.584 | 2.437 | 0.000 |
| | II | 5.548 | 1.045 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.032 | 13.987 | 1.619 | 2.490 | 1245.238 |
| Mei | I | 5.863 | 0.187 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.015 | 14.828 | 1.716 | 2.640 | 2640.327 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.352 | 9.452 | 1.094 | 1.683 | 2524.564 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 7.406 | 10.506 | 1.216 | 1.871 | 2806.179 |
| | II | 6.943 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.059 | 11.259 | 1.303 | 2.005 | 3007.255 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.496 | 8.596 | 0.995 | 1.531 | 1530.608 |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.611 | 5.711 | 0.661 | 1.017 | 508.418 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 1806.566 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 3498.220 |
| | II | 11.433 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 5247.331 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 15.557 | 18.657 | 2.159 | 3.322 | 4983.215 |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 15.318 | 18.418 | 2.132 | 3.280 | 4919.288 |
| Nov | I | 7.841 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.972 | 12.172 | 1.409 | 2.167 | 3251.076 |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.228 | 8.328 | 0.964 | 1.483 | 1482.828 |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.469 | 4.131 | 0.478 | 0.736 | 367.814 |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 |

**Tabel D. 11** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan April Periode II

| Mulai Tanam Bulan April Periode II | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Apr | II | 5.548 | 1.045 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.032 | 13.987 | 1.619 | 2.490 | 0.000 | |
| Mei | I | 5.863 | 0.187 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.015 | 14.828 | 1.716 | 2.640 | 1320.163 | |
| | II | 5.863 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 13.015 | 15.015 | 1.738 | 2.674 | 2673.565 | |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 7.522 | 10.622 | 1.229 | 1.891 | 2837.088 | |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 7.406 | 10.506 | 1.216 | 1.871 | 2806.179 | |
| Jul | I | 8.244 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 8.381 | 12.581 | 1.456 | 2.240 | 3360.374 | |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.496 | 8.596 | 0.995 | 1.531 | 1530.608 | |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.935 | 7.035 | 0.814 | 1.253 | 626.376 | |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Sep | I | 11.433 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 1749.110 | |
| | II | 11.433 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 3498.220 | |
| Okt | I | 14.360 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 5875.504 | |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 15.557 | 18.657 | 2.159 | 3.322 | 4983.215 | |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.364 | 11.464 | 1.327 | 2.041 | 3061.991 | |
| | II | 7.841 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.972 | 12.172 | 1.409 | 2.167 | 3251.076 | |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.197 | 6.860 | 0.794 | 1.221 | 1221.467 | |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.469 | 0.921 | 0.107 | 0.164 | 81.964 | |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 | |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 | |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 | |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 | |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 | |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 | |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 | |

**Tabel D. 12** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Mei Periode I

| Mulai Tanam Bulan Mei Periode I | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.015 | 14.828 | 1.716 | 2.640 | 0.000 | |
| | II | 5.863 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 13.015 | 15.015 | 1.738 | 2.674 | 1336.782 | |
| Jun | I | 6.943 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 2860.007 | |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 7.522 | 10.622 | 1.229 | 1.891 | 2837.088 | |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.793 | 11.893 | 1.377 | 2.118 | 3176.665 | |
| | II | 8.244 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 8.381 | 12.581 | 1.456 | 2.240 | 3360.374 | |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 8.285 | 11.385 | 1.318 | 2.027 | 2027.275 | |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.935 | 7.035 | 0.814 | 1.253 | 626.376 | |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 11.433 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 1749.110 | |
| Okt | I | 14.360 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 3917.003 | |
| | II | 14.360 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 5875.504 | |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.495 | 11.595 | 1.342 | 2.065 | 3096.898 | |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.364 | 11.464 | 1.327 | 2.041 | 3061.991 | |
| Des | I | 7.796 | 1.437 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.926 | 10.688 | 1.237 | 1.903 | 2854.763 | |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.197 | 3.649 | 0.422 | 0.650 | 649.767 | |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.934 | 4.175 | 0.483 | 0.743 | 371.722 | |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 | |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 | |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 | |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 | |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 | |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 | |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 | |

**Tabel D. 13** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Mei Periode II

| Mulai Tanam Bulan Mei Periode II | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Mei | II | 5.863 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 13.015 | 15.015 | 1.738 | 2.674 | 0.000 | |
| Jun | I | 6.943 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 1430.003 | |
| | II | 6.943 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 2860.007 | |
| Jul | I | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.931 | 12.031 | 1.392 | 2.142 | 3213.363 | |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.793 | 11.893 | 1.377 | 2.118 | 3176.665 | |
| Agu | I | 12.428 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 12.635 | 16.835 | 1.948 | 2.998 | 4496.499 | |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 8.285 | 11.385 | 1.318 | 2.027 | 2027.275 | |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.621 | 6.721 | 0.778 | 1.197 | 598.337 | |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Okt | I | 14.360 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 1958.501 | |
| | II | 14.360 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 3917.003 | |
| Nov | I | 7.841 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 4472.858 | |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.495 | 11.595 | 1.342 | 2.065 | 3096.898 | |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.315 | 9.978 | 1.155 | 1.777 | 2665.068 | |
| | II | 7.796 | 4.648 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.926 | 7.478 | 0.865 | 1.331 | 1997.213 | |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.071 | 6.313 | 0.731 | 1.124 | 1124.036 | |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.934 | 2.495 | 0.289 | 0.444 | 222.149 | |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 | |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 | |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 | |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 | |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 | |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 | |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 | |

**Tabel D. 14** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Juni Periode I

| Mulai Tanam Bulan Juni Periode I | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 0.000 | |
| | II | 6.943 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 1430.003 | |
| Jul | I | 8.244 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 2996.296 | |
| | II | 8.244 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.931 | 12.031 | 1.392 | 2.142 | 3213.363 | |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 13.256 | 16.356 | 1.893 | 2.912 | 4368.665 | |
| | II | 12.428 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 12.635 | 16.835 | 1.948 | 2.998 | 4496.499 | |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 7.622 | 10.722 | 1.241 | 1.909 | 1909.213 | |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 3.621 | 6.721 | 0.778 | 1.197 | 598.337 | |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 14.360 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 1958.501 | |
| Nov | I | 7.841 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 2981.905 | |
| | II | 7.841 | 0.000 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 4472.858 | |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.445 | 10.108 | 1.170 | 1.800 | 2699.771 | |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.315 | 6.767 | 0.783 | 1.205 | 1807.518 | |
| Jan | I | 6.107 | 0.859 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 6.209 | 9.550 | 1.105 | 1.700 | 2550.746 | |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.071 | 4.633 | 0.536 | 0.825 | 824.891 | |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.650 | -0.626 | -0.072 | -0.111 | -55.737 | |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 | |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 | |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 | |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 | |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 | |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 | |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |

**Tabel D. 15** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Juni Periode II

| Mulai Tanam Bulan Juni Periode II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Jun | II | 6.943 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.062 | 16.062 | 1.859 | 2.860 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 1498.148 |
| | II | 8.244 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 2996.296 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 13.463 | 16.563 | 1.917 | 2.949 | 4423.988 |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 13.256 | 16.356 | 1.893 | 2.912 | 4368.665 |
| Sep | I | 11.433 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 11.624 | 15.824 | 1.831 | 2.818 | 4226.432 |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 7.622 | 10.722 | 1.241 | 1.909 | 1909.213 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 4.547 | 7.647 | 0.885 | 1.362 | 680.865 |
| | II | 14.360 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 1490.953 |
| | II | 7.841 | 0.000 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 2981.905 |
| Des | I | 7.796 | 1.437 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.477 | 15.039 | 1.741 | 2.678 | 4016.912 |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.445 | 6.897 | 0.798 | 1.228 | 1842.221 |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.514 | 8.755 | 1.013 | 1.559 | 2338.498 |
| | II | 6.107 | 2.539 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 6.209 | 7.870 | 0.911 | 1.401 | 2102.028 |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.474 | 1.198 | 0.139 | 0.213 | 213.251 |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.650 | 2.034 | 0.235 | 0.362 | 181.087 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 16** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Juli Periode I

| Mulai Tanam Bulan Juli Periode I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 1498.148 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 3613.132 |
| | II | 12.428 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 13.463 | 16.563 | 1.917 | 2.949 | 4423.988 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 12.195 | 15.295 | 1.770 | 2.724 | 4085.316 |
| | II | 11.433 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 11.624 | 15.824 | 1.831 | 2.818 | 4226.432 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 9.574 | 12.674 | 1.467 | 2.257 | 2256.701 |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 4.547 | 7.647 | 0.885 | 1.362 | 680.865 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | 500 | LP | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 1490.953 |
| Des | I | 7.796 | 1.437 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.477 | 15.039 | 1.741 | 2.678 | 2677.941 |
| | II | 7.796 | 4.648 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 14.477 | 11.829 | 1.369 | 2.106 | 3159.362 |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.616 | 8.857 | 1.025 | 1.577 | 2365.683 |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.514 | 7.075 | 0.819 | 1.260 | 1889.780 |
| Feb | I | 5.210 | 5.376 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.297 | 4.121 | 0.477 | 0.734 | 1100.765 |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.474 | 3.858 | 0.446 | 0.687 | 686.897 |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.762 | 2.548 | 0.295 | 0.454 | 226.809 |
| | II | 5.565 | 3.136 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 17** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Juli Periode II

**Mulai Tanam Bulan Juli Periode II**

| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Jul | II | 8.244 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 14.827 | 16.827 | 1.948 | 2.996 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 1806.566 |
| | II | 12.428 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 3613.132 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 12.386 | 15.486 | 1.792 | 2.757 | 4136.211 |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 12.195 | 15.295 | 1.770 | 2.724 | 4085.316 |
| Okt | I | 14.360 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 14.600 | 18.800 | 2.176 | 3.348 | 5021.312 |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 9.574 | 12.674 | 1.467 | 2.257 | 2256.701 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.483 | 5.583 | 0.646 | 0.994 | 497.070 |
| | II | 7.841 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.437 | 2.00 | | 500 | LP | LP | LP | LP | 14.477 | 15.039 | 1.741 | 2.678 | 1338.971 |
| | II | 7.796 | 4.648 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 14.477 | 11.829 | 1.369 | 2.106 | 2106.241 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.194 | 14.336 | 1.659 | 2.553 | 3829.007 |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.616 | 7.177 | 0.831 | 1.278 | 1916.965 |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.558 | 3.282 | 0.380 | 0.584 | 876.545 |
| | II | 5.210 | 2.716 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.297 | 6.781 | 0.785 | 1.207 | 1811.235 |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.710 | 4.495 | 0.520 | 0.800 | 800.429 |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.762 | 1.726 | 0.200 | 0.307 | 153.685 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 18** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Agustus Periode I

**Mulai Tanam Bulan Agustus Periode I**

| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 1806.566 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 3498.220 |
| | II | 11.433 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 12.386 | 15.486 | 1.792 | 2.757 | 4136.211 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 15.318 | 18.418 | 2.132 | 3.280 | 4919.288 |
| | II | 14.360 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 14.600 | 18.800 | 2.176 | 3.348 | 5021.312 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.228 | 8.328 | 0.964 | 1.483 | 1482.828 |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.483 | 5.583 | 0.646 | 0.994 | 497.070 |
| Des | I | 7.796 | 1.437 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 0.563 | 0.065 | 0.100 | 0.000 |
| | II | 7.796 | 4.648 | 2.00 | | 500 | LP | LP | LP | LP | 14.477 | 11.829 | 1.369 | 2.106 | 1053.121 |
| Jan | I | 6.107 | 0.859 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.194 | 14.336 | 1.659 | 2.553 | 2552.671 |
| | II | 6.107 | 2.539 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.194 | 12.656 | 1.465 | 2.254 | 3380.289 |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 5.645 | 3.369 | 0.390 | 0.600 | 899.740 |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.558 | 5.942 | 0.688 | 1.058 | 1587.015 |
| Mar | I | 5.565 | 2.315 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.658 | 7.543 | 0.873 | 1.343 | 2014.661 |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.710 | 3.674 | 0.425 | 0.654 | 654.180 |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.757 | 3.513 | 0.407 | 0.626 | 312.750 |
| | II | 5.548 | 1.045 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 19** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Agustus Periode II

| Mulai Tanam Bulan Agustus Periode II | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Agu | II | 12.428 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 18.291 | 20.291 | 2.349 | 3.613 | 0.000 | |
| Sep | I | 11.433 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 1749.110 | |
| | II | 11.433 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 3498.220 | |
| Okt | I | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 15.557 | 18.657 | 2.159 | 3.322 | 4983.215 | |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 15.318 | 18.418 | 2.132 | 3.280 | 4919.288 | |
| Nov | I | 7.841 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.972 | 12.172 | 1.409 | 2.167 | 3251.076 | |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.228 | 8.328 | 0.964 | 1.483 | 1482.828 | |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.469 | 4.131 | 0.478 | 0.736 | 367.814 | |
| | II | 7.796 | 4.648 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -2.648 | -0.306 | -0.472 | 0.000 | |
| Jan | I | 6.107 | 0.859 | 2.00 | | 500 | LP | LP | LP | LP | 13.194 | 14.336 | 1.659 | 2.553 | 1276.336 | |
| | II | 6.107 | 2.539 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.194 | 12.656 | 1.465 | 2.254 | 2253.526 | |
| Feb | I | 5.210 | 5.376 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.057 | 9.681 | 1.121 | 1.724 | 2585.868 | |
| | II | 5.210 | 2.716 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 5.645 | 6.029 | 0.698 | 1.073 | 1610.210 | |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.936 | 6.721 | 0.778 | 1.197 | 1795.174 | |
| | II | 5.565 | 3.136 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.658 | 6.722 | 0.778 | 1.197 | 1795.288 | |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.699 | 5.455 | 0.631 | 0.971 | 971.253 | |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.757 | 3.811 | 0.441 | 0.679 | 339.341 | |
| Mei | I | 5.863 | 0.187 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 | |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |

**Tabel D. 20** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan September Periode I

| Mulai Tanam Bulan September Periode I | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 0.000 | |
| | II | 11.433 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 1749.110 | |
| Okt | I | 14.360 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 3917.003 | |
| | II | 14.360 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 19.998 | 23.098 | 2.673 | 4.113 | 6169.308 | |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.364 | 11.464 | 1.327 | 2.041 | 3061.991 | |
| | II | 7.841 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.972 | 12.172 | 1.409 | 2.167 | 3251.076 | |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.197 | 6.860 | 0.794 | 1.221 | 1221.467 | |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.469 | 0.921 | 0.107 | 0.164 | 81.964 | |
| Jan | I | 6.107 | 0.859 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 | |
| | II | 6.107 | 2.539 | 2.00 | | 500 | LP | LP | LP | LP | 13.194 | 12.656 | 1.465 | 2.254 | 1126.763 | |
| Feb | I | 5.210 | 5.376 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.057 | 9.681 | 1.121 | 1.724 | 1723.912 | |
| | II | 5.210 | 2.716 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.057 | 12.341 | 1.428 | 2.198 | 3296.338 | |
| Mar | I | 5.565 | 2.315 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.029 | 6.814 | 0.789 | 1.213 | 1819.946 | |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.936 | 5.900 | 0.683 | 1.051 | 1575.801 | |
| Apr | I | 5.548 | 1.344 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.640 | 8.496 | 0.983 | 1.513 | 2269.310 | |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.699 | 5.753 | 0.666 | 1.024 | 1024.434 | |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.857 | 4.770 | 0.552 | 0.849 | 424.685 | |
| | II | 5.863 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 | |

**Tabel D. 21** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan September Periode II

| Mulai Tanam Bulan September Periode II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Sep | II | 11.433 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 17.646 | 19.646 | 2.274 | 3.498 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 1958.501 |
| | II | 14.360 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 3917.003 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.495 | 11.595 | 1.342 | 2.065 | 3096.898 |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.364 | 11.464 | 1.327 | 2.041 | 3061.991 |
| Des | I | 7.796 | 1.437 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.926 | 10.688 | 1.237 | 1.903 | 2854.763 |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 5.197 | 3.649 | 0.422 | 0.650 | 649.767 |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.934 | 4.175 | 0.483 | 0.743 | 371.722 |
| | II | 6.107 | 2.539 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 500 | LP | LP | LP | LP | 13.057 | 9.681 | 1.121 | 1.724 | 861.956 |
| | II | 5.210 | 2.716 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 13.057 | 12.341 | 1.428 | 2.198 | 2197.559 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 12.796 | 12.482 | 1.445 | 2.222 | 3333.749 |
| | II | 5.565 | 3.136 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.029 | 5.993 | 0.694 | 1.067 | 1600.573 |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.918 | 7.674 | 0.888 | 1.366 | 2049.596 |
| | II | 5.548 | 1.045 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.640 | 8.795 | 1.018 | 1.566 | 2349.082 |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.909 | 6.822 | 0.790 | 1.215 | 1214.786 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.857 | 4.957 | 0.574 | 0.883 | 441.304 |
| Jun | I | 6.943 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 22** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Oktober Periode I

| Mulai Tanam Bulan Oktober Periode I | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 1958.501 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 2981.905 |
| | II | 7.841 | 0.000 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 14.746 | 17.846 | 2.066 | 3.178 | 4766.661 |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.315 | 9.978 | 1.155 | 1.777 | 2665.068 |
| | II | 7.796 | 4.648 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 7.926 | 7.478 | 0.865 | 1.331 | 1997.213 |
| Jan | I | 6.107 | 0.859 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.071 | 6.313 | 0.731 | 1.124 | 1124.036 |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.934 | 2.495 | 0.289 | 0.444 | 222.149 |
| Feb | I | 5.210 | 5.376 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 |
| | II | 5.210 | 2.716 | 2.00 | | 500 | LP | LP | LP | LP | 13.057 | 12.341 | 1.428 | 2.198 | 1098.779 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 12.796 | 12.482 | 1.445 | 2.222 | 2222.499 |
| | II | 5.565 | 3.136 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 12.796 | 11.660 | 1.350 | 2.076 | 3114.376 |
| Apr | I | 5.548 | 1.344 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.010 | 7.766 | 0.899 | 1.383 | 2074.292 |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 5.918 | 7.972 | 0.923 | 1.420 | 2129.368 |
| Mei | I | 5.863 | 0.187 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.961 | 9.974 | 1.154 | 1.776 | 2664.105 |
| | II | 5.863 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 3.909 | 7.009 | 0.811 | 1.248 | 1248.024 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.199 | 5.299 | 0.613 | 0.944 | 471.755 |
| | II | 6.943 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 23** Perhitungan Kebutuhan Air Tanaman Padi dengan Waktu Awal Tanam Bulan Oktober Periode II

| Mulai Tanam Bulan Oktober Periode II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Padi | Perkolasi | WLR | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Okt | II | 14.360 | 0.000 | 2.00 | | 0.00 | LP | LP | LP | LP | 19.998 | 21.998 | 2.546 | 3.917 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | 500 | 1.1 | LP | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 1490.953 |
| | II | 7.841 | 0.000 | 2.00 | | 1000 | 1.1 | 1.1 | LP | LP | 14.746 | 16.746 | 1.938 | 2.982 | 2981.905 |
| Des | I | 7.796 | 1.437 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 8.445 | 10.108 | 1.170 | 1.800 | 2699.771 |
| | II | 7.796 | 4.648 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 8.315 | 6.767 | 0.783 | 1.205 | 1807.518 |
| Jan | I | 6.107 | 0.859 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 6.209 | 9.550 | 1.105 | 1.700 | 2550.746 |
| | II | 6.107 | 2.539 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.071 | 4.633 | 0.536 | 0.825 | 824.891 |
| Feb | I | 5.210 | 5.376 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 1.650 | -0.626 | -0.072 | -0.111 | -55.737 |
| | II | 5.210 | 2.716 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 |
| Mar | I | 5.565 | 2.315 | 2.00 | | 500 | LP | LP | LP | LP | 12.796 | 12.482 | 1.445 | 2.222 | 1111.250 |
| | II | 5.565 | 3.136 | 2.00 | | 1000 | 1.1 | LP | LP | LP | 12.796 | 11.660 | 1.350 | 2.076 | 2076.250 |
| Apr | I | 5.548 | 1.344 | 2.00 | | 1500 | 1.1 | 1.1 | LP | LP | 13.032 | 13.688 | 1.584 | 2.437 | 3655.942 |
| | II | 5.548 | 1.045 | 2.00 | 1.1 | 1500 | 1.05 | 1.1 | 1.1 | 1.08 | 6.010 | 8.065 | 0.933 | 1.436 | 2154.064 |
| Mei | I | 5.863 | 0.187 | 2.00 | 1.1 | 1500 | 1.05 | 1.05 | 1.1 | 1.07 | 6.254 | 9.168 | 1.061 | 1.632 | 2448.605 |
| | II | 5.863 | 0.000 | 2.00 | 2.2 | 1500 | 0.95 | 1.05 | 1.05 | 1.02 | 5.961 | 10.161 | 1.176 | 1.809 | 2713.963 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1.1 | 1000 | 0 | 0.95 | 1.05 | 0.67 | 4.629 | 7.729 | 0.895 | 1.376 | 1376.239 |
| | II | 6.943 | 0.000 | 2.00 | 1.1 | 500 | | 0 | 0.95 | 0.32 | 2.199 | 5.299 | 0.613 | 0.944 | 471.755 |
| Jul | I | 8.244 | 0.000 | 2.00 | | 0.00 | | | 0 | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | 0.00 | | | | 0.00 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |

**Tabel D. 24** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan November Periode II

| Mulai Tanam Bulan November Periode II | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 | 12 | 13 | 14 | 15 |
| Nov | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.859 | 2.00 | | | | | 0.000 | | 0.000 | 1.141 | 0.132 | 0.203 | 0.000 |
| | II | 6.107 | 2.539 | 2.00 | | | | | 0.000 | | 0.000 | -0.539 | -0.062 | -0.096 | 0.000 |
| Feb | I | 5.210 | 5.376 | 2.00 | | | | | 0.000 | | 0.000 | -3.376 | -0.391 | -0.601 | 0.000 |
| | II | 5.210 | 2.716 | 2.00 | | | | | 0.000 | | 0.000 | -0.716 | -0.083 | -0.127 | 0.000 |
| Mar | I | 5.565 | 2.315 | 2.00 | | | | | 0.000 | | 0.000 | -0.315 | -0.036 | -0.056 | 0.000 |
| | II | 5.565 | 3.136 | 2.00 | | | | | 0.000 | | 0.000 | -1.136 | -0.131 | -0.202 | 0.000 |
| Apr | I | 5.548 | 1.344 | 2.00 | | | | | 0.000 | | 0.000 | 0.656 | 0.076 | 0.117 | 0.000 |
| | II | 5.548 | 1.045 | 2.00 | | | | | 0.000 | | 0.000 | 0.955 | 0.110 | 0.170 | 0.000 |
| Mei | I | 5.863 | 0.187 | 2.00 | | | | | 0.000 | | 0.000 | 1.813 | 0.210 | 0.323 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | | 1.374 | 3.374 | 0.391 | 0.601 | 300.389 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | | 5.178 | 7.178 | 0.831 | 1.278 | 1278.176 |
| | II | 12.428 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | | 9.321 | 11.321 | 1.310 | 2.016 | 3023.724 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | | 10.480 | 12.480 | 1.444 | 2.222 | 3333.451 |
| | II | 11.433 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | | 10.747 | 12.747 | 1.475 | 2.270 | 3404.705 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | | 10.866 | 12.866 | 1.489 | 2.291 | 3436.452 |
| | II | 14.360 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | | 6.079 | 8.079 | 0.935 | 1.439 | 1438.614 |
| Nov | I | 7.841 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | | 1.176 | 3.176 | 0.368 | 0.566 | 282.781 |

**Tabel D. 25** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Desember Periode I

| Mulai Tanam Bulan Desember Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 2.071 | 4.071 | 0.471 | 0.725 | 362.473 |
| | II | 12.428 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 5.178 | 7.178 | 0.831 | 1.278 | 1278.176 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 8.575 | 10.575 | 1.224 | 1.883 | 2824.494 |
| | II | 11.433 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 10.480 | 12.480 | 1.444 | 2.222 | 3333.451 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 13.499 | 15.499 | 1.794 | 2.760 | 4139.643 |
| | II | 14.360 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 10.866 | 12.866 | 1.489 | 2.291 | 3436.452 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 3.320 | 5.320 | 0.616 | 0.947 | 947.205 |
| | II | 7.841 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.176 | 3.176 | 0.368 | 0.566 | 282.781 |

**Tabel D. 26** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Desember Periode II

| Mulai Tanam Bulan Desember Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Des | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 2.071 | 4.071 | 0.471 | 0.725 | 362.473 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 4.764 | 6.764 | 0.783 | 1.204 | 1204.387 |
| | II | 11.433 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 8.575 | 10.575 | 1.224 | 1.883 | 2824.494 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 13.164 | 15.164 | 1.755 | 2.700 | 4050.146 |
| | II | 14.360 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 13.499 | 15.499 | 1.794 | 2.760 | 4139.643 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 5.933 | 7.933 | 0.918 | 1.413 | 2118.932 |
| | II | 7.841 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 3.320 | 5.320 | 0.616 | 0.947 | 947.205 |
| Des | I | 7.796 | 1.531 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.169 | 1.638 | 0.190 | 0.292 | 145.855 |

**Tabel D. 27** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Januari Periode I

| Mulai Tanam Bulan Januari Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 1.906 | 3.906 | 0.452 | 0.695 | 347.715 |
| | II | 11.433 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 4.764 | 6.764 | 0.783 | 1.204 | 1204.387 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 10.770 | 12.770 | 1.478 | 2.274 | 3410.881 |
| | II | 14.360 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 13.164 | 15.164 | 1.755 | 2.700 | 4050.146 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 7.371 | 9.371 | 1.085 | 1.669 | 2502.901 |
| | II | 7.841 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 5.933 | 7.933 | 0.918 | 1.413 | 2118.932 |
| Des | I | 7.796 | 1.531 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 3.300 | 3.769 | 0.436 | 0.671 | 671.127 |
| | II | 7.796 | 1.531 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.169 | 1.638 | 0.190 | 0.292 | 145.855 |

**Tabel D. 28** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Januari Periode II

| Mulai Tanam Bulan Januari Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Jan | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 1.906 | 3.906 | 0.452 | 0.695 | 347.715 |
| Okt | I | 14.360 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 5.984 | 7.984 | 0.924 | 1.422 | 1421.567 |
| | II | 14.360 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 10.770 | 12.770 | 1.478 | 2.274 | 3410.881 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 7.188 | 9.188 | 1.063 | 1.636 | 2454.032 |
| | II | 7.841 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 7.371 | 9.371 | 1.085 | 1.669 | 2502.901 |
| Des | I | 7.796 | 1.531 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 5.899 | 6.368 | 0.737 | 1.134 | 1700.747 |
| | II | 7.796 | 1.531 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 3.300 | 3.769 | 0.436 | 0.671 | 671.127 |
| Jan | I | 6.107 | 0.805 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.916 | 2.111 | 0.244 | 0.376 | 187.912 |

**Tabel D. 29** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Februari Periode I

| Mulai Tanam Bulan Februari Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 2.393 | 4.393 | 0.508 | 0.782 | 391.151 |
| | II | 14.360 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 5.984 | 7.984 | 0.924 | 1.422 | 1421.567 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 5.881 | 7.881 | 0.912 | 1.403 | 2104.969 |
| | II | 7.841 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 7.188 | 9.188 | 1.063 | 1.636 | 2454.032 |
| Des | I | 7.796 | 1.531 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 7.328 | 7.797 | 0.902 | 1.388 | 2082.478 |
| | II | 7.796 | 1.531 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 5.899 | 6.368 | 0.737 | 1.134 | 1700.747 |
| Jan | I | 6.107 | 0.805 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.585 | 3.780 | 0.437 | 0.673 | 673.049 |
| | II | 6.107 | 0.805 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.916 | 2.111 | 0.244 | 0.376 | 187.912 |

**Tabel D. 30** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Februari Periode II

| Mulai Tanam Bulan Februari Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Feb | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 2.393 | 4.393 | 0.508 | 0.782 | 391.151 |
| Nov | I | 7.841 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 3.267 | 5.267 | 0.610 | 0.938 | 937.896 |
| | II | 7.841 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 5.881 | 7.881 | 0.912 | 1.403 | 2104.969 |
| Des | I | 7.796 | 1.531 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 7.146 | 7.615 | 0.881 | 1.356 | 2033.894 |
| | II | 7.796 | 1.531 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 7.328 | 7.797 | 0.902 | 1.388 | 2082.478 |
| Jan | I | 6.107 | 0.805 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.621 | 5.815 | 0.673 | 1.036 | 1553.277 |
| | II | 6.107 | 0.805 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.585 | 3.780 | 0.437 | 0.673 | 673.049 |
| Feb | I | 5.210 | 1.662 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.782 | 1.120 | 0.130 | 0.199 | 99.680 |

**Tabel D. 31** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Maret Periode I

| Mulai Tanam Bulan Maret Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 1.307 | 3.307 | 0.383 | 0.589 | 294.417 |
| | II | 7.841 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 3.267 | 5.267 | 0.610 | 0.938 | 937.896 |
| Des | I | 7.796 | 1.531 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 5.847 | 6.316 | 0.731 | 1.125 | 1686.866 |
| | II | 7.796 | 1.531 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 7.146 | 7.615 | 0.881 | 1.356 | 2033.894 |
| Jan | I | 6.107 | 0.805 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.740 | 6.935 | 0.803 | 1.235 | 1852.314 |
| | II | 6.107 | 0.805 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.621 | 5.815 | 0.673 | 1.036 | 1553.277 |
| Feb | I | 5.210 | 1.662 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.206 | 2.544 | 0.294 | 0.453 | 452.953 |
| | II | 5.210 | 1.662 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.782 | 1.120 | 0.130 | 0.199 | 99.680 |

**Tabel D. 32** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Maret Periode II

| Mulai Tanam Bulan Maret Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Mar | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 1.307 | 3.307 | 0.383 | 0.589 | 294.417 |
| Des | I | 7.796 | 1.531 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 3.248 | 3.717 | 0.430 | 0.662 | 661.873 |
| | II | 7.796 | 1.531 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 5.847 | 6.316 | 0.731 | 1.125 | 1686.866 |
| Jan | I | 6.107 | 0.805 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.598 | 6.793 | 0.786 | 1.210 | 1814.255 |
| | II | 6.107 | 0.805 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.740 | 6.935 | 0.803 | 1.235 | 1852.314 |
| Feb | I | 5.210 | 1.662 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 3.943 | 4.281 | 0.495 | 0.762 | 1143.320 |
| | II | 5.210 | 1.662 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.206 | 2.544 | 0.294 | 0.453 | 452.953 |
| Mar | I | 5.565 | 1.199 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.835 | 1.636 | 0.189 | 0.291 | 145.671 |

**Tabel D. 33** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan April Periode I

**Mulai Tanam Bulan April Periode I**

| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | 500 | 0.50 | | | 0.17 | 1.299 | 1.768 | 0.205 | 0.315 | 157.422 |
| | II | 7.796 | 1.531 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 3.248 | 3.717 | 0.430 | 0.662 | 661.873 |
| Jan | I | 6.107 | 0.805 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.580 | 5.775 | 0.668 | 1.028 | 1542.403 |
| | II | 6.107 | 0.805 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.598 | 6.793 | 0.786 | 1.210 | 1814.255 |
| Feb | I | 5.210 | 1.662 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 4.898 | 5.236 | 0.606 | 0.932 | 1398.460 |
| | II | 5.210 | 1.662 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 3.943 | 4.281 | 0.495 | 0.762 | 1143.320 |
| Mar | I | 5.565 | 1.199 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.356 | 3.157 | 0.365 | 0.562 | 562.185 |
| | II | 5.565 | 1.199 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.835 | 1.636 | 0.189 | 0.291 | 145.671 |

**Tabel D. 34** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan April Periode II

**Mulai Tanam Bulan April Periode II**

| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Apr | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | 500 | 0.50 | | | 0.17 | 1.299 | 1.768 | 0.205 | 0.315 | 157.422 |
| Jan | I | 6.107 | 0.805 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.545 | 3.739 | 0.433 | 0.666 | 665.800 |
| | II | 6.107 | 0.805 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.580 | 5.775 | 0.668 | 1.028 | 1542.403 |
| Feb | I | 5.210 | 1.662 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 4.776 | 5.114 | 0.592 | 0.911 | 1365.988 |
| | II | 5.210 | 1.662 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 4.898 | 5.236 | 0.606 | 0.932 | 1398.460 |
| Mar | I | 5.565 | 1.199 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.211 | 5.012 | 0.580 | 0.892 | 1338.720 |
| | II | 5.565 | 1.199 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.356 | 3.157 | 0.365 | 0.562 | 562.185 |
| Apr | I | 5.548 | 0.554 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.832 | 2.278 | 0.264 | 0.406 | 202.832 |

**Tabel D. 35** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Mei Periode I

| Mulai Tanam Bulan Mei Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | 500 | 0.50 | | | 0.17 | 1.018 | 2.212 | 0.256 | 0.394 | 196.974 |
| | II | 6.107 | 0.805 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.545 | 3.739 | 0.433 | 0.666 | 665.800 |
| Feb | I | 5.210 | 1.662 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 3.908 | 4.246 | 0.491 | 0.756 | 1134.043 |
| | II | 5.210 | 1.662 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 4.776 | 5.114 | 0.592 | 0.911 | 1365.988 |
| Mar | I | 5.565 | 1.199 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.231 | 6.032 | 0.698 | 1.074 | 1611.213 |
| | II | 5.565 | 1.199 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.211 | 5.012 | 0.580 | 0.892 | 1338.720 |
| Apr | I | 5.548 | 0.554 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.349 | 3.795 | 0.439 | 0.676 | 675.680 |
| | II | 5.548 | 0.554 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.832 | 2.278 | 0.264 | 0.406 | 202.832 |

**Tabel D. 36** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Mei Periode II

| Mulai Tanam Bulan Mei Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Mei | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | 500 | 0.50 | | | 0.17 | 1.018 | 2.212 | 0.256 | 0.394 | 196.974 |
| Feb | I | 5.210 | 1.662 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.171 | 2.509 | 0.290 | 0.447 | 446.768 |
| | II | 5.210 | 1.662 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 3.908 | 4.246 | 0.491 | 0.756 | 1134.043 |
| Mar | I | 5.565 | 1.199 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.101 | 5.903 | 0.683 | 1.051 | 1576.532 |
| | II | 5.565 | 1.199 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.231 | 6.032 | 0.698 | 1.074 | 1611.213 |
| Apr | I | 5.548 | 0.554 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.198 | 5.644 | 0.653 | 1.005 | 1507.451 |
| | II | 5.548 | 0.554 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.349 | 3.795 | 0.439 | 0.676 | 675.680 |
| Mei | I | 5.863 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.880 | 2.880 | 0.333 | 0.513 | 256.366 |

**Tabel D. 37** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Juni Periode I

| Mulai Tanam Bulan Juni Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | 500 | 0.50 | | | 0.17 | 0.868 | 1.206 | 0.140 | 0.215 | 107.411 |
| | II | 5.210 | 1.662 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.171 | 2.509 | 0.290 | 0.447 | 446.768 |
| Mar | I | 5.565 | 1.199 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.174 | 4.975 | 0.576 | 0.886 | 1328.811 |
| | II | 5.565 | 1.199 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.101 | 5.903 | 0.683 | 1.051 | 1576.532 |
| Apr | I | 5.548 | 0.554 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.215 | 6.661 | 0.771 | 1.186 | 1779.113 |
| | II | 5.548 | 0.554 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.198 | 5.644 | 0.653 | 1.005 | 1507.451 |
| Mei | I | 5.863 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.482 | 4.482 | 0.519 | 0.798 | 798.104 |
| | II | 5.863 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 0.880 | 2.880 | 0.333 | 0.513 | 256.366 |

**Tabel D. 38** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Juni Periode II

| Mulai Tanam Bulan Juni Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Jun | II | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | 500 | 0.50 | | | 0.17 | 0.868 | 1.206 | 0.140 | 0.215 | 107.411 |
| Mar | I | 5.565 | 1.199 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.319 | 3.120 | 0.361 | 0.556 | 555.579 |
| | II | 5.565 | 1.199 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.174 | 4.975 | 0.576 | 0.886 | 1328.811 |
| Apr | I | 5.548 | 0.554 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.086 | 6.532 | 0.756 | 1.163 | 1744.538 |
| | II | 5.548 | 0.554 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.215 | 6.661 | 0.771 | 1.186 | 1779.113 |
| Mei | I | 5.863 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.437 | 6.437 | 0.745 | 1.146 | 1719.178 |
| | II | 5.863 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.482 | 4.482 | 0.519 | 0.798 | 798.104 |
| Jun | I | 6.943 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.042 | 3.042 | 0.352 | 0.542 | 270.790 |

**Tabel D. 39** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Juli Periode I

| Mulai Tanam Bulan Juli Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Jul | I | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | 500 | 0.50 | | | 0.17 | 0.927 | 1.729 | 0.200 | 0.308 | 153.929 |
| | II | 5.565 | 1.199 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.319 | 3.120 | 0.361 | 0.556 | 555.579 |
| Apr | I | 5.548 | 0.554 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.161 | 5.607 | 0.649 | 0.998 | 1497.572 |
| | II | 5.548 | 0.554 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.086 | 6.532 | 0.756 | 1.163 | 1744.538 |
| Mei | I | 5.863 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.512 | 7.512 | 0.869 | 1.338 | 2006.291 |
| | II | 5.863 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 4.437 | 6.437 | 0.745 | 1.146 | 1719.178 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.939 | 4.939 | 0.572 | 0.880 | 879.521 |
| | II | 6.943 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.042 | 3.042 | 0.352 | 0.542 | 270.790 |

**Tabel D. 40** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Juli Periode II

| Mulai Tanam Bulan Juli Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Jul | II | 8.244 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | 500 | 0.50 | | | 0.17 | 0.927 | 1.729 | 0.200 | 0.308 | 153.929 |
| Apr | I | 5.548 | 0.554 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.312 | 3.758 | 0.435 | 0.669 | 669.094 |
| | II | 5.548 | 0.554 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.161 | 5.607 | 0.649 | 0.998 | 1497.572 |
| Mei | I | 5.863 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.375 | 7.375 | 0.854 | 1.313 | 1969.749 |
| | II | 5.863 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 5.512 | 7.512 | 0.869 | 1.338 | 2006.291 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 5.254 | 7.254 | 0.840 | 1.292 | 1937.465 |
| | II | 6.943 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 2.939 | 4.939 | 0.572 | 0.880 | 879.521 |
| Jul | I | 8.244 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.237 | 3.237 | 0.375 | 0.576 | 288.157 |

**Tabel D. 41** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Agustus Periode I

| Mulai Tanam Bulan Agustus Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Agu | I | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | 500 | 0.50 | | | 0.17 | 0.925 | 2.371 | 0.274 | 0.422 | 211.064 |
| | II | 5.548 | 0.554 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.312 | 3.758 | 0.435 | 0.669 | 669.094 |
| Mei | I | 5.863 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.398 | 6.398 | 0.740 | 1.139 | 1708.738 |
| | II | 5.863 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 5.375 | 7.375 | 0.854 | 1.313 | 1969.749 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 6.527 | 8.527 | 0.987 | 1.518 | 2277.466 |
| | II | 6.943 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 5.254 | 7.254 | 0.840 | 1.292 | 1937.465 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 3.490 | 5.490 | 0.635 | 0.978 | 977.545 |
| | II | 8.244 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.237 | 3.237 | 0.375 | 0.576 | 288.157 |

**Tabel D. 42** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Agustus Periode II

| Mulai Tanam Bulan Agustus Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Agu | II | 12.428 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | 500 | 0.50 | | | 0.17 | 0.925 | 2.371 | 0.274 | 0.422 | 211.064 |
| Mei | I | 5.863 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.443 | 4.443 | 0.514 | 0.791 | 791.144 |
| | II | 5.863 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 4.398 | 6.398 | 0.740 | 1.139 | 1708.738 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 6.365 | 8.365 | 0.968 | 1.489 | 2234.193 |
| | II | 6.943 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 6.527 | 8.527 | 0.987 | 1.518 | 2277.466 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 6.238 | 8.238 | 0.953 | 1.467 | 2200.278 |
| | II | 8.244 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 3.490 | 5.490 | 0.635 | 0.978 | 977.545 |
| Agu | I | 12.428 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.864 | 3.864 | 0.447 | 0.688 | 344.032 |

**Tabel D. 43** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan September Periode I

| Mulai Tanam Bulan September Periode I | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Sep | I | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 0.977 | 2.977 | 0.345 | 0.530 | 265.066 |
| | II | 5.863 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.443 | 4.443 | 0.514 | 0.791 | 791.144 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 5.208 | 7.208 | 0.834 | 1.283 | 1925.101 |
| | II | 6.943 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 6.365 | 8.365 | 0.968 | 1.489 | 2234.193 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 7.749 | 9.749 | 1.128 | 1.736 | 2603.957 |
| | II | 8.244 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 6.238 | 8.238 | 0.953 | 1.467 | 2200.278 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 5.261 | 7.261 | 0.840 | 1.293 | 1292.929 |
| | II | 12.428 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.864 | 3.864 | 0.447 | 0.688 | 344.032 |

**Tabel D. 44** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan September Periode II

| Mulai Tanam Bulan September Periode II | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Sep | II | 11.433 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 0.977 | 2.977 | 0.345 | 0.530 | 265.066 |
| Jun | I | 6.943 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.893 | 4.893 | 0.566 | 0.871 | 871.278 |
| | II | 6.943 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 5.208 | 7.208 | 0.834 | 1.283 | 1925.101 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 7.557 | 9.557 | 1.106 | 1.702 | 2552.579 |
| | II | 8.244 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 7.749 | 9.749 | 1.128 | 1.736 | 2603.957 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 9.404 | 11.404 | 1.320 | 2.031 | 3045.853 |
| | II | 12.428 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 5.261 | 7.261 | 0.840 | 1.293 | 1292.929 |
| Sep | I | 11.433 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.715 | 3.715 | 0.430 | 0.661 | 330.750 |

**Tabel D. 45** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Oktober Periode I

**Mulai Tanam Bulan Oktober Periode I**

| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Okt | I | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 1.157 | 3.157 | 0.365 | 0.562 | 281.093 |
| | II | 6.943 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 2.893 | 4.893 | 0.566 | 0.871 | 871.278 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 6.183 | 8.183 | 0.947 | 1.457 | 2185.599 |
| | II | 8.244 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 7.557 | 9.557 | 1.106 | 1.702 | 2552.579 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 11.682 | 13.682 | 1.584 | 2.436 | 3654.406 |
| | II | 12.428 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 9.404 | 11.404 | 1.320 | 2.031 | 3045.853 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 4.840 | 6.840 | 0.792 | 1.218 | 1217.959 |
| | II | 11.433 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 1.715 | 3.715 | 0.430 | 0.661 | 330.750 |

**Tabel D. 46** Perhitungan Kebutuhan Air Tanaman Palawija dengan Waktu Awal Tanam Bulan Oktober Periode II

**Mulai Tanam Bulan Oktober Periode II**

| Bulan | Periode | Eto | Re Pal | Perkolasi | Area Tanam | Padi | | | | | | | | Kebutuhan Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Koefisien Tanaman | | | | Etc | NFR | | DR | |
| | | mm/hari | mm/hari | mm/hari | ha | c1 | c2 | c3 | c | mm/hari | mm/hari | lt/det/ha | lt/dtk/ha | lt/dtk |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Okt | II | 14.360 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Nov | I | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 7.841 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Des | I | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| | II | 7.796 | 1.531 | 2.00 | | | | | 0.000 | 0.000 | 0.469 | 0.054 | 0.083 | 0.000 |
| Jan | I | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| | II | 6.107 | 0.805 | 2.00 | | | | | 0.000 | 0.000 | 1.195 | 0.138 | 0.213 | 0.000 |
| Feb | I | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| | II | 5.210 | 1.662 | 2.00 | | | | | 0.000 | 0.000 | 0.338 | 0.039 | 0.060 | 0.000 |
| Mar | I | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| | II | 5.565 | 1.199 | 2.00 | | | | | 0.000 | 0.000 | 0.801 | 0.093 | 0.143 | 0.000 |
| Apr | I | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| | II | 5.548 | 0.554 | 2.00 | | | | | 0.000 | 0.000 | 1.446 | 0.167 | 0.257 | 0.000 |
| Mei | I | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 5.863 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| Jun | I | 6.943 | 0.000 | 2.00 | | | | | 0.000 | 0.000 | 2.000 | 0.231 | 0.356 | 0.000 |
| | II | 6.943 | 0.000 | 2.00 | 500 | 0.50 | | | 0.17 | 1.157 | 3.157 | 0.365 | 0.562 | 281.093 |
| Jul | I | 8.244 | 0.000 | 2.00 | 1000 | 0.75 | 0.50 | | 0.42 | 3.435 | 5.435 | 0.629 | 0.968 | 967.759 |
| | II | 8.244 | 0.000 | 2.00 | 1500 | 1.00 | 0.75 | 0.50 | 0.75 | 6.183 | 8.183 | 0.947 | 1.457 | 2185.599 |
| Agu | I | 12.428 | 0.000 | 2.00 | 1500 | 1.00 | 1.00 | 0.75 | 0.92 | 11.392 | 13.392 | 1.550 | 2.385 | 3576.954 |
| | II | 12.428 | 0.000 | 2.00 | 1500 | 0.82 | 1.00 | 1.00 | 0.94 | 11.682 | 13.682 | 1.584 | 2.436 | 3654.406 |
| Sep | I | 11.433 | 0.000 | 2.00 | 1500 | 0.45 | 0.82 | 1.00 | 0.76 | 8.651 | 10.651 | 1.233 | 1.897 | 2844.852 |
| | II | 11.433 | 0.000 | 2.00 | 1000 | 0.00 | 0.45 | 0.82 | 0.42 | 4.840 | 6.840 | 0.792 | 1.218 | 1217.959 |
| Okt | I | 14.360 | 0.000 | 2.00 | 500 | 0.00 | 0.00 | 0.45 | 0.15 | 2.154 | 4.154 | 0.481 | 0.740 | 369.842 |

**Tabel D. 47** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan November Periode II

| Mulai Tanam Bulan November Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Nov | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Des | I | 1338.971 | 0.000 | 1338.971 | 1.339 |
| | II | 2106.241 | 0.000 | 2106.241 | 2.106 |
| Jan | I | 2365.683 | 0.000 | 2365.683 | 2.366 |
| | II | 1889.780 | 0.000 | 1889.780 | 1.890 |
| Feb | I | 1100.765 | 0.000 | 1100.765 | 1.101 |
| | II | 686.897 | 0.000 | 686.897 | 0.687 |
| Mar | I | 226.809 | 0.000 | 226.809 | 0.227 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Apr | I | 1218.647 | 0.000 | 1218.647 | 1.219 |
| | II | 2490.476 | 0.000 | 2490.476 | 2.490 |
| Mei | I | 3960.490 | 0.000 | 3960.490 | 3.960 |
| | II | 2524.564 | 0.000 | 2524.564 | 2.525 |
| Jun | I | 2806.179 | 0.000 | 2806.179 | 2.806 |
| | II | 3007.255 | 0.000 | 3007.255 | 3.007 |
| Jul | I | 1530.608 | 0.000 | 1530.608 | 1.531 |
| | II | 508.418 | 300.389 | 808.807 | 0.809 |
| Agu | I | 0.000 | 1278.176 | 1278.176 | 1.278 |
| | II | 0.000 | 3023.724 | 3023.724 | 3.024 |
| Sep | I | 0.000 | 3333.451 | 3333.451 | 3.333 |
| | II | 0.000 | 3404.705 | 3404.705 | 3.405 |
| Okt | I | 0.000 | 3436.452 | 3436.452 | 3.436 |
| | II | 0.000 | 1438.614 | 1438.614 | 1.439 |
| Nov | I | 0.000 | 282.781 | 282.781 | 0.283 |

**Tabel D. 48** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Desember Periode I

| Mulai Tanam Bulan Desember Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Des | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1053.121 | 0.000 | 1053.121 | 1.053 |
| Jan | I | 2552.671 | 0.000 | 2552.671 | 2.553 |
| | II | 1916.965 | 0.000 | 1916.965 | 1.917 |
| Feb | I | 876.545 | 0.000 | 876.545 | 0.877 |
| | II | 1811.235 | 0.000 | 1811.235 | 1.811 |
| Mar | I | 800.429 | 0.000 | 800.429 | 0.800 |
| | II | 153.685 | 0.000 | 153.685 | 0.154 |
| Apr | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1245.238 | 0.000 | 1245.238 | 1.245 |
| Mei | I | 2640.327 | 0.000 | 2640.327 | 2.640 |
| | II | 4010.347 | 0.000 | 4010.347 | 4.010 |
| Jun | I | 2837.088 | 0.000 | 2837.088 | 2.837 |
| | II | 2806.179 | 0.000 | 2806.179 | 2.806 |
| Jul | I | 3360.374 | 0.000 | 3360.374 | 3.360 |
| | II | 1530.608 | 0.000 | 1530.608 | 1.531 |
| Agu | I | 626.376 | 362.473 | 988.849 | 0.989 |
| | II | 0.000 | 1278.176 | 1278.176 | 1.278 |
| Sep | I | 0.000 | 2824.494 | 2824.494 | 2.824 |
| | II | 0.000 | 3333.451 | 3333.451 | 3.333 |
| Okt | I | 0.000 | 4139.643 | 4139.643 | 4.140 |
| | II | 0.000 | 3436.452 | 3436.452 | 3.436 |
| Nov | I | 0.000 | 947.205 | 947.205 | 0.947 |
| | II | 0.000 | 282.781 | 282.781 | 0.283 |

**Tabel D. 49** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Desember Periode II

| Mulai Tanam Bulan Desember Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Des | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Jan | I | 1276.336 | 0.000 | 1276.336 | 1.276 |
| | II | 2253.526 | 0.000 | 2253.526 | 2.254 |
| Feb | I | 899.740 | 0.000 | 899.740 | 0.900 |
| | II | 1587.015 | 0.000 | 1587.015 | 1.587 |
| Mar | I | 2014.661 | 0.000 | 2014.661 | 2.015 |
| | II | 654.180 | 0.000 | 654.180 | 0.654 |
| Apr | I | 312.750 | 0.000 | 312.750 | 0.313 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Mei | I | 1320.163 | 0.000 | 1320.163 | 1.320 |
| | II | 2673.565 | 0.000 | 2673.565 | 2.674 |
| Jun | I | 4290.010 | 0.000 | 4290.010 | 4.290 |
| | II | 2837.088 | 0.000 | 2837.088 | 2.837 |
| Jul | I | 3176.665 | 0.000 | 3176.665 | 3.177 |
| | II | 3360.374 | 0.000 | 3360.374 | 3.360 |
| Agu | I | 2027.275 | 0.000 | 2027.275 | 2.027 |
| | II | 626.376 | 362.473 | 988.849 | 0.989 |
| Sep | I | 0.000 | 1204.387 | 1204.387 | 1.204 |
| | II | 0.000 | 2824.494 | 2824.494 | 2.824 |
| Okt | I | 0.000 | 4050.146 | 4050.146 | 4.050 |
| | II | 0.000 | 4139.643 | 4139.643 | 4.140 |
| Nov | I | 0.000 | 2118.932 | 2118.932 | 2.119 |
| | II | 0.000 | 947.205 | 947.205 | 0.947 |
| Des | I | 0.000 | 145.855 | 145.855 | 0.146 |

**Tabel D. 50** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Januari Periode I

| Mulai Tanam Bulan Januari Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Jan | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1126.763 | 0.000 | 1126.763 | 1.127 |
| Feb | I | 1723.912 | 0.000 | 1723.912 | 1.724 |
| | II | 1610.210 | 0.000 | 1610.210 | 1.610 |
| Mar | I | 1795.174 | 0.000 | 1795.174 | 1.795 |
| | II | 1795.288 | 0.000 | 1795.288 | 1.795 |
| Apr | I | 971.253 | 0.000 | 971.253 | 0.971 |
| | II | 339.341 | 0.000 | 339.341 | 0.339 |
| Mei | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1336.782 | 0.000 | 1336.782 | 1.337 |
| Jun | I | 2860.007 | 0.000 | 2860.007 | 2.860 |
| | II | 4290.010 | 0.000 | 4290.010 | 4.290 |
| Jul | I | 3213.363 | 0.000 | 3213.363 | 3.213 |
| | II | 3176.665 | 0.000 | 3176.665 | 3.177 |
| Agu | I | 4496.499 | 0.000 | 4496.499 | 4.496 |
| | II | 2027.275 | 0.000 | 2027.275 | 2.027 |
| Sep | I | 598.337 | 347.715 | 946.051 | 0.946 |
| | II | 0.000 | 1204.387 | 1204.387 | 1.204 |
| Okt | I | 0.000 | 3410.881 | 3410.881 | 3.411 |
| | II | 0.000 | 4050.146 | 4050.146 | 4.050 |
| Nov | I | 0.000 | 2502.901 | 2502.901 | 2.503 |
| | II | 0.000 | 2118.932 | 2118.932 | 2.119 |
| Des | I | 0.000 | 671.127 | 671.127 | 0.671 |
| | II | 0.000 | 145.855 | 145.855 | 0.146 |

**Tabel D. 51** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Januari Periode II

| Mulai Tanam Bulan Januari Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Jan | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Feb | I | 861.956 | 0.000 | 861.956 | 0.862 |
| | II | 2197.559 | 0.000 | 2197.559 | 2.198 |
| Mar | I | 1819.946 | 0.000 | 1819.946 | 1.820 |
| | II | 1575.801 | 0.000 | 1575.801 | 1.576 |
| Apr | I | 2269.310 | 0.000 | 2269.310 | 2.269 |
| | II | 1024.434 | 0.000 | 1024.434 | 1.024 |
| Mei | I | 424.685 | 0.000 | 424.685 | 0.425 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Jun | I | 1430.003 | 0.000 | 1430.003 | 1.430 |
| | II | 2860.007 | 0.000 | 2860.007 | 2.860 |
| Jul | I | 4494.444 | 0.000 | 4494.444 | 4.494 |
| | II | 3213.363 | 0.000 | 3213.363 | 3.213 |
| Agu | I | 4368.665 | 0.000 | 4368.665 | 4.369 |
| | II | 4496.499 | 0.000 | 4496.499 | 4.496 |
| Sep | I | 1909.213 | 0.000 | 1909.213 | 1.909 |
| | II | 598.337 | 347.715 | 946.051 | 0.946 |
| Okt | I | 0.000 | 1421.567 | 1421.567 | 1.422 |
| | II | 0.000 | 3410.881 | 3410.881 | 3.411 |
| Nov | I | 0.000 | 2454.032 | 2454.032 | 2.454 |
| | II | 0.000 | 2502.901 | 2502.901 | 2.503 |
| Des | I | 0.000 | 1700.747 | 1700.747 | 1.701 |
| | II | 0.000 | 671.127 | 671.127 | 0.671 |
| Jan | I | 0.000 | 187.912 | 187.912 | 0.188 |

**Tabel D. 52** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Februari Periode I

| Mulai Tanam Bulan Februari Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Feb | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1098.779 | 0.000 | 1098.779 | 1.099 |
| Mar | I | 2222.499 | 0.000 | 2222.499 | 2.222 |
| | II | 1600.573 | 0.000 | 1600.573 | 1.601 |
| Apr | I | 2049.596 | 0.000 | 2049.596 | 2.050 |
| | II | 2349.082 | 0.000 | 2349.082 | 2.349 |
| Mei | I | 1214.786 | 0.000 | 1214.786 | 1.215 |
| | II | 441.304 | 0.000 | 441.304 | 0.441 |
| Jun | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1430.003 | 0.000 | 1430.003 | 1.430 |
| Jul | I | 2996.296 | 0.000 | 2996.296 | 2.996 |
| | II | 4494.444 | 0.000 | 4494.444 | 4.494 |
| Agu | I | 4423.988 | 0.000 | 4423.988 | 4.424 |
| | II | 4368.665 | 0.000 | 4368.665 | 4.369 |
| Sep | I | 4226.432 | 0.000 | 4226.432 | 4.226 |
| | II | 1909.213 | 0.000 | 1909.213 | 1.909 |
| Okt | I | 680.865 | 391.151 | 1072.016 | 1.072 |
| | II | 0.000 | 1421.567 | 1421.567 | 1.422 |
| Nov | I | 0.000 | 2104.969 | 2104.969 | 2.105 |
| | II | 0.000 | 2454.032 | 2454.032 | 2.454 |
| Des | I | 0.000 | 2082.478 | 2082.478 | 2.082 |
| | II | 0.000 | 1700.747 | 1700.747 | 1.701 |
| Jan | I | 0.000 | 673.049 | 673.049 | 0.673 |
| | II | 0.000 | 187.912 | 187.912 | 0.188 |

**Tabel D. 53** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Februari Periode II

| Mulai Tanam Bulan Februari Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Feb | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Mar | I | 1111.250 | 0.000 | 1111.250 | 1.111 |
| | II | 2076.250 | 0.000 | 2076.250 | 2.076 |
| Apr | I | 2074.292 | 0.000 | 2074.292 | 2.074 |
| | II | 2129.368 | 0.000 | 2129.368 | 2.129 |
| Mei | I | 2664.105 | 0.000 | 2664.105 | 2.664 |
| | II | 1248.024 | 0.000 | 1248.024 | 1.248 |
| Jun | I | 471.755 | 0.000 | 471.755 | 0.472 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Jul | I | 1498.148 | 0.000 | 1498.148 | 1.498 |
| | II | 2996.296 | 0.000 | 2996.296 | 2.996 |
| Agu | I | 5419.698 | 0.000 | 5419.698 | 5.420 |
| | II | 4423.988 | 0.000 | 4423.988 | 4.424 |
| Sep | I | 4085.316 | 0.000 | 4085.316 | 4.085 |
| | II | 4226.432 | 0.000 | 4226.432 | 4.226 |
| Okt | I | 2256.701 | 0.000 | 2256.701 | 2.257 |
| | II | 680.865 | 391.151 | 1072.016 | 1.072 |
| Nov | I | 0.000 | 937.896 | 937.896 | 0.938 |
| | II | 0.000 | 2104.969 | 2104.969 | 2.105 |
| Des | I | 0.000 | 2033.894 | 2033.894 | 2.034 |
| | II | 0.000 | 2082.478 | 2082.478 | 2.082 |
| Jan | I | 0.000 | 1553.277 | 1553.277 | 1.553 |
| | II | 0.000 | 673.049 | 673.049 | 0.673 |
| Feb | I | 0.000 | 99.680 | 99.680 | 0.100 |

**Tabel D. 54** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Maret Periode I

| Mulai Tanam Bulan Maret Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Mar | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1038.125 | 0.000 | 1038.125 | 1.038 |
| Apr | I | 2437.295 | 0.000 | 2437.295 | 2.437 |
| | II | 2154.064 | 0.000 | 2154.064 | 2.154 |
| Mei | I | 2448.605 | 0.000 | 2448.605 | 2.449 |
| | II | 2713.963 | 0.000 | 2713.963 | 2.714 |
| Jun | I | 1376.239 | 0.000 | 1376.239 | 1.376 |
| | II | 471.755 | 0.000 | 471.755 | 0.472 |
| Jul | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1498.148 | 0.000 | 1498.148 | 1.498 |
| Agu | I | 3613.132 | 0.000 | 3613.132 | 3.613 |
| | II | 5419.698 | 0.000 | 5419.698 | 5.420 |
| Sep | I | 4136.211 | 0.000 | 4136.211 | 4.136 |
| | II | 4085.316 | 0.000 | 4085.316 | 4.085 |
| Okt | I | 5021.312 | 0.000 | 5021.312 | 5.021 |
| | II | 2256.701 | 0.000 | 2256.701 | 2.257 |
| Nov | I | 497.070 | 294.417 | 791.487 | 0.791 |
| | II | 0.000 | 937.896 | 937.896 | 0.938 |
| Des | I | 0.000 | 1686.866 | 1686.866 | 1.687 |
| | II | 0.000 | 2033.894 | 2033.894 | 2.034 |
| Jan | I | 0.000 | 1852.314 | 1852.314 | 1.852 |
| | II | 0.000 | 1553.277 | 1553.277 | 1.553 |
| Feb | I | 0.000 | 452.953 | 452.953 | 0.453 |
| | II | 0.000 | 99.680 | 99.680 | 0.100 |

**Tabel D. 55** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Maret Periode II

| Mulai Tanam Bulan Maret Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Mar | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Apr | I | 1218.647 | 0.000 | 1218.647 | 1.219 |
| | II | 2490.476 | 0.000 | 2490.476 | 2.490 |
| Mei | I | 2474.706 | 0.000 | 2474.706 | 2.475 |
| | II | 2498.463 | 0.000 | 2498.463 | 2.498 |
| Jun | I | 3007.255 | 0.000 | 3007.255 | 3.007 |
| | II | 1376.239 | 0.000 | 1376.239 | 1.376 |
| Jul | I | 508.418 | 0.000 | 508.418 | 0.508 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Agu | I | 1806.566 | 0.000 | 1806.566 | 1.807 |
| | II | 3613.132 | 0.000 | 3613.132 | 3.613 |
| Sep | I | 5247.331 | 0.000 | 5247.331 | 5.247 |
| | II | 4136.211 | 0.000 | 4136.211 | 4.136 |
| Okt | I | 4919.288 | 0.000 | 4919.288 | 4.919 |
| | II | 5021.312 | 0.000 | 5021.312 | 5.021 |
| Nov | I | 1482.828 | 0.000 | 1482.828 | 1.483 |
| | II | 497.070 | 294.417 | 791.487 | 0.791 |
| Des | I | 0.000 | 661.873 | 661.873 | 0.662 |
| | II | 0.000 | 1686.866 | 1686.866 | 1.687 |
| Jan | I | 0.000 | 1814.255 | 1814.255 | 1.814 |
| | II | 0.000 | 1852.314 | 1852.314 | 1.852 |
| Feb | I | 0.000 | 1143.320 | 1143.320 | 1.143 |
| | II | 0.000 | 452.953 | 452.953 | 0.453 |
| Mar | I | 0.000 | 145.671 | 145.671 | 0.146 |

**Tabel D. 56** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan April Periode I

| Mulai Tanam Bulan April Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Apr | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1245.238 | 0.000 | 1245.238 | 1.245 |
| Mei | I | 2640.327 | 0.000 | 2640.327 | 2.640 |
| | II | 2524.564 | 0.000 | 2524.564 | 2.525 |
| Jun | I | 2806.179 | 0.000 | 2806.179 | 2.806 |
| | II | 3007.255 | 0.000 | 3007.255 | 3.007 |
| Jul | I | 1530.608 | 0.000 | 1530.608 | 1.531 |
| | II | 508.418 | 0.000 | 508.418 | 0.508 |
| Agu | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1806.566 | 0.000 | 1806.566 | 1.807 |
| Sep | I | 3498.220 | 0.000 | 3498.220 | 3.498 |
| | II | 5247.331 | 0.000 | 5247.331 | 5.247 |
| Okt | I | 4983.215 | 0.000 | 4983.215 | 4.983 |
| | II | 4919.288 | 0.000 | 4919.288 | 4.919 |
| Nov | I | 3251.076 | 0.000 | 3251.076 | 3.251 |
| | II | 1482.828 | 0.000 | 1482.828 | 1.483 |
| Des | I | 367.814 | 157.422 | 525.236 | 0.525 |
| | II | 0.000 | 661.873 | 661.873 | 0.662 |
| Jan | I | 0.000 | 1542.403 | 1542.403 | 1.542 |
| | II | 0.000 | 1814.255 | 1814.255 | 1.814 |
| Feb | I | 0.000 | 1398.460 | 1398.460 | 1.398 |
| | II | 0.000 | 1143.320 | 1143.320 | 1.143 |
| Mar | I | 0.000 | 562.185 | 562.185 | 0.562 |
| | II | 0.000 | 145.671 | 145.671 | 0.146 |

**Tabel D. 57** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan April Periode II

| Mulai Tanam Bulan April Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Apr | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Mei | I | 1320.163 | 0.000 | 1320.163 | 1.320 |
| | II | 2673.565 | 0.000 | 2673.565 | 2.674 |
| Jun | I | 2837.088 | 0.000 | 2837.088 | 2.837 |
| | II | 2806.179 | 0.000 | 2806.179 | 2.806 |
| Jul | I | 3360.374 | 0.000 | 3360.374 | 3.360 |
| | II | 1530.608 | 0.000 | 1530.608 | 1.531 |
| Agu | I | 626.376 | 0.000 | 626.376 | 0.626 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Sep | I | 1749.110 | 0.000 | 1749.110 | 1.749 |
| | II | 3498.220 | 0.000 | 3498.220 | 3.498 |
| Okt | I | 5875.504 | 0.000 | 5875.504 | 5.876 |
| | II | 4983.215 | 0.000 | 4983.215 | 4.983 |
| Nov | I | 3061.991 | 0.000 | 3061.991 | 3.062 |
| | II | 3251.076 | 0.000 | 3251.076 | 3.251 |
| Des | I | 1221.467 | 0.000 | 1221.467 | 1.221 |
| | II | 81.964 | 157.422 | 239.386 | 0.239 |
| Jan | I | 0.000 | 665.800 | 665.800 | 0.666 |
| | II | 0.000 | 1542.403 | 1542.403 | 1.542 |
| Feb | I | 0.000 | 1365.988 | 1365.988 | 1.366 |
| | II | 0.000 | 1398.460 | 1398.460 | 1.398 |
| Mar | I | 0.000 | 1338.720 | 1338.720 | 1.339 |
| | II | 0.000 | 562.185 | 562.185 | 0.562 |
| Apr | I | 0.000 | 202.832 | 202.832 | 0.203 |

**Tabel D. 58** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Mei Periode I

| Mulai Tanam Bulan Mei Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Mei | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1336.782 | 0.000 | 1336.782 | 1.337 |
| Jun | I | 2860.007 | 0.000 | 2860.007 | 2.860 |
| | II | 2837.088 | 0.000 | 2837.088 | 2.837 |
| Jul | I | 3176.665 | 0.000 | 3176.665 | 3.177 |
| | II | 3360.374 | 0.000 | 3360.374 | 3.360 |
| Agu | I | 2027.275 | 0.000 | 2027.275 | 2.027 |
| | II | 626.376 | 0.000 | 626.376 | 0.626 |
| Sep | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1749.110 | 0.000 | 1749.110 | 1.749 |
| Okt | I | 3917.003 | 0.000 | 3917.003 | 3.917 |
| | II | 5875.504 | 0.000 | 5875.504 | 5.876 |
| Nov | I | 3096.898 | 0.000 | 3096.898 | 3.097 |
| | II | 3061.991 | 0.000 | 3061.991 | 3.062 |
| Des | I | 2854.763 | 0.000 | 2854.763 | 2.855 |
| | II | 649.767 | 0.000 | 649.767 | 0.650 |
| Jan | I | 371.722 | 196.974 | 568.696 | 0.569 |
| | II | 0.000 | 665.800 | 665.800 | 0.666 |
| Feb | I | 0.000 | 1134.043 | 1134.043 | 1.134 |
| | II | 0.000 | 1365.988 | 1365.988 | 1.366 |
| Mar | I | 0.000 | 1611.213 | 1611.213 | 1.611 |
| | II | 0.000 | 1338.720 | 1338.720 | 1.339 |
| Apr | I | 0.000 | 675.680 | 675.680 | 0.676 |
| | II | 0.000 | 202.832 | 202.832 | 0.203 |

**Tabel D. 59** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Mei Periode II

| Mulai Tanam Bulan Mei Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Mei | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Jun | I | 1430.003 | 0.000 | 1430.003 | 1.430 |
| | II | 2860.007 | 0.000 | 2860.007 | 2.860 |
| Jul | I | 3213.363 | 0.000 | 3213.363 | 3.213 |
| | II | 3176.665 | 0.000 | 3176.665 | 3.177 |
| Agu | I | 4496.499 | 0.000 | 4496.499 | 4.496 |
| | II | 2027.275 | 0.000 | 2027.275 | 2.027 |
| Sep | I | 598.337 | 0.000 | 598.337 | 0.598 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Okt | I | 1958.501 | 0.000 | 1958.501 | 1.959 |
| | II | 3917.003 | 0.000 | 3917.003 | 3.917 |
| Nov | I | 4472.858 | 0.000 | 4472.858 | 4.473 |
| | II | 3096.898 | 0.000 | 3096.898 | 3.097 |
| Des | I | 2665.068 | 0.000 | 2665.068 | 2.665 |
| | II | 1997.213 | 0.000 | 1997.213 | 1.997 |
| Jan | I | 1124.036 | 0.000 | 1124.036 | 1.124 |
| | II | 222.149 | 196.974 | 419.123 | 0.419 |
| Feb | I | 0.000 | 446.768 | 446.768 | 0.447 |
| | II | 0.000 | 1134.043 | 1134.043 | 1.134 |
| Mar | I | 0.000 | 1576.532 | 1576.532 | 1.577 |
| | II | 0.000 | 1611.213 | 1611.213 | 1.611 |
| Apr | I | 0.000 | 1507.451 | 1507.451 | 1.507 |
| | II | 0.000 | 675.680 | 675.680 | 0.676 |
| Mei | I | 0.000 | 256.366 | 256.366 | 0.256 |

**Tabel D. 60** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Juni Periode I

| Mulai Tanam Bulan Juni Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Jun | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1430.003 | 0.000 | 1430.003 | 1.430 |
| Jul | I | 2996.296 | 0.000 | 2996.296 | 2.996 |
| | II | 3213.363 | 0.000 | 3213.363 | 3.213 |
| Agu | I | 4368.665 | 0.000 | 4368.665 | 4.369 |
| | II | 4496.499 | 0.000 | 4496.499 | 4.496 |
| Sep | I | 1909.213 | 0.000 | 1909.213 | 1.909 |
| | II | 598.337 | 0.000 | 598.337 | 0.598 |
| Okt | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1958.501 | 0.000 | 1958.501 | 1.959 |
| Nov | I | 2981.905 | 0.000 | 2981.905 | 2.982 |
| | II | 4472.858 | 0.000 | 4472.858 | 4.473 |
| Des | I | 2699.771 | 0.000 | 2699.771 | 2.700 |
| | II | 1807.518 | 0.000 | 1807.518 | 1.808 |
| Jan | I | 2550.746 | 0.000 | 2550.746 | 2.551 |
| | II | 824.891 | 0.000 | 824.891 | 0.825 |
| Feb | I | -55.737 | 107.411 | 51.675 | 0.052 |
| | II | 0.000 | 446.768 | 446.768 | 0.447 |
| Mar | I | 0.000 | 1328.811 | 1328.811 | 1.329 |
| | II | 0.000 | 1576.532 | 1576.532 | 1.577 |
| Apr | I | 0.000 | 1779.113 | 1779.113 | 1.779 |
| | II | 0.000 | 1507.451 | 1507.451 | 1.507 |
| Mei | I | 0.000 | 798.104 | 798.104 | 0.798 |
| | II | 0.000 | 256.366 | 256.366 | 0.256 |

**Tabel D. 61** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Juni Periode II

| Mulai Tanam Bulan Juni Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Jun | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Jul | I | 1498.148 | 0.000 | 1498.148 | 1.498 |
| | II | 2996.296 | 0.000 | 2996.296 | 2.996 |
| Agu | I | 4423.988 | 0.000 | 4423.988 | 4.424 |
| | II | 4368.665 | 0.000 | 4368.665 | 4.369 |
| Sep | I | 4226.432 | 0.000 | 4226.432 | 4.226 |
| | II | 1909.213 | 0.000 | 1909.213 | 1.909 |
| Okt | I | 680.865 | 0.000 | 680.865 | 0.681 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Nov | I | 1490.953 | 0.000 | 1490.953 | 1.491 |
| | II | 2981.905 | 0.000 | 2981.905 | 2.982 |
| Des | I | 4016.912 | 0.000 | 4016.912 | 4.017 |
| | II | 1842.221 | 0.000 | 1842.221 | 1.842 |
| Jan | I | 2338.498 | 0.000 | 2338.498 | 2.338 |
| | II | 2102.028 | 0.000 | 2102.028 | 2.102 |
| Feb | I | 213.251 | 0.000 | 213.251 | 0.213 |
| | II | 181.087 | 107.411 | 288.498 | 0.288 |
| Mar | I | 0.000 | 555.579 | 555.579 | 0.556 |
| | II | 0.000 | 1328.811 | 1328.811 | 1.329 |
| Apr | I | 0.000 | 1744.538 | 1744.538 | 1.745 |
| | II | 0.000 | 1779.113 | 1779.113 | 1.779 |
| Mei | I | 0.000 | 1719.178 | 1719.178 | 1.719 |
| | II | 0.000 | 798.104 | 798.104 | 0.798 |
| Jun | I | 0.000 | 270.790 | 270.790 | 0.271 |

**Tabel D. 62** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Juli Periode I

| Mulai Tanam Bulan Juli Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Jul | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1498.148 | 0.000 | 1498.148 | 1.498 |
| Agu | I | 3613.132 | 0.000 | 3613.132 | 3.613 |
| | II | 4423.988 | 0.000 | 4423.988 | 4.424 |
| Sep | I | 4085.316 | 0.000 | 4085.316 | 4.085 |
| | II | 4226.432 | 0.000 | 4226.432 | 4.226 |
| Okt | I | 2256.701 | 0.000 | 2256.701 | 2.257 |
| | II | 680.865 | 0.000 | 680.865 | 0.681 |
| Nov | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1490.953 | 0.000 | 1490.953 | 1.491 |
| Des | I | 2677.941 | 0.000 | 2677.941 | 2.678 |
| | II | 3159.362 | 0.000 | 3159.362 | 3.159 |
| Jan | I | 2365.683 | 0.000 | 2365.683 | 2.366 |
| | II | 1889.780 | 0.000 | 1889.780 | 1.890 |
| Feb | I | 1100.765 | 0.000 | 1100.765 | 1.101 |
| | II | 686.897 | 0.000 | 686.897 | 0.687 |
| Mar | I | 226.809 | 153.929 | 380.738 | 0.381 |
| | II | 0.000 | 555.579 | 555.579 | 0.556 |
| Apr | I | 0.000 | 1497.572 | 1497.572 | 1.498 |
| | II | 0.000 | 1744.538 | 1744.538 | 1.745 |
| Mei | I | 0.000 | 2006.291 | 2006.291 | 2.006 |
| | II | 0.000 | 1719.178 | 1719.178 | 1.719 |
| Jun | I | 0.000 | 879.521 | 879.521 | 0.880 |
| | II | 0.000 | 270.790 | 270.790 | 0.271 |

**Tabel D. 63** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Juli Periode II

| Mulai Tanam Bulan Juli Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Jul | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Agu | I | 1806.566 | 0.000 | 1806.566 | 1.807 |
| | II | 3613.132 | 0.000 | 3613.132 | 3.613 |
| Sep | I | 4136.211 | 0.000 | 4136.211 | 4.136 |
| | II | 4085.316 | 0.000 | 4085.316 | 4.085 |
| Okt | I | 5021.312 | 0.000 | 5021.312 | 5.021 |
| | II | 2256.701 | 0.000 | 2256.701 | 2.257 |
| Nov | I | 497.070 | 0.000 | 497.070 | 0.497 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Des | I | 1338.971 | 0.000 | 1338.971 | 1.339 |
| | II | 2106.241 | 0.000 | 2106.241 | 2.106 |
| Jan | I | 3829.007 | 0.000 | 3829.007 | 3.829 |
| | II | 1916.965 | 0.000 | 1916.965 | 1.917 |
| Feb | I | 876.545 | 0.000 | 876.545 | 0.877 |
| | II | 1811.235 | 0.000 | 1811.235 | 1.811 |
| Mar | I | 800.429 | 0.000 | 800.429 | 0.800 |
| | II | 153.685 | 153.929 | 307.614 | 0.308 |
| Apr | I | 0.000 | 669.094 | 669.094 | 0.669 |
| | II | 0.000 | 1497.572 | 1497.572 | 1.498 |
| Mei | I | 0.000 | 1969.749 | 1969.749 | 1.970 |
| | II | 0.000 | 2006.291 | 2006.291 | 2.006 |
| Jun | I | 0.000 | 1937.465 | 1937.465 | 1.937 |
| | II | 0.000 | 879.521 | 879.521 | 0.880 |
| Jul | I | 0.000 | 288.157 | 288.157 | 0.288 |

**Tabel D. 64** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Agustus Periode I

| Mulai Tanam Bulan Agustus Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Agu | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1806.566 | 0.000 | 1806.566 | 1.807 |
| Sep | I | 3498.220 | 0.000 | 3498.220 | 3.498 |
| | II | 4136.211 | 0.000 | 4136.211 | 4.136 |
| Okt | I | 4919.288 | 0.000 | 4919.288 | 4.919 |
| | II | 5021.312 | 0.000 | 5021.312 | 5.021 |
| Nov | I | 1482.828 | 0.000 | 1482.828 | 1.483 |
| | II | 497.070 | 0.000 | 497.070 | 0.497 |
| Des | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1053.121 | 0.000 | 1053.121 | 1.053 |
| Jan | I | 2552.671 | 0.000 | 2552.671 | 2.553 |
| | II | 3380.289 | 0.000 | 3380.289 | 3.380 |
| Feb | I | 899.740 | 0.000 | 899.740 | 0.900 |
| | II | 1587.015 | 0.000 | 1587.015 | 1.587 |
| Mar | I | 2014.661 | 0.000 | 2014.661 | 2.015 |
| | II | 654.180 | 0.000 | 654.180 | 0.654 |
| Apr | I | 312.750 | 211.064 | 523.815 | 0.524 |
| | II | 0.000 | 669.094 | 669.094 | 0.669 |
| Mei | I | 0.000 | 1708.738 | 1708.738 | 1.709 |
| | II | 0.000 | 1969.749 | 1969.749 | 1.970 |
| Jun | I | 0.000 | 2277.466 | 2277.466 | 2.277 |
| | II | 0.000 | 1937.465 | 1937.465 | 1.937 |
| Jul | I | 0.000 | 977.545 | 977.545 | 0.978 |
| | II | 0.000 | 288.157 | 288.157 | 0.288 |

**Tabel D. 65** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Agustus Periode II

| Mulai Tanam Bulan Agustus Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Agu | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Sep | I | 1749.110 | 0.000 | 1749.110 | 1.749 |
| | II | 3498.220 | 0.000 | 3498.220 | 3.498 |
| Okt | I | 4983.215 | 0.000 | 4983.215 | 4.983 |
| | II | 4919.288 | 0.000 | 4919.288 | 4.919 |
| Nov | I | 3251.076 | 0.000 | 3251.076 | 3.251 |
| | II | 1482.828 | 0.000 | 1482.828 | 1.483 |
| Des | I | 367.814 | 0.000 | 367.814 | 0.368 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Jan | I | 1276.336 | 0.000 | 1276.336 | 1.276 |
| | II | 2253.526 | 0.000 | 2253.526 | 2.254 |
| Feb | I | 2585.868 | 0.000 | 2585.868 | 2.586 |
| | II | 1610.210 | 0.000 | 1610.210 | 1.610 |
| Mar | I | 1795.174 | 0.000 | 1795.174 | 1.795 |
| | II | 1795.288 | 0.000 | 1795.288 | 1.795 |
| Apr | I | 971.253 | 0.000 | 971.253 | 0.971 |
| | II | 339.341 | 211.064 | 550.406 | 0.550 |
| Mei | I | 0.000 | 791.144 | 791.144 | 0.791 |
| | II | 0.000 | 1708.738 | 1708.738 | 1.709 |
| Jun | I | 0.000 | 2234.193 | 2234.193 | 2.234 |
| | II | 0.000 | 2277.466 | 2277.466 | 2.277 |
| Jul | I | 0.000 | 2200.278 | 2200.278 | 2.200 |
| | II | 0.000 | 977.545 | 977.545 | 0.978 |
| Agu | I | 0.000 | 344.032 | 344.032 | 0.344 |

**Tabel D. 66** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan September Periode I

| Mulai Tanam BulanSeptember Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Sep | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1749.110 | 0.000 | 1749.110 | 1.749 |
| Okt | I | 3917.003 | 0.000 | 3917.003 | 3.917 |
| | II | 6169.308 | 0.000 | 6169.308 | 6.169 |
| Nov | I | 3061.991 | 0.000 | 3061.991 | 3.062 |
| | II | 3251.076 | 0.000 | 3251.076 | 3.251 |
| Des | I | 1221.467 | 0.000 | 1221.467 | 1.221 |
| | II | 81.964 | 0.000 | 81.964 | 0.082 |
| Jan | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1126.763 | 0.000 | 1126.763 | 1.127 |
| Feb | I | 1723.912 | 0.000 | 1723.912 | 1.724 |
| | II | 3296.338 | 0.000 | 3296.338 | 3.296 |
| Mar | I | 1819.946 | 0.000 | 1819.946 | 1.820 |
| | II | 1575.801 | 0.000 | 1575.801 | 1.576 |
| Apr | I | 2269.310 | 0.000 | 2269.310 | 2.269 |
| | II | 1024.434 | 0.000 | 1024.434 | 1.024 |
| Mei | I | 424.685 | 265.066 | 689.751 | 0.690 |
| | II | 0.000 | 791.144 | 791.144 | 0.791 |
| Jun | I | 0.000 | 1925.101 | 1925.101 | 1.925 |
| | II | 0.000 | 2234.193 | 2234.193 | 2.234 |
| Jul | I | 0.000 | 2603.957 | 2603.957 | 2.604 |
| | II | 0.000 | 2200.278 | 2200.278 | 2.200 |
| Agu | I | 0.000 | 1292.929 | 1292.929 | 1.293 |
| | II | 0.000 | 344.032 | 344.032 | 0.344 |

**Tabel D. 67** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan September Periode II

| Mulai Tanam Bulan September Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Sep | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Okt | I | 1958.501 | 0.000 | 1958.501 | 1.959 |
| | II | 3917.003 | 0.000 | 3917.003 | 3.917 |
| Nov | I | 3096.898 | 0.000 | 3096.898 | 3.097 |
| | II | 3061.991 | 0.000 | 3061.991 | 3.062 |
| Des | I | 2854.763 | 0.000 | 2854.763 | 2.855 |
| | II | 649.767 | 0.000 | 649.767 | 0.650 |
| Jan | I | 371.722 | 0.000 | 371.722 | 0.372 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Feb | I | 861.956 | 0.000 | 861.956 | 0.862 |
| | II | 2197.559 | 0.000 | 2197.559 | 2.198 |
| Mar | I | 3333.749 | 0.000 | 3333.749 | 3.334 |
| | II | 1600.573 | 0.000 | 1600.573 | 1.601 |
| Apr | I | 2049.596 | 0.000 | 2049.596 | 2.050 |
| | II | 2349.082 | 0.000 | 2349.082 | 2.349 |
| Mei | I | 1214.786 | 0.000 | 1214.786 | 1.215 |
| | II | 441.304 | 265.066 | 706.371 | 0.706 |
| Jun | I | 0.000 | 871.278 | 871.278 | 0.871 |
| | II | 0.000 | 1925.101 | 1925.101 | 1.925 |
| Jul | I | 0.000 | 2552.579 | 2552.579 | 2.553 |
| | II | 0.000 | 2603.957 | 2603.957 | 2.604 |
| Agu | I | 0.000 | 3045.853 | 3045.853 | 3.046 |
| | II | 0.000 | 1292.929 | 1292.929 | 1.293 |
| Sep | I | 0.000 | 330.750 | 330.750 | 0.331 |

**Tabel D. 68** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Oktober Periode I

| Mulai Tanam Bulan Oktober Periode I | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Okt | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1958.501 | 0.000 | 1958.501 | 1.959 |
| Nov | I | 2981.905 | 0.000 | 2981.905 | 2.982 |
| | II | 4766.661 | 0.000 | 4766.661 | 4.767 |
| Des | I | 2665.068 | 0.000 | 2665.068 | 2.665 |
| | II | 1997.213 | 0.000 | 1997.213 | 1.997 |
| Jan | I | 1124.036 | 0.000 | 1124.036 | 1.124 |
| | II | 222.149 | 0.000 | 222.149 | 0.222 |
| Feb | I | 0.000 | 0.000 | 0.000 | 0.000 |
| | II | 1098.779 | 0.000 | 1098.779 | 1.099 |
| Mar | I | 2222.499 | 0.000 | 2222.499 | 2.222 |
| | II | 3114.376 | 0.000 | 3114.376 | 3.114 |
| Apr | I | 2074.292 | 0.000 | 2074.292 | 2.074 |
| | II | 2129.368 | 0.000 | 2129.368 | 2.129 |
| Mei | I | 2664.105 | 0.000 | 2664.105 | 2.664 |
| | II | 1248.024 | 0.000 | 1248.024 | 1.248 |
| Jun | I | 471.755 | 281.093 | 752.849 | 0.753 |
| | II | 0.000 | 871.278 | 871.278 | 0.871 |
| Jul | I | 0.000 | 2185.599 | 2185.599 | 2.186 |
| | II | 0.000 | 2552.579 | 2552.579 | 2.553 |
| Agu | I | 0.000 | 3654.406 | 3654.406 | 3.654 |
| | II | 0.000 | 3045.853 | 3045.853 | 3.046 |
| Sep | I | 0.000 | 1217.959 | 1217.959 | 1.218 |
| | II | 0.000 | 330.750 | 330.750 | 0.331 |

**Tabel D. 69** Total Kebutuhan Air Tanaman Dengan Waktu Awal Tanam pada Bulan Oktober Periode II

| Mulai Tanam Bulan Oktober Periode II | | | | | |
|---|---|---|---|---|---|
| Bulan | Periode | Q padi | Q Pal | Total Q | |
| | | lt/dtk | lt/dtk | lt/dtk | $m^3$/dtk |
| Okt | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Nov | I | 1490.953 | 0.000 | 1490.953 | 1.491 |
| | II | 2981.905 | 0.000 | 2981.905 | 2.982 |
| Des | I | 2699.771 | 0.000 | 2699.771 | 2.700 |
| | II | 1807.518 | 0.000 | 1807.518 | 1.808 |
| Jan | I | 2550.746 | 0.000 | 2550.746 | 2.551 |
| | II | 824.891 | 0.000 | 824.891 | 0.825 |
| Feb | I | -55.737 | 0.000 | -55.737 | -0.056 |
| | II | 0.000 | 0.000 | 0.000 | 0.000 |
| Mar | I | 1111.250 | 0.000 | 1111.250 | 1.111 |
| | II | 2076.250 | 0.000 | 2076.250 | 2.076 |
| Apr | I | 3655.942 | 0.000 | 3655.942 | 3.656 |
| | II | 2154.064 | 0.000 | 2154.064 | 2.154 |
| Mei | I | 2448.605 | 0.000 | 2448.605 | 2.449 |
| | II | 2713.963 | 0.000 | 2713.963 | 2.714 |
| Jun | I | 1376.239 | 0.000 | 1376.239 | 1.376 |
| | II | 471.755 | 281.093 | 752.849 | 0.753 |
| Jul | I | 0.000 | 967.759 | 967.759 | 0.968 |
| | II | 0.000 | 2185.599 | 2185.599 | 2.186 |
| Agu | I | 0.000 | 3576.954 | 3576.954 | 3.577 |
| | II | 0.000 | 3654.406 | 3654.406 | 3.654 |
| Sep | I | 0.000 | 2844.852 | 2844.852 | 2.845 |
| | II | 0.000 | 1217.959 | 1217.959 | 1.218 |
| Okt | I | 0.000 | 369.842 | 369.842 | 0.370 |

**Tabel E. 1** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan November Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | | Qt | | PPt | | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | | $m^3$/dtk | juta $m^3$ | juta $m^3$ | | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | | 7 | 8 | 9 | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Nov | II | 15 | 25.165 | | 2.549 | 3.303 | 0.524 | | 11.719 | 0.571 | 28.421 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | Des | I | 15 | 25.165 | | 2.489 | 3.225 | 0.400 | | 11.290 | 0.550 | 28.240 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.339 | 1.735 | 1.735 | 1.000 | 1.735 | 1.788 |
| | 3 | | II | 16 | 25.165 | | 3.273 | 4.525 | 0.632 | | 11.290 | 0.587 | 29.735 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.106 | 2.912 | 2.912 | 1.000 | 2.912 | 2.967 |
| | 4 | Jan | I | 15 | 25.165 | | 1.285 | 1.665 | 0.158 | | 12.982 | 0.633 | 26.356 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.366 | 3.066 | 3.066 | 1.000 | 3.066 | 3.118 |
| | 5 | | II | 16 | 23.237 | | 2.295 | 3.172 | 0.445 | | 12.982 | 0.675 | 26.179 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.890 | 2.612 | 2.612 | 1.000 | 2.612 | 2.668 |
| | 6 | Feb | I | 15 | 23.511 | | 4.068 | 5.272 | 0.834 | | 13.484 | 0.657 | 28.960 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.101 | 1.427 | 1.427 | 1.000 | 1.427 | 1.479 |
| | 7 | | II | 14 | 25.165 | | 4.478 | 5.417 | 0.850 | | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.687 | 0.831 | 0.831 | 1.000 | 0.831 | 0.880 |
| | 8 | Mar | I | 15 | 25.165 | | 1.078 | 1.397 | 0.000 | | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.227 | 0.294 | 0.294 | 1.000 | 0.294 | 0.346 |
| | 9 | | II | 16 | 25.165 | | 0.820 | 1.133 | 0.000 | | 12.074 | 0.628 | 25.671 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 10 | Apr | I | 15 | 25.165 | | 3.384 | 4.386 | 0.648 | | 13.668 | 0.666 | 29.532 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.219 | 1.579 | 1.579 | 1.000 | 1.579 | 1.632 |
| | 11 | | II | 15 | 25.165 | | 1.304 | 1.690 | 0.025 | | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.490 | 3.228 | 3.228 | 1.000 | 3.228 | 3.280 |
| November Periode II | 12 | Mei | I | 15 | 22.934 | | 2.586 | 3.351 | 0.452 | | 18.557 | 0.905 | 25.833 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.960 | 5.133 | 5.133 | 1.000 | 5.133 | 5.185 |
| | 13 | | II | 16 | 20.648 | | 2.256 | 3.119 | 0.282 | | 18.557 | 0.965 | 23.085 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.525 | 3.490 | 3.490 | 1.000 | 3.490 | 3.546 |
| | 14 | Jun | I | 15 | 19.539 | | 1.095 | 1.419 | 0.029 | | 13.647 | 0.665 | 20.322 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.806 | 3.637 | 3.637 | 1.000 | 3.637 | 3.689 |
| | 15 | | II | 15 | 16.633 | | 1.288 | 1.669 | 0.183 | | 13.647 | 0.665 | 17.820 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.007 | 3.897 | 3.897 | 1.000 | 3.897 | 3.950 |
| | 16 | Jul | I | 15 | 13.870 | | 0.677 | 0.877 | 0.056 | | 12.721 | 0.620 | 14.184 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.531 | 1.984 | 1.984 | 1.000 | 1.984 | 2.036 |
| | 17 | | II | 16 | 12.148 | | 0.762 | 1.053 | 0.055 | | 12.721 | 0.661 | 12.594 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.809 | 1.118 | 1.118 | 1.000 | 1.118 | 1.174 |
| | 18 | Agu | I | 15 | 11.420 | | 0.385 | 0.499 | 0.023 | | 15.200 | 0.741 | 11.201 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.278 | 1.657 | 1.657 | 1.000 | 1.657 | 1.709 |
| | 19 | | II | 16 | 9.492 | | 0.942 | 1.302 | 0.036 | | 15.200 | 0.790 | 10.039 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.024 | 4.180 | 4.180 | 0.452 | 1.888 | 1.944 |
| | 20 | Sep | I | 15 | 8.095 | | 1.441 | 1.867 | 0.054 | | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.333 | 4.320 | 4.320 | 0.303 | 1.308 | 1.360 |
| | 21 | | II | 15 | 8.095 | | 1.539 | 1.994 | 0.280 | | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.405 | 4.412 | 4.412 | 0.376 | 1.661 | 1.713 |
| | 22 | Okt | I | 15 | 8.095 | | 2.007 | 2.602 | 0.319 | | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.436 | 4.454 | 4.454 | 0.339 | 1.512 | 1.564 |
| | 23 | | II | 16 | 8.095 | | 1.696 | 2.344 | 0.241 | | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.439 | 1.989 | 1.989 | 0.544 | 1.082 | 1.138 |
| | 24 | Nov | I | 15 | 8.095 | | 1.302 | 1.688 | 0.009 | | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.283 | 0.366 | 0.366 | 1.000 | 0.366 | 0.419 |

**Tabel E. 3** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan November Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Nov | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 28.369 | 0 | 3.203 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.041 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 26.453 | 0 | 1.288 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 3 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.171 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 26.768 | 0 | 1.603 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 4 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.372 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.237 | 0 | 0 | 23.237 | 184.11 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.872 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 23.511 | 0 | 0 | 23.511 | 184.25 | 1.000 | OK | - |
| | 6 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.733 | 0.576 | 0.746 | 0.746 | 0.982 | 0.733 | | 27.481 | 0 | 2.316 | 25.165 | 185.02 | 0.995 | OK | MELIMPAS |
| | 7 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 0.183 | 0.576 | 0.696 | 0.696 | 0.263 | 0.183 | | 29.939 | 0 | 4.773 | 25.165 | 185.02 | 0.816 | OK | MELIMPAS |
| | 8 | Mar | I | 0.576 | 0.746 | 0.746 | 0.464 | 0.346 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 25.627 | 0 | 0.462 | 25.165 | 185.02 | 0.616 | OK | MELIMPAS |
| | 9 | | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 25.615 | 0 | 0.450 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 10 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.885 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 27.901 | 0 | 2.735 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 11 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.534 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 22.934 | 0 | 0 | 22.934 | 183.96 | 1.000 | OK | - |
| November | 12 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.439 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.648 | 0 | 0 | 20.648 | 182.78 | 1.000 | OK | - |
| Periode II | 13 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.750 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.539 | 0 | 0 | 19.539 | 182.17 | 1.000 | OK | - |
| | 14 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.943 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.633 | 0 | 0 | 16.633 | 180.47 | 1.000 | OK | - |
| | 15 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.203 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 13.870 | 0 | 0 | 13.870 | 178.71 | 1.000 | OK | - |
| | 16 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.290 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 12.148 | 0 | 0 | 12.148 | 177.54 | 1.000 | OK | - |
| | 17 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.378 | 0.576 | 0.796 | 0.796 | 0.475 | 0.378 | | 11.420 | 0 | 0 | 11.420 | 177.03 | 0.869 | OK | - |
| | 18 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.963 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 9.492 | 0 | 0 | 9.492 | 175.63 | 1.000 | OK | - |
| | 19 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.148 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.863 | OK | - |
| | 20 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.781 | OK | - |
| | 21 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.844 | OK | - |
| | 22 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.835 | OK | - |
| | 23 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.743 | OK | - |
| | 24 | Nov | I | 0.576 | 0.746 | 0.746 | 0.561 | 0.419 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 8.801 | 0 | 0 | 8.801 | 175.12 | 0.640 | OK | - |

**Tabel E. 5** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Desember Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Desember Periode I | 1 | Des | I | 15 | 25.165 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 28.240 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 16 | 25.165 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 29.735 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.053 | 1.456 | 1.456 | 1.000 | 1.456 | 1.512 |
| | 3 | Jan | I | 15 | 25.165 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 26.356 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.553 | 3.308 | 3.308 | 1.000 | 3.308 | 3.361 |
| | 4 | | II | 16 | 22.995 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 25.937 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.917 | 2.650 | 2.650 | 1.000 | 2.650 | 2.706 |
| | 5 | Feb | I | 15 | 23.231 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 28.680 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.877 | 1.136 | 1.136 | 1.000 | 1.136 | 1.188 |
| | 6 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.811 | 2.191 | 2.191 | 1.000 | 2.191 | 2.240 |
| | 7 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.800 | 1.037 | 1.037 | 1.000 | 1.037 | 1.090 |
| | 8 | | II | 16 | 24.884 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 25.389 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.154 | 0.212 | 0.212 | 1.000 | 0.212 | 0.268 |
| | 9 | Apr | I | 15 | 25.121 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 29.488 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 15 | 25.165 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.245 | 1.614 | 1.614 | 1.000 | 1.614 | 1.666 |
| | 11 | Mei | I | 15 | 24.548 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 27.447 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.640 | 3.422 | 3.422 | 1.000 | 3.422 | 3.474 |
| | 12 | | II | 16 | 23.973 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 26.409 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.010 | 5.544 | 5.544 | 1.000 | 5.544 | 5.600 |
| | 13 | Jun | I | 15 | 20.810 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 21.593 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.837 | 3.677 | 3.677 | 1.000 | 3.677 | 3.729 |
| | 14 | | II | 15 | 17.864 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 19.051 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.806 | 3.637 | 3.637 | 1.000 | 3.637 | 3.689 |
| | 15 | Jul | I | 15 | 15.362 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 15.675 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.360 | 4.355 | 4.355 | 1.000 | 4.355 | 4.407 |
| | 16 | | II | 16 | 11.268 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 11.714 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.531 | 2.116 | 2.116 | 1.000 | 2.116 | 2.172 |
| | 17 | Agu | I | 15 | 9.542 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 9.323 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.989 | 1.282 | 1.282 | 0.918 | 1.176 | 1.228 |
| | 18 | | II | 16 | 8.095 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 8.642 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.278 | 1.767 | 1.767 | 0.278 | 0.491 | 0.547 |
| | 19 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.824 | 3.661 | 3.661 | 0.357 | 1.308 | 1.360 |
| | 20 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.333 | 4.320 | 4.320 | 0.385 | 1.661 | 1.713 |
| | 21 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.140 | 5.365 | 5.365 | 0.282 | 1.512 | 1.564 |
| | 22 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.436 | 4.751 | 4.751 | 0.228 | 1.082 | 1.138 |
| | 23 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.947 | 1.228 | 1.228 | 0.874 | 1.073 | 1.125 |
| | 24 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.283 | 0.366 | 0.366 | 1.000 | 0.366 | 0.419 |

**Tabel E. 7** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Desember Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | Release AB + IR - PLTMH 1 | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | |
| | 1 | Des | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 28.188 | 0 | 3.023 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS | |
| | 2 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.716 | 0.576 | 0.796 | 0.796 | 0.899 | 0.716 | 28.224 | 0 | 3.059 | 25.165 | 185.02 | 0.975 | OK | MELIMPAS | |
| | 3 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.614 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 22.995 | 0 | 0 | 22.995 | 183.99 | 1.000 | OK | - | |
| | 4 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.910 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 23.231 | 0 | 0 | 23.231 | 184.11 | 1.000 | OK | - | |
| | 5 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.442 | 0.576 | 0.746 | 0.746 | 0.592 | 0.442 | 27.492 | 0 | 2.326 | 25.165 | 185.02 | 0.898 | OK | MELIMPAS | |
| | 6 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.543 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 28.579 | 0 | 3.413 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS | |
| | 7 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.343 | 0.576 | 0.746 | 0.746 | 0.460 | 0.343 | 24.884 | 0 | 0 | 24.884 | 184.89 | 0.865 | OK | - | |
| | 8 | | II | 0.576 | 0.796 | 0.796 | 0.337 | 0.268 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 25.121 | 0 | 0 | 25.121 | 185.00 | 0.584 | OK | - | |
| | 9 | Apr | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 29.436 | 0 | 4.271 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS | |
| | 10 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.920 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 24.548 | 0 | 0 | 24.548 | 184.74 | 1.000 | OK | - | |
| | 11 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.728 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 23.973 | 0 | 0 | 23.973 | 184.47 | 1.000 | OK | - | |
| Desember Periode I | 12 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 4.804 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 20.810 | 0 | 0 | 20.810 | 182.87 | 1.000 | OK | - | |
| | 13 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.983 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 17.864 | 0 | 0 | 17.864 | 181.21 | 1.000 | OK | - | |
| | 14 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.943 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 15.362 | 0 | 0 | 15.362 | 179.68 | 1.000 | OK | - | |
| | 15 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.661 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 11.268 | 0 | 0 | 11.268 | 176.92 | 1.000 | OK | - | |
| | 16 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.376 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 9.542 | 0 | 0 | 9.542 | 175.67 | 1.000 | OK | - | |
| | 17 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.482 | 0.576 | 0.746 | 0.746 | 0.646 | 0.482 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.891 | OK | - | |
| | 18 | | II | 0.576 | 0.796 | 0.796 | 0.687 | 0.547 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.491 | OK | - | |
| | 19 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.795 | OK | - | |
| | 20 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.846 | OK | - | |
| | 21 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.820 | OK | - | |
| | 22 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.664 | OK | - | |
| | 23 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.845 | OK | - | |
| | 24 | | II | 0.576 | 0.746 | 0.746 | 0.561 | 0.419 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 10.932 | 0 | 0 | 10.932 | 176.68 | 0.640 | OK | - | |

# **Tabel E. 9** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Desember Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | Release AB + IR |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Des | II | 15 | 25.165 | 3.273 | 4.242 | 0.632 | 11.290 | 0.550 | 29.489 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | Jan | I | 16 | 25.165 | 1.285 | 1.777 | 0.158 | 12.982 | 0.675 | 26.425 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.276 | 1.764 | 1.764 | 1.000 | 1.764 | 1.820 |
| | 3 | | II | 15 | 24.604 | 2.295 | 2.974 | 0.445 | 12.982 | 0.633 | 27.390 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.254 | 2.921 | 2.921 | 1.000 | 2.921 | 2.973 |
| | 4 | Feb | I | 16 | 24.417 | 4.068 | 5.623 | 0.834 | 13.484 | 0.701 | 30.174 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.900 | 1.244 | 1.244 | 1.000 | 1.244 | 1.300 |
| | 5 | | II | 15 | 25.165 | 4.478 | 5.804 | 0.850 | 13.484 | 0.657 | 31.161 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.587 | 2.057 | 2.057 | 1.000 | 2.057 | 2.109 |
| | 6 | Mar | I | 14 | 25.165 | 1.078 | 1.304 | 0.000 | 12.074 | 0.549 | 25.920 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 2.015 | 2.437 | 2.437 | 1.000 | 2.437 | 2.486 |
| | 7 | | II | 15 | 23.434 | 0.820 | 1.063 | 0.000 | 12.074 | 0.589 | 23.908 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.654 | 0.848 | 0.848 | 1.000 | 0.848 | 0.900 |
| | 8 | Apr | I | 16 | 23.008 | 3.384 | 4.678 | 0.648 | 13.668 | 0.711 | 27.623 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.313 | 0.432 | 0.432 | 1.000 | 0.432 | 0.488 |
| | 9 | | II | 15 | 25.165 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | Mei | I | 15 | 25.165 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 28.064 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.320 | 1.711 | 1.711 | 1.000 | 1.711 | 1.763 |
| | 11 | | II | 15 | 25.165 | 2.256 | 2.924 | 0.282 | 18.557 | 0.905 | 27.467 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.674 | 3.465 | 3.465 | 1.000 | 3.465 | 3.517 |
| Desember | 12 | Jun | I | 16 | 23.950 | 1.095 | 1.514 | 0.029 | 13.647 | 0.710 | 24.784 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.290 | 5.931 | 5.931 | 1.000 | 5.931 | 5.986 |
| Periode II | 13 | | II | 15 | 18.797 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 19.984 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.837 | 3.677 | 3.677 | 1.000 | 3.677 | 3.729 |
| | 14 | Jul | I | 15 | 16.255 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 16.569 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.177 | 4.117 | 4.117 | 1.000 | 4.117 | 4.169 |
| | 15 | | II | 15 | 12.400 | 0.762 | 0.987 | 0.055 | 12.721 | 0.620 | 12.821 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.360 | 4.355 | 4.355 | 1.000 | 4.355 | 4.407 |
| | 16 | Agu | I | 16 | 8.414 | 0.385 | 0.533 | 0.023 | 15.200 | 0.790 | 8.179 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.027 | 2.803 | 2.803 | 0.010 | 0.028 | 0.084 |
| | 17 | | II | 15 | 8.095 | 0.942 | 1.220 | 0.036 | 15.200 | 0.741 | 8.610 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.989 | 1.282 | 1.282 | 0.361 | 0.462 | 0.515 |
| | 18 | Sep | I | 16 | 8.095 | 1.441 | 1.991 | 0.054 | 11.496 | 0.598 | 9.542 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.204 | 1.665 | 1.665 | 0.836 | 1.391 | 1.447 |
| | 19 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.824 | 3.661 | 3.661 | 0.454 | 1.661 | 1.713 |
| | 20 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.050 | 5.249 | 5.249 | 0.288 | 1.512 | 1.564 |
| | 21 | | II | 15 | 8.095 | 1.696 | 2.197 | 0.241 | 27.828 | 1.357 | 9.177 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.140 | 5.365 | 5.365 | 0.192 | 1.029 | 1.082 |
| | 22 | Nov | I | 16 | 8.095 | 1.302 | 1.800 | 0.009 | 11.719 | 0.609 | 9.295 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.119 | 2.929 | 2.929 | 0.390 | 1.144 | 1.200 |
| | 23 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.947 | 1.228 | 1.228 | 1.000 | 1.228 | 1.280 |
| | 24 | Des | I | 15 | 10.071 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 13.146 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.146 | 0.189 | 0.189 | 1.000 | 0.189 | 0.241 |

**Tabel E. 11** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Desember Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Des | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 29.437 | 0 | 4.272 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Jan | I | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.024 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 24.604 | 0 | 0 | 24.604 | 184.76 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.227 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.417 | 0 | 0 | 24.417 | 184.68 | 1.000 | OK | - |
| | 4 | Feb | I | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.504 | 0.576 | 0.796 | 0.796 | 0.633 | 0.504 | | 28.874 | 0 | 3.709 | 25.165 | 185.02 | 0.908 | OK | MELIMPAS |
| | 5 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.363 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 29.052 | 0 | 3.887 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 6 | Mar | I | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.789 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 23.434 | 0 | 0 | 23.434 | 184.21 | 1.000 | OK | - |
| | 7 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.154 | 0.576 | 0.746 | 0.746 | 0.206 | 0.154 | | 23.008 | 0 | 0 | 23.008 | 184.00 | 0.802 | OK | - |
| | 8 | Apr | I | 0.576 | 0.796 | 0.796 | 0.613 | 0.488 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 27.134 | 0 | 1.969 | 25.165 | 185.02 | 0.653 | OK | MELIMPAS |
| | 9 | | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.162 | 0 | 0.997 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 10 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.017 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 26.301 | 0 | 1.136 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 11 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.771 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.950 | 0 | 0 | 23.950 | 184.46 | 1.000 | OK | - |
| Desember Periode II | 12 | Jun | I | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 5.190 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 18.797 | 0 | 0 | 18.797 | 181.75 | 1.000 | OK | - |
| | 13 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.983 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.255 | 0 | 0 | 16.255 | 180.24 | 1.000 | OK | - |
| | 14 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.423 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 12.400 | 0 | 0 | 12.400 | 177.72 | 1.000 | OK | - |
| | 15 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.661 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.414 | 0 | 0 | 8.414 | 174.82 | 1.000 | OK | - |
| | 16 | Agu | I | 0.576 | 0.796 | 0.796 | 0.105 | 0.084 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.279 | OK | - |
| | 17 | | II | 0.576 | 0.746 | 0.746 | 0.690 | 0.515 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.513 | OK | - |
| | 18 | Sep | I | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.651 | 0.576 | 0.796 | 0.796 | 0.818 | 0.651 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.913 | OK | - |
| | 19 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.863 | OK | - |
| | 20 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.822 | OK | - |
| | 21 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.335 | 0.576 | 0.746 | 0.746 | 0.450 | 0.335 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.660 | OK | - |
| | 22 | Nov | I | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.404 | 0.576 | 0.796 | 0.796 | 0.507 | 0.404 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.724 | OK | - |
| | 23 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.534 | 0.576 | 0.746 | 0.746 | 0.715 | 0.534 | | 10.071 | 0 | 0 | 10.071 | 176.06 | 0.929 | OK | - |
| | 24 | Des | I | 0.576 | 0.746 | 0.746 | 0.323 | 0.241 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 12.905 | 0 | 0 | 12.905 | 178.06 | 0.581 | OK | - |

# **Tabel E. 13** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Januari Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Jan | I | 15 | 25.165 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 26.356 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 16 | 25.165 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 28.107 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.127 | 1.558 | 1.558 | 1.000 | 1.558 | 1.613 |
| | 3 | Feb | I | 15 | 25.165 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 30.614 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.724 | 2.234 | 2.234 | 1.000 | 2.234 | 2.286 |
| | 4 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.610 | 1.948 | 1.948 | 1.000 | 1.948 | 1.997 |
| | 5 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.795 | 2.327 | 2.327 | 1.000 | 2.327 | 2.379 |
| | 6 | | II | 16 | 23.595 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 24.100 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.795 | 2.482 | 2.482 | 1.000 | 2.482 | 2.538 |
| | 7 | Apr | I | 15 | 21.563 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 25.930 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.971 | 1.259 | 1.259 | 1.000 | 1.259 | 1.311 |
| | 8 | | II | 15 | 24.619 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 25.667 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.339 | 0.440 | 0.440 | 1.000 | 0.440 | 0.492 |
| | 9 | Mei | I | 15 | 25.165 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 28.064 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 16 | 25.165 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 27.602 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.337 | 1.848 | 1.848 | 1.000 | 1.848 | 1.904 |
| | 11 | Jun | I | 15 | 25.165 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 25.949 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.860 | 3.707 | 3.707 | 1.000 | 3.707 | 3.759 |
| Januari | 12 | | II | 15 | 22.190 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 23.377 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.290 | 5.560 | 5.560 | 1.000 | 5.560 | 5.612 |
| Periode I | 13 | Jul | I | 15 | 17.764 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 18.078 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.213 | 4.165 | 4.165 | 1.000 | 4.165 | 4.217 |
| | 14 | | II | 16 | 13.861 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 14.307 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.177 | 4.391 | 4.391 | 1.000 | 4.391 | 4.447 |
| | 15 | Agu | I | 15 | 9.860 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 9.641 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.496 | 5.827 | 5.827 | 0.256 | 1.494 | 1.546 |
| | 16 | | II | 16 | 8.095 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 8.642 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.027 | 2.803 | 2.803 | 0.175 | 0.491 | 0.547 |
| | 17 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.946 | 1.226 | 1.226 | 1.000 | 1.226 | 1.278 |
| | 18 | | II | 15 | 8.177 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.890 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.204 | 1.561 | 1.561 | 1.000 | 1.561 | 1.613 |
| | 19 | Okt | I | 15 | 8.277 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.841 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.411 | 4.421 | 4.421 | 0.383 | 1.694 | 1.746 |
| | 20 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.050 | 5.599 | 5.599 | 0.193 | 1.082 | 1.138 |
| | 21 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.503 | 3.244 | 3.244 | 0.331 | 1.073 | 1.125 |
| | 22 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.119 | 2.746 | 2.746 | 1.000 | 2.746 | 2.798 |
| | 23 | Des | I | 15 | 8.552 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.627 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.671 | 0.870 | 0.870 | 1.000 | 0.870 | 0.922 |
| | 24 | | II | 16 | 10.705 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 15.275 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.146 | 0.202 | 0.202 | 1.000 | 0.202 | 0.257 |

**Tabel E. 15** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Januari Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Jan | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 26.303 | 0 | 1.138 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.817 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 26.494 | 0 | 1.329 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 3 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.540 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 28.327 | 0 | 3.162 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 4 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.300 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 28.822 | 0 | 3.656 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 5 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.633 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 23.595 | 0 | 0 | 23.595 | 184.29 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.742 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 21.563 | 0 | 0 | 21.563 | 183.26 | 1.000 | OK | - |
| | 7 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.565 | 0.576 | 0.746 | 0.746 | 0.757 | 0.565 | 24.619 | 0 | 0 | 24.619 | 184.77 | 0.939 | OK | - |
| | 8 | | II | 0.576 | 0.746 | 0.746 | 0.659 | 0.492 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 25.175 | 0 | 0.010 | 25.165 | 185.02 | 0.665 | OK | MELIMPAS |
| | 9 | Mei | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 28.012 | 0 | 2.847 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 10 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.108 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 25.698 | 0 | 0.533 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 11 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.013 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 22.190 | 0 | 0 | 22.190 | 183.59 | 1.000 | OK | - |
| Januari Periode I | 12 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.866 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 17.764 | 0 | 0 | 17.764 | 181.15 | 1.000 | OK | - |
| | 13 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.471 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 13.861 | 0 | 0 | 13.861 | 178.71 | 1.000 | OK | - |
| | 14 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.651 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 9.860 | 0 | 0 | 9.860 | 175.91 | 1.000 | OK | - |
| | 15 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.800 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.814 | OK | - |
| | 16 | | II | 0.576 | 0.796 | 0.796 | 0.687 | 0.547 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.466 | OK | - |
| | 17 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.532 | 0.576 | 0.746 | 0.746 | 0.713 | 0.532 | 8.177 | 0 | 0 | 8.177 | 174.64 | 0.928 | OK | - |
| | 18 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.867 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.277 | 0 | 0 | 8.277 | 174.72 | 1.000 | OK | - |
| | 19 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.000 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.846 | OK | - |
| | 20 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.656 | OK | - |
| | 21 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.710 | OK | - |
| | 22 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.052 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.552 | 0 | 0 | 8.552 | 174.93 | 1.000 | OK | - |
| | 23 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.176 | 0.576 | 0.746 | 0.746 | 0.236 | 0.176 | 10.705 | 0 | 0 | 10.705 | 176.52 | 0.809 | OK | - |
| | 24 | | II | 0.576 | 0.796 | 0.796 | 0.323 | 0.257 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 15.018 | 0 | 0 | 15.018 | 179.46 | 0.581 | OK | - |

# **Tabel E. 17** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Januari Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Januari Periode II | 1 | Jan | II | 16 | 25.165 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 28.107 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 2 | Feb | I | 15 | 25.165 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 30.614 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.862 | 1.117 | 1.117 | 1.000 | 1.117 | 1.169 |
| | 3 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 2.198 | 2.658 | 2.658 | 1.000 | 2.658 | 2.707 |
| | 4 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.820 | 2.359 | 2.359 | 1.000 | 2.359 | 2.411 |
| | 5 | | II | 16 | 23.562 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 24.068 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.576 | 2.178 | 2.178 | 1.000 | 2.178 | 2.234 |
| | 6 | Apr | I | 15 | 21.834 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 26.201 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.269 | 2.941 | 2.941 | 1.000 | 2.941 | 2.993 |
| | 7 | | II | 15 | 23.208 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 24.256 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.024 | 1.328 | 1.328 | 1.000 | 1.328 | 1.380 |
| | 8 | Mei | I | 15 | 22.876 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 25.775 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.425 | 0.550 | 0.550 | 1.000 | 0.550 | 0.603 |
| | 9 | | II | 16 | 25.165 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 27.602 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 10 | Jun | I | 15 | 25.165 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 25.949 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.430 | 1.853 | 1.853 | 1.000 | 1.853 | 1.906 |
| | 11 | | II | 15 | 24.043 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 25.230 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.860 | 3.707 | 3.707 | 1.000 | 3.707 | 3.759 |
| | 12 | Jul | I | 15 | 21.471 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 21.785 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.494 | 5.825 | 5.825 | 1.000 | 5.825 | 5.877 |
| | 13 | | II | 16 | 15.908 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 16.354 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.213 | 4.442 | 4.442 | 1.000 | 4.442 | 4.498 |
| | 14 | Agu | I | 15 | 11.856 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 11.637 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.369 | 5.662 | 5.662 | 0.616 | 3.490 | 3.542 |
| | 15 | | II | 16 | 8.095 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 8.642 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.496 | 6.216 | 6.216 | 0.079 | 0.491 | 0.547 |
| | 16 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.909 | 2.474 | 2.474 | 0.529 | 1.308 | 1.360 |
| | 17 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.946 | 1.226 | 1.226 | 1.000 | 1.226 | 1.278 |
| | 18 | Okt | I | 15 | 8.530 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 10.094 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.422 | 1.842 | 1.842 | 1.000 | 1.842 | 1.895 |
| | 19 | | II | 16 | 8.200 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.337 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.411 | 4.715 | 4.715 | 0.252 | 1.187 | 1.242 |
| | 20 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.454 | 3.180 | 3.180 | 0.337 | 1.073 | 1.125 |
| | 21 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.503 | 3.244 | 3.244 | 0.988 | 3.203 | 3.256 |
| | 22 | Des | I | 15 | 8.095 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.170 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.701 | 2.204 | 2.204 | 1.000 | 2.204 | 2.256 |
| | 23 | | II | 16 | 8.914 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 13.484 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.671 | 0.928 | 0.928 | 1.000 | 0.928 | 0.984 |
| | 24 | Jan | I | 15 | 12.500 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 13.691 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.188 | 0.244 | 0.244 | 1.000 | 0.244 | 0.296 |

**Tabel E. 19** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Januari Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Jan | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 28.051 | 0 | 2.886 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.423 | 0.576 | 0.746 | 0.746 | 0.567 | 0.423 | 29.445 | 0 | 4.279 | 25.165 | 185.02 | 0.892 | OK | MELIMPAS |
| | 3 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 2.010 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 28.111 | 0 | 2.946 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 4 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.665 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 23.562 | 0 | 0 | 23.562 | 184.27 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.438 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 21.834 | 0 | 0 | 21.834 | 183.41 | 1.000 | OK | - |
| | 6 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.247 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 23.208 | 0 | 0 | 23.208 | 184.10 | 1.000 | OK | - |
| | 7 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.634 | 0.576 | 0.746 | 0.746 | 0.849 | 0.634 | 22.876 | 0 | 0 | 22.876 | 183.93 | 0.962 | OK | - |
| | 8 | Mei | I | 0.576 | 0.746 | 0.746 | 0.808 | 0.603 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 25.173 | 0 | 0.007 | 25.165 | 185.02 | 0.702 | OK | MELIMPAS |
| | 9 | | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 27.546 | 0 | 2.381 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 10 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.159 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 24.043 | 0 | 0 | 24.043 | 184.50 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.013 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 21.471 | 0 | 0 | 21.471 | 183.22 | 1.000 | OK | - |
| Januari Periode II | 12 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 5.131 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 15.908 | 0 | 0 | 15.908 | 180.02 | 1.000 | OK | - |
| | 13 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.702 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 11.856 | 0 | 0 | 11.856 | 177.34 | 1.000 | OK | - |
| | 14 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.796 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.904 | OK | - |
| | 15 | | II | 0.576 | 0.796 | 0.796 | 0.687 | 0.547 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.441 | OK | - |
| | 16 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.838 | OK | - |
| | 17 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.532 | 0.576 | 0.746 | 0.746 | 0.713 | 0.532 | 8.530 | 0 | 0 | 8.530 | 174.91 | 0.928 | OK | - |
| | 18 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.148 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.200 | 0 | 0 | 8.200 | 174.66 | 1.000 | OK | - |
| | 19 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.446 | 0.576 | 0.796 | 0.796 | 0.561 | 0.446 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.703 | OK | - |
| | 20 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.711 | OK | - |
| | 21 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.509 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.997 | OK | - |
| | 22 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.510 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.914 | 0 | 0 | 8.914 | 175.20 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.188 | 0.576 | 0.796 | 0.796 | 0.236 | 0.188 | 12.500 | 0 | 0 | 12.500 | 177.79 | 0.809 | OK | - |
| | 24 | Jan | I | 0.576 | 0.746 | 0.746 | 0.396 | 0.296 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 13.395 | 0 | 0 | 13.395 | 178.39 | 0.599 | OK | - |

# **Tabel E. 21** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Februari Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Feb | I | 15 | 25.165 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 30.614 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.099 | 1.329 | 1.329 | 1.000 | 1.329 | 1.378 |
| | 3 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.222 | 2.880 | 2.880 | 1.000 | 2.880 | 2.933 |
| | 4 | | II | 16 | 23.041 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 23.546 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.601 | 2.213 | 2.213 | 1.000 | 2.213 | 2.268 |
| | 5 | Apr | I | 15 | 21.278 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 25.645 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.050 | 2.656 | 2.656 | 1.000 | 2.656 | 2.709 |
| | 6 | | II | 15 | 22.936 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 23.985 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.349 | 3.044 | 3.044 | 1.000 | 3.044 | 3.097 |
| | 7 | Mei | I | 15 | 20.888 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 23.787 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.215 | 1.574 | 1.574 | 1.000 | 1.574 | 1.627 |
| | 8 | | II | 16 | 22.161 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 24.597 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.441 | 0.610 | 0.610 | 1.000 | 0.610 | 0.666 |
| | 9 | Jun | I | 15 | 23.931 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 24.715 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 15 | 24.663 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 25.849 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.430 | 1.853 | 1.853 | 1.000 | 1.853 | 1.906 |
| | 11 | Jul | I | 15 | 23.944 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 24.258 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.996 | 3.883 | 3.883 | 1.000 | 3.883 | 3.935 |
| Februari Periode I | 12 | | II | 16 | 20.322 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 20.768 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.494 | 6.213 | 6.213 | 1.000 | 6.213 | 6.269 |
| | 13 | Agu | I | 15 | 14.499 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 14.280 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.424 | 5.733 | 5.733 | 1.000 | 5.733 | 5.786 |
| | 14 | | II | 16 | 8.494 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 9.041 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.369 | 6.039 | 6.039 | 0.147 | 0.890 | 0.946 |
| | 15 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.226 | 5.477 | 5.477 | 0.239 | 1.308 | 1.360 |
| | 16 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.909 | 2.474 | 2.474 | 0.671 | 1.661 | 1.713 |
| | 17 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.072 | 1.389 | 1.389 | 1.000 | 1.389 | 1.442 |
| | 18 | | II | 16 | 8.218 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.355 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.422 | 1.965 | 1.965 | 0.613 | 1.205 | 1.260 |
| | 19 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.105 | 2.728 | 2.728 | 0.393 | 1.073 | 1.125 |
| | 20 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.454 | 3.180 | 3.180 | 1.000 | 3.180 | 3.233 |
| | 21 | Des | I | 15 | 8.118 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.193 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.082 | 2.699 | 2.699 | 1.000 | 2.699 | 2.751 |
| | 22 | | II | 16 | 8.442 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 13.012 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.701 | 2.351 | 2.351 | 1.000 | 2.351 | 2.407 |
| | 23 | Jan | I | 15 | 10.605 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 11.796 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.673 | 0.872 | 0.872 | 1.000 | 0.872 | 0.925 |
| | 24 | | II | 16 | 10.871 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 13.813 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.188 | 0.260 | 0.260 | 1.000 | 0.260 | 0.316 |

**Tabel E. 23** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Februari Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Feb | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 30.562 | 0 | 5.396 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 0.681 | 0.576 | 0.696 | 0.696 | 0.978 | 0.681 | | 29.440 | 0 | 4.275 | 25.165 | 185.02 | 0.995 | OK | MELIMPAS |
| | 3 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.186 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.041 | 0 | 0 | 23.041 | 184.02 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.472 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 21.278 | 0 | 0 | 21.278 | 183.12 | 1.000 | OK | - |
| | 5 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.962 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 22.936 | 0 | 0 | 22.936 | 183.96 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.350 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.888 | 0 | 0 | 20.888 | 182.91 | 1.000 | OK | - |
| | 7 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.880 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 22.161 | 0 | 0 | 22.161 | 183.57 | 1.000 | OK | - |
| | 8 | | II | 0.576 | 0.796 | 0.796 | 0.837 | 0.666 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 23.931 | 0 | 0 | 23.931 | 184.45 | 0.709 | OK | - |
| | 9 | Jun | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 24.663 | 0 | 0 | 24.663 | 184.79 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.159 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.944 | 0 | 0 | 23.944 | 184.45 | 1.000 | OK | - |
| | 11 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.189 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.322 | 0 | 0 | 20.322 | 182.60 | 1.000 | OK | - |
| Februari Periode I | 12 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 5.473 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 14.499 | 0 | 0 | 14.499 | 179.12 | 1.000 | OK | - |
| | 13 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 5.040 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.494 | 0 | 0 | 8.494 | 174.88 | 1.000 | OK | - |
| | 14 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.150 | 0.576 | 0.796 | 0.796 | 0.189 | 0.150 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.584 | OK | - |
| | 15 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.765 | OK | - |
| | 16 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.918 | OK | - |
| | 17 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.695 | 0.576 | 0.746 | 0.746 | 0.932 | 0.695 | | 8.218 | 0 | 0 | 8.218 | 174.67 | 0.983 | OK | - |
| | 18 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.464 | 0.576 | 0.796 | 0.796 | 0.583 | 0.464 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.799 | OK | - |
| | 19 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.725 | OK | - |
| | 20 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.486 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.118 | 0 | 0 | 8.118 | 174.60 | 1.000 | OK | - |
| | 21 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.005 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.442 | 0 | 0 | 8.442 | 174.84 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.611 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 10.605 | 0 | 0 | 10.605 | 176.45 | 1.000 | OK | - |
| | 23 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.178 | 0.576 | 0.746 | 0.746 | 0.239 | 0.178 | | 10.871 | 0 | 0 | 10.871 | 176.64 | 0.810 | OK | - |
| | 24 | | II | 0.576 | 0.796 | 0.796 | 0.396 | 0.316 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 13.497 | 0 | 0 | 13.497 | 178.46 | 0.599 | OK | - |

**Tabel E. 25** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Februari Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Feb | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.049 |
| | 2 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.111 | 1.440 | 1.440 | 1.000 | 1.440 | 1.492 |
| | 3 | | II | 16 | 24.481 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 24.986 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.076 | 2.870 | 2.870 | 1.000 | 2.870 | 2.926 |
| | 4 | Apr | I | 15 | 22.060 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 26.428 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.074 | 2.688 | 2.688 | 1.000 | 2.688 | 2.741 |
| | 5 | | II | 15 | 23.687 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 24.736 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.129 | 2.760 | 2.760 | 1.000 | 2.760 | 2.812 |
| | 6 | Mei | I | 15 | 21.924 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 24.823 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.664 | 3.453 | 3.453 | 1.000 | 3.453 | 3.505 |
| | 7 | | II | 16 | 21.318 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 23.754 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.248 | 1.725 | 1.725 | 1.000 | 1.725 | 1.781 |
| | 8 | Jun | I | 15 | 21.973 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 22.757 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.472 | 0.611 | 0.611 | 1.000 | 0.611 | 0.664 |
| | 9 | | II | 15 | 22.093 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 23.280 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | Jul | I | 15 | 23.227 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 23.541 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.498 | 1.942 | 1.942 | 1.000 | 1.942 | 1.994 |
| | 11 | | II | 16 | 21.547 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 21.993 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.996 | 4.142 | 4.142 | 1.000 | 4.142 | 4.198 |
| Februari Periode II | 12 | Agu | I | 15 | 17.796 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 17.577 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 5.420 | 7.024 | 7.024 | 1.000 | 7.024 | 7.076 |
| | 13 | | II | 16 | 10.500 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 11.047 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.424 | 6.116 | 6.116 | 0.474 | 2.896 | 2.952 |
| | 14 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.085 | 5.295 | 5.295 | 0.247 | 1.308 | 1.360 |
| | 15 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.226 | 5.477 | 5.477 | 0.303 | 1.661 | 1.713 |
| | 16 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.257 | 2.925 | 2.925 | 0.517 | 1.512 | 1.564 |
| | 17 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.072 | 1.482 | 1.482 | 0.730 | 1.082 | 1.138 |
| | 18 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.938 | 1.216 | 1.216 | 0.883 | 1.073 | 1.125 |
| | 19 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.105 | 2.728 | 2.728 | 1.000 | 2.728 | 2.780 |
| | 20 | Des | I | 15 | 8.570 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.645 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.034 | 2.636 | 2.636 | 1.000 | 2.636 | 2.688 |
| | 21 | | II | 16 | 8.957 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 13.527 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.082 | 2.879 | 2.879 | 1.000 | 2.879 | 2.935 |
| | 22 | Jan | I | 15 | 10.593 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 11.783 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.553 | 2.013 | 2.013 | 1.000 | 2.013 | 2.065 |
| | 23 | | II | 16 | 9.718 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 12.660 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.673 | 0.930 | 0.930 | 1.000 | 0.930 | 0.986 |
| | 24 | Feb | I | 15 | 11.674 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 17.122 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.100 | 0.129 | 0.129 | 1.000 | 0.129 | 0.181 |

**Tabel E. 27** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Februari Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Feb | II | 0.576 | 0.696 | 0.696 | 0.070 | 0.049 | 0.000 | 0.576 | 0.696 | 0.696 | 0.000 | 0.000 | 30.769 | 0 | 5.604 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.746 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 24.481 | 0 | 0 | 24.481 | 184.71 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.130 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 22.060 | 0 | 0 | 22.060 | 183.52 | 1.000 | OK | - |
| | 4 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.994 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 23.687 | 0 | 0 | 23.687 | 184.33 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.066 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 21.924 | 0 | 0 | 21.924 | 183.45 | 1.000 | OK | - |
| | 6 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.759 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 21.318 | 0 | 0 | 21.318 | 183.14 | 1.000 | OK | - |
| | 7 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.985 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 21.973 | 0 | 0 | 21.973 | 183.48 | 1.000 | OK | - |
| | 8 | Jun | I | 0.576 | 0.746 | 0.746 | 0.889 | 0.664 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 22.093 | 0 | 0 | 22.093 | 183.54 | 0.722 | OK | - |
| | 9 | | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 23.227 | 0 | 0 | 23.227 | 184.11 | 0.518 | OK | - |
| | 10 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.248 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 21.547 | 0 | 0 | 21.547 | 183.26 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.402 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 17.796 | 0 | 0 | 17.796 | 181.17 | 1.000 | OK | - |
| Februari Periode II | 12 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 6.330 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 10.500 | 0 | 0 | 10.500 | 176.37 | 1.000 | OK | - |
| | 13 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.156 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.868 | OK | - |
| | 14 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.767 | OK | - |
| | 15 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.826 | OK | - |
| | 16 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.879 | OK | - |
| | 17 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.790 | OK | - |
| | 18 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.848 | OK | - |
| | 19 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.034 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.570 | 0 | 0 | 8.570 | 174.94 | 1.000 | OK | - |
| | 20 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.942 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.957 | 0 | 0 | 8.957 | 175.23 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.139 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 10.593 | 0 | 0 | 10.593 | 176.44 | 1.000 | OK | - |
| | 22 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.319 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 9.718 | 0 | 0 | 9.718 | 175.80 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.190 | 0.576 | 0.796 | 0.796 | 0.239 | 0.190 | 11.674 | 0 | 0 | 11.674 | 177.21 | 0.810 | OK | - |
| | 24 | Feb | I | 0.576 | 0.746 | 0.746 | 0.243 | 0.181 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 16.941 | 0 | 0 | 16.941 | 180.66 | 0.561 | OK | - |

# **Tabel E. 29** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Maret Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 16 | 25.165 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 25.671 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.038 | 1.435 | 1.435 | 1.000 | 1.435 | 1.491 |
| | 3 | Apr | I | 15 | 24.180 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 28.547 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.437 | 3.159 | 3.159 | 1.000 | 3.159 | 3.211 |
| | 4 | | II | 15 | 25.165 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.154 | 2.792 | 2.792 | 1.000 | 2.792 | 2.844 |
| | 5 | Mei | I | 15 | 23.370 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 26.269 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.449 | 3.173 | 3.173 | 1.000 | 3.173 | 3.226 |
| | 6 | | II | 16 | 23.043 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 25.480 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.714 | 3.752 | 3.752 | 1.000 | 3.752 | 3.808 |
| | 7 | Jun | I | 15 | 21.672 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 22.456 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.376 | 1.784 | 1.784 | 1.000 | 1.784 | 1.836 |
| | 8 | | II | 15 | 20.620 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 21.807 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.472 | 0.611 | 0.611 | 1.000 | 0.611 | 0.664 |
| | 9 | Jul | I | 15 | 21.143 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 21.457 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 16 | 21.404 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 21.851 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.498 | 2.071 | 2.071 | 1.000 | 2.071 | 2.127 |
| | 11 | Agu | I | 15 | 19.724 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 19.505 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.613 | 4.683 | 4.683 | 1.000 | 4.683 | 4.735 |
| Maret | 12 | | II | 16 | 14.770 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 15.316 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 5.420 | 7.492 | 7.492 | 0.956 | 7.166 | 7.221 |
| Periode I | 13 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.136 | 5.361 | 5.361 | 0.244 | 1.308 | 1.360 |
| | 14 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.085 | 5.295 | 5.295 | 0.314 | 1.661 | 1.713 |
| | 15 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 5.021 | 6.508 | 6.508 | 0.232 | 1.512 | 1.564 |
| | 16 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.257 | 3.120 | 3.120 | 0.347 | 1.082 | 1.138 |
| | 17 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.791 | 1.026 | 1.026 | 1.000 | 1.026 | 1.078 |
| | 18 | | II | 15 | 8.142 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.398 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.938 | 1.216 | 1.216 | 1.000 | 1.216 | 1.268 |
| | 19 | Des | I | 15 | 10.130 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 13.205 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.687 | 2.186 | 2.186 | 1.000 | 2.186 | 2.238 |
| | 20 | | II | 16 | 10.967 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 15.537 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.034 | 2.812 | 2.812 | 1.000 | 2.812 | 2.867 |
| | 21 | Jan | I | 15 | 12.669 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 13.860 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.852 | 2.401 | 2.401 | 1.000 | 2.401 | 2.453 |
| | 22 | | II | 16 | 11.407 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 14.349 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.553 | 2.147 | 2.147 | 1.000 | 2.147 | 2.203 |
| | 23 | Feb | I | 15 | 12.146 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 17.595 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.453 | 0.587 | 0.587 | 1.000 | 0.587 | 0.639 |
| | 24 | | II | 14 | 16.955 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 22.608 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.100 | 0.121 | 0.121 | 1.000 | 0.121 | 0.169 |

**Tabel E. 31** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Maret Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | Release AB + IR - PLTMH 1 | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Mar | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 25.921 | 0 | 0.756 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.695 | 0.576 | 0.796 | 0.796 | 0.873 | 0.695 | | 24.180 | 0 | 0 | 24.180 | 184.57 | 0.968 | OK | - |
| | 3 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.465 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 25.336 | 0 | 0.171 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 4 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.098 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.370 | 0 | 0 | 23.370 | 184.18 | 1.000 | OK | - |
| | 5 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.479 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.043 | 0 | 0 | 23.043 | 184.02 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.012 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 21.672 | 0 | 0 | 21.672 | 183.32 | 1.000 | OK | - |
| | 7 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.090 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.620 | 0 | 0 | 20.620 | 182.77 | 1.000 | OK | - |
| | 8 | | II | 0.576 | 0.746 | 0.746 | 0.889 | 0.664 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 21.143 | 0 | 0 | 21.143 | 183.04 | 0.722 | OK | - |
| | 9 | Jul | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 21.404 | 0 | 0 | 21.404 | 183.18 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.331 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.724 | 0 | 0 | 19.724 | 182.28 | 1.000 | OK | - |
| | 11 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.989 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 14.770 | 0 | 0 | 14.770 | 179.30 | 1.000 | OK | - |
| Maret Periode I | 12 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 6.426 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.989 | OK | - |
| | 13 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.767 | OK | - |
| | 14 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.828 | OK | - |
| | 15 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.808 | OK | - |
| | 16 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.694 | OK | - |
| | 17 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.332 | 0.576 | 0.746 | 0.746 | 0.445 | 0.332 | | 8.142 | 0 | 0 | 8.142 | 174.61 | 0.861 | OK | - |
| | 18 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.522 | 0.576 | 0.746 | 0.746 | 0.699 | 0.522 | | 10.130 | 0 | 0 | 10.130 | 176.10 | 0.925 | OK | - |
| | 19 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.492 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 10.967 | 0 | 0 | 10.967 | 176.71 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.071 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 12.669 | 0 | 0 | 12.669 | 177.90 | 1.000 | OK | - |
| | 21 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.707 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 11.407 | 0 | 0 | 11.407 | 177.02 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.407 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 12.146 | 0 | 0 | 12.146 | 177.54 | 1.000 | OK | - |
| | 23 | Feb | I | 0.576 | 0.746 | 0.746 | 0.857 | 0.639 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 16.955 | 0 | 0 | 16.955 | 180.67 | 0.714 | OK | - |
| | 24 | | II | 0.576 | 0.696 | 0.696 | 0.243 | 0.169 | 0.000 | 0.576 | 0.696 | 0.696 | 0.000 | 0.000 | | 22.439 | 0 | 0 | 22.439 | 183.71 | 0.561 | OK | - |

**Tabel E. 33** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Maret Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Mar | II | 16 | 25.165 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 25.671 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 2 | Apr | I | 15 | 25.165 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 29.532 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.219 | 1.579 | 1.579 | 1.000 | 1.579 | 1.632 |
| | 3 | | II | 15 | 25.165 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.490 | 3.228 | 3.228 | 1.000 | 3.228 | 3.280 |
| | 4 | Mei | I | 15 | 22.934 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 25.833 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.475 | 3.207 | 3.207 | 1.000 | 3.207 | 3.260 |
| | 5 | | II | 16 | 22.573 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 25.010 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.498 | 3.454 | 3.454 | 1.000 | 3.454 | 3.510 |
| | 6 | Jun | I | 15 | 21.500 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 22.284 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.007 | 3.897 | 3.897 | 1.000 | 3.897 | 3.950 |
| | 7 | | II | 15 | 18.334 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 19.521 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.376 | 1.784 | 1.784 | 1.000 | 1.784 | 1.836 |
| | 8 | Jul | I | 15 | 17.685 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 17.999 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.508 | 0.659 | 0.659 | 1.000 | 0.659 | 0.711 |
| | 9 | | II | 16 | 17.288 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 17.734 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 10 | Agu | I | 15 | 17.678 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 17.459 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.807 | 2.341 | 2.341 | 1.000 | 2.341 | 2.394 |
| | 11 | | II | 16 | 15.065 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 15.612 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.613 | 4.995 | 4.995 | 1.000 | 4.995 | 5.051 |
| Maret Periode II | 12 | Sep | I | 15 | 10.561 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 11.922 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 5.247 | 6.801 | 6.801 | 0.555 | 3.774 | 3.827 |
| | 13 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.136 | 5.361 | 5.361 | 0.310 | 1.661 | 1.713 |
| | 14 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.919 | 6.375 | 6.375 | 0.237 | 1.512 | 1.564 |
| | 15 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 5.021 | 6.941 | 6.941 | 0.156 | 1.082 | 1.138 |
| | 16 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.483 | 1.922 | 1.922 | 0.558 | 1.073 | 1.125 |
| | 17 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.791 | 1.026 | 1.026 | 1.000 | 1.026 | 1.078 |
| | 18 | Des | I | 15 | 10.272 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 13.348 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.662 | 0.858 | 0.858 | 1.000 | 0.858 | 0.910 |
| | 19 | | II | 16 | 12.438 | 3.273 | 4.525 | 0.158 | 11.290 | 0.587 | 16.533 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.687 | 2.332 | 2.332 | 1.000 | 2.332 | 2.388 |
| | 20 | Jan | I | 15 | 14.146 | 1.285 | 1.665 | 0.445 | 12.982 | 0.633 | 15.623 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.814 | 2.351 | 2.351 | 1.000 | 2.351 | 2.404 |
| | 21 | | II | 16 | 13.219 | 2.295 | 3.172 | 0.834 | 12.982 | 0.675 | 16.551 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.852 | 2.561 | 2.561 | 1.000 | 2.561 | 2.616 |
| | 22 | Feb | I | 15 | 13.935 | 4.068 | 5.272 | 0.850 | 13.484 | 0.657 | 19.399 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.143 | 1.482 | 1.482 | 1.000 | 1.482 | 1.534 |
| | 23 | | II | 14 | 17.865 | 4.478 | 5.417 | 0.000 | 13.484 | 0.614 | 22.668 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.453 | 0.548 | 0.548 | 1.000 | 0.548 | 0.597 |
| | 24 | Mar | I | 15 | 22.071 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 22.879 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.146 | 0.189 | 0.189 | 1.000 | 0.189 | 0.241 |

**Tabel E. 35** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Maret Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Mar | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 25.615 | 0 | 0.450 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.885 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 27.901 | 0 | 2.735 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 3 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.534 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 22.934 | 0 | 0 | 22.934 | 183.96 | 1.000 | OK | - |
| | 4 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.513 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 22.573 | 0 | 0 | 22.573 | 183.78 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.714 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 21.500 | 0 | 0 | 21.500 | 183.23 | 1.000 | OK | - |
| | 6 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.203 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 18.334 | 0 | 0 | 18.334 | 181.49 | 1.000 | OK | - |
| | 7 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.090 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 17.685 | 0 | 0 | 17.685 | 181.11 | 1.000 | OK | - |
| | 8 | Jul | I | 0.576 | 0.746 | 0.746 | 0.953 | 0.711 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 17.288 | 0 | 0 | 17.288 | 180.87 | 0.738 | OK | - |
| | 9 | | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 17.678 | 0 | 0 | 17.678 | 181.10 | 0.518 | OK | - |
| | 10 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.647 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 15.065 | 0 | 0 | 15.065 | 179.49 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 4.255 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 10.561 | 0 | 0 | 10.561 | 176.42 | 1.000 | OK | - |
| Maret Periode II | 12 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.080 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.889 | OK | - |
| | 13 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.827 | OK | - |
| | 14 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.809 | OK | - |
| | 15 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.646 | OK | - |
| | 16 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.767 | OK | - |
| | 17 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.332 | 0.576 | 0.746 | 0.746 | 0.445 | 0.332 | 10.272 | 0 | 0 | 10.272 | 176.21 | 0.861 | OK | - |
| | 18 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.164 | 0.576 | 0.746 | 0.746 | 0.220 | 0.164 | 12.438 | 0 | 0 | 12.438 | 177.74 | 0.805 | OK | - |
| | 19 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.592 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 14.146 | 0 | 0 | 14.146 | 178.89 | 1.000 | OK | - |
| | 20 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.657 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 13.219 | 0 | 0 | 13.219 | 178.28 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.820 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 13.935 | 0 | 0 | 13.935 | 178.75 | 1.000 | OK | - |
| | 22 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.788 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 17.865 | 0 | 0 | 17.865 | 181.21 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.696 | 0.696 | 0.857 | 0.597 | 0.000 | 0.576 | 0.696 | 0.696 | 0.000 | 0.000 | 22.071 | 0 | 0 | 22.071 | 183.53 | 0.714 | OK | - |
| | 24 | Mar | I | 0.576 | 0.746 | 0.746 | 0.323 | 0.241 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 22.638 | 0 | 0 | 22.638 | 183.81 | 0.581 | OK | - |

**Tabel E. 37** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan April Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Apr | I | 15 | 25.165 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 29.532 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 15 | 25.165 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.245 | 1.614 | 1.614 | 1.000 | 1.614 | 1.666 |
| | 3 | Mei | I | 15 | 24.548 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 27.447 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.640 | 3.422 | 3.422 | 1.000 | 3.422 | 3.474 |
| | 4 | | II | 16 | 23.973 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 26.409 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.525 | 3.490 | 3.490 | 1.000 | 3.490 | 3.546 |
| | 5 | Jun | I | 15 | 22.864 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 23.647 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.806 | 3.637 | 3.637 | 1.000 | 3.637 | 3.689 |
| | 6 | | II | 15 | 19.958 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 21.145 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.007 | 3.897 | 3.897 | 1.000 | 3.897 | 3.950 |
| | 7 | Jul | I | 15 | 17.195 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 17.509 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.531 | 1.984 | 1.984 | 1.000 | 1.984 | 2.036 |
| | 8 | | II | 16 | 15.473 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 15.919 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.508 | 0.703 | 0.703 | 1.000 | 0.703 | 0.759 |
| | 9 | Agu | I | 15 | 15.160 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 14.941 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 16 | 14.889 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 15.436 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.807 | 2.497 | 2.497 | 1.000 | 2.497 | 2.553 |
| | 11 | Sep | I | 15 | 12.882 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 14.243 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.498 | 4.534 | 4.534 | 1.000 | 4.534 | 4.586 |
| April | 12 | | II | 15 | 9.657 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 11.370 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 5.247 | 6.801 | 6.801 | 0.474 | 3.223 | 3.275 |
| Periode I | 13 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.983 | 6.458 | 6.458 | 0.234 | 1.512 | 1.564 |
| | 14 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.919 | 6.800 | 6.800 | 0.159 | 1.082 | 1.138 |
| | 15 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.251 | 4.213 | 4.213 | 0.255 | 1.073 | 1.125 |
| | 16 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.483 | 1.922 | 1.922 | 1.000 | 1.922 | 1.974 |
| | 17 | Des | I | 15 | 9.377 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 12.452 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.525 | 0.681 | 0.681 | 1.000 | 0.681 | 0.733 |
| | 18 | | II | 16 | 11.719 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 16.289 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.662 | 0.915 | 0.915 | 1.000 | 0.915 | 0.971 |
| | 19 | Jan | I | 15 | 15.318 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 16.509 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.542 | 1.999 | 1.999 | 1.000 | 1.999 | 2.051 |
| | 20 | | II | 16 | 14.457 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 17.399 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.814 | 2.508 | 2.508 | 1.000 | 2.508 | 2.564 |
| | 21 | Feb | I | 15 | 14.836 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 20.284 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.398 | 1.812 | 1.812 | 1.000 | 1.812 | 1.865 |
| | 22 | | II | 14 | 18.419 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 24.072 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.143 | 1.383 | 1.383 | 1.000 | 1.383 | 1.432 |
| | 23 | Mar | I | 15 | 22.641 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 23.449 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.562 | 0.729 | 0.729 | 1.000 | 0.729 | 0.781 |
| | 24 | | II | 16 | 22.668 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 23.173 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.146 | 0.201 | 0.201 | 1.000 | 0.201 | 0.257 |

**Tabel E. 39** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan April Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Apr | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 29.480 | 0 | 4.315 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.920 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.548 | 0 | 0 | 24.548 | 184.74 | 1.000 | OK | - |
| | 3 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.728 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.973 | 0 | 0 | 23.973 | 184.47 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.750 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 22.864 | 0 | 0 | 22.864 | 183.93 | 1.000 | OK | - |
| | 5 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.943 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.958 | 0 | 0 | 19.958 | 182.40 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.203 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.195 | 0 | 0 | 17.195 | 180.81 | 1.000 | OK | - |
| | 7 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.290 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 15.473 | 0 | 0 | 15.473 | 179.75 | 1.000 | OK | - |
| | 8 | | II | 0.576 | 0.796 | 0.796 | 0.953 | 0.759 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 15.160 | 0 | 0 | 15.160 | 179.55 | 0.738 | OK | - |
| | 9 | Agu | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 14.889 | 0 | 0 | 14.889 | 179.38 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.757 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 12.882 | 0 | 0 | 12.882 | 178.05 | 1.000 | OK | - |
| | 11 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.840 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 9.657 | 0 | 0 | 9.657 | 175.76 | 1.000 | OK | - |
| April | 12 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.529 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.868 | OK | - |
| Periode I | 13 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.809 | OK | - |
| | 14 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.647 | OK | - |
| | 15 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.691 | OK | - |
| | 16 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.228 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 9.377 | 0 | 0 | 9.377 | 175.55 | 1.000 | OK | - |
| | 17 | Des | I | 0.576 | 0.746 | 0.746 | 0.982 | 0.733 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 11.719 | 0 | 0 | 11.719 | 177.24 | 0.746 | OK | - |
| | 18 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.175 | 0.576 | 0.796 | 0.796 | 0.220 | 0.175 | | 15.318 | 0 | 0 | 15.318 | 179.65 | 0.805 | OK | - |
| | 19 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.305 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 14.457 | 0 | 0 | 14.457 | 179.10 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.768 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 14.836 | 0 | 0 | 14.836 | 179.34 | 1.000 | OK | - |
| | 21 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.118 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.419 | 0 | 0 | 18.419 | 181.54 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 0.735 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 22.641 | 0 | 0 | 22.641 | 183.82 | 1.000 | OK | - |
| | 23 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.035 | 0.576 | 0.746 | 0.746 | 0.046 | 0.035 | | 22.668 | 0 | 0 | 22.668 | 183.83 | 0.762 | OK | - |
| | 24 | | II | 0.576 | 0.796 | 0.796 | 0.323 | 0.257 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 22.916 | 0 | 0 | 22.916 | 183.95 | 0.581 | OK | - |

# **Tabel E. 41** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan April Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Apr | II | 15 | 25.165 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 26.214 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | Mei | I | 15 | 25.165 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 28.064 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.320 | 1.711 | 1.711 | 1.000 | 1.711 | 1.763 |
| | 3 | | II | 16 | 25.165 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 27.602 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.674 | 3.696 | 3.696 | 1.000 | 3.696 | 3.752 |
| | 4 | Jun | I | 15 | 23.850 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 24.634 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.837 | 3.677 | 3.677 | 1.000 | 3.677 | 3.729 |
| | 5 | | II | 15 | 20.905 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 22.091 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.806 | 3.637 | 3.637 | 1.000 | 3.637 | 3.689 |
| | 6 | Jul | I | 15 | 18.402 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 18.716 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.360 | 4.355 | 4.355 | 1.000 | 4.355 | 4.407 |
| | 7 | | II | 16 | 14.309 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 14.755 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.531 | 2.116 | 2.116 | 1.000 | 2.116 | 2.172 |
| | 8 | Agu | I | 15 | 12.583 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 12.364 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.626 | 0.812 | 0.812 | 1.000 | 0.812 | 0.864 |
| | 9 | | II | 16 | 11.500 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 12.047 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 10 | Sep | I | 15 | 11.991 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 13.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.749 | 2.267 | 2.267 | 1.000 | 2.267 | 2.319 |
| | 11 | | II | 15 | 11.032 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 12.745 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.498 | 4.534 | 4.534 | 1.000 | 4.534 | 4.586 |
| April Periode II | 12 | Okt | I | 15 | 8.159 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.723 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 5.876 | 7.615 | 7.615 | 0.207 | 1.576 | 1.628 |
| | 13 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.983 | 6.889 | 6.889 | 0.157 | 1.082 | 1.138 |
| | 14 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.062 | 3.968 | 3.968 | 0.270 | 1.073 | 1.125 |
| | 15 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.251 | 4.213 | 4.213 | 0.760 | 3.203 | 3.256 |
| | 16 | Des | I | 15 | 8.095 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.170 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.221 | 1.583 | 1.583 | 1.000 | 1.583 | 1.635 |
| | 17 | | II | 16 | 9.535 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 14.105 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.239 | 0.331 | 0.331 | 1.000 | 0.331 | 0.387 |
| | 18 | Jan | I | 15 | 13.718 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 14.909 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.666 | 0.863 | 0.863 | 1.000 | 0.863 | 0.915 |
| | 19 | | II | 16 | 13.994 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 16.936 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.542 | 2.132 | 2.132 | 1.000 | 2.132 | 2.188 |
| | 20 | Feb | I | 15 | 14.748 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 20.196 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.366 | 1.770 | 1.770 | 1.000 | 1.770 | 1.823 |
| | 21 | | II | 14 | 18.374 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 24.027 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.398 | 1.692 | 1.692 | 1.000 | 1.692 | 1.740 |
| | 22 | Mar | I | 15 | 22.286 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 23.094 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.339 | 1.735 | 1.735 | 1.000 | 1.735 | 1.787 |
| | 23 | | II | 16 | 21.307 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 21.813 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.562 | 0.777 | 0.777 | 1.000 | 0.777 | 0.833 |
| | 24 | Apr | I | 15 | 20.980 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 25.347 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.203 | 0.263 | 0.263 | 1.000 | 0.263 | 0.315 |

**Tabel E. 43** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan April Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | Release AB + IR - PLTMH 1 | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Apr | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.162 | 0 | 0.997 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.017 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 26.301 | 0 | 1.136 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 3 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.956 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 23.850 | 0 | 0 | 23.850 | 184.41 | 1.000 | OK | - |
| | 4 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.983 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.905 | 0 | 0 | 20.905 | 182.92 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.943 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.402 | 0 | 0 | 18.402 | 181.53 | 1.000 | OK | - |
| | 6 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.661 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 14.309 | 0 | 0 | 14.309 | 179.00 | 1.000 | OK | - |
| | 7 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.376 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 12.583 | 0 | 0 | 12.583 | 177.84 | 1.000 | OK | - |
| | 8 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.118 | 0.576 | 0.746 | 0.746 | 0.158 | 0.118 | | 11.500 | 0 | 0 | 11.500 | 177.09 | 0.789 | OK | - |
| | 9 | | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 11.991 | 0 | 0 | 11.991 | 177.43 | 0.518 | OK | - |
| | 10 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.573 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 11.032 | 0 | 0 | 11.032 | 176.76 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.840 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.159 | 0 | 0 | 8.159 | 174.63 | 1.000 | OK | - |
| April | 12 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.882 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.802 | OK | - |
| Periode II | 13 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.647 | OK | - |
| | 14 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.695 | OK | - |
| | 15 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.509 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.940 | OK | - |
| | 16 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.889 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 9.535 | 0 | 0 | 9.535 | 175.67 | 1.000 | OK | - |
| | 17 | | II | 0.576 | 0.796 | 0.796 | 0.486 | 0.387 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 13.718 | 0 | 0 | 13.718 | 178.61 | 0.621 | OK | - |
| | 18 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.169 | 0.576 | 0.746 | 0.746 | 0.226 | 0.169 | | 13.994 | 0 | 0 | 13.994 | 178.79 | 0.807 | OK | - |
| | 19 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.392 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 14.748 | 0 | 0 | 14.748 | 179.29 | 1.000 | OK | - |
| | 20 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.076 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.374 | 0 | 0 | 18.374 | 181.51 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.044 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 22.286 | 0 | 0 | 22.286 | 183.64 | 1.000 | OK | - |
| | 22 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.041 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.307 | 0 | 0 | 21.307 | 183.13 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.037 | 0.576 | 0.796 | 0.796 | 0.046 | 0.037 | | 20.980 | 0 | 0 | 20.980 | 182.96 | 0.762 | OK | - |
| | 24 | Apr | I | 0.576 | 0.746 | 0.746 | 0.422 | 0.315 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 25.032 | 0 | 0 | 25.032 | 184.96 | 0.606 | OK | - |

**Tabel E. 45** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Mei Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Mei | I | 15 | 25.165 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 28.064 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 16 | 25.165 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 27.602 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.337 | 1.848 | 1.848 | 1.000 | 1.848 | 1.904 |
| | 3 | Jun | I | 15 | 25.165 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 25.949 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.860 | 3.707 | 3.707 | 1.000 | 3.707 | 3.759 |
| | 4 | | II | 15 | 22.190 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 23.377 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.837 | 3.677 | 3.677 | 1.000 | 3.677 | 3.729 |
| | 5 | Jul | I | 15 | 19.647 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 19.961 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.177 | 4.117 | 4.117 | 1.000 | 4.117 | 4.169 |
| | 6 | | II | 16 | 15.792 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 16.238 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.360 | 4.645 | 4.645 | 1.000 | 4.645 | 4.701 |
| | 7 | Agu | I | 15 | 11.537 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 11.318 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.027 | 2.627 | 2.627 | 1.000 | 2.627 | 2.680 |
| | 8 | | II | 16 | 8.638 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 9.185 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.626 | 0.866 | 0.866 | 1.000 | 0.866 | 0.922 |
| | 9 | Sep | I | 15 | 8.263 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.623 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 15 | 9.571 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 11.284 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.749 | 2.267 | 2.267 | 1.000 | 2.267 | 2.319 |
| | 11 | Okt | I | 15 | 8.965 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 10.530 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.917 | 5.076 | 5.076 | 0.469 | 2.382 | 2.435 |
| Mei Periode I | 12 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 5.876 | 8.122 | 8.122 | 0.133 | 1.082 | 1.138 |
| | 13 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.097 | 4.014 | 4.014 | 0.267 | 1.073 | 1.125 |
| | 14 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.062 | 3.968 | 3.968 | 0.807 | 3.203 | 3.256 |
| | 15 | Des | I | 15 | 8.095 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.170 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.855 | 3.700 | 3.700 | 0.817 | 3.023 | 3.075 |
| | 16 | | II | 16 | 8.095 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 12.665 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.650 | 0.898 | 0.898 | 1.000 | 0.898 | 0.954 |
| | 17 | Jan | I | 15 | 11.711 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 12.902 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.569 | 0.737 | 0.737 | 1.000 | 0.737 | 0.789 |
| | 18 | | II | 16 | 12.112 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 15.054 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.666 | 0.920 | 0.920 | 1.000 | 0.920 | 0.976 |
| | 19 | Feb | I | 15 | 14.078 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 19.527 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.134 | 1.470 | 1.470 | 1.000 | 1.470 | 1.522 |
| | 20 | | II | 14 | 18.005 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 23.658 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.366 | 1.652 | 1.652 | 1.000 | 1.652 | 1.701 |
| | 21 | Mar | I | 15 | 21.957 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 22.765 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.611 | 2.088 | 2.088 | 1.000 | 2.088 | 2.140 |
| | 22 | | II | 16 | 20.624 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 21.130 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.339 | 1.851 | 1.851 | 1.000 | 1.851 | 1.906 |
| | 23 | Apr | I | 15 | 19.223 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 23.591 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.676 | 0.876 | 0.876 | 1.000 | 0.876 | 0.928 |
| | 24 | | II | 15 | 22.663 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 23.711 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.203 | 0.263 | 0.263 | 1.000 | 0.263 | 0.315 |

**Tabel E. 47** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Mei Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| Mei Periode I | 1 | Mei | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 28.012 | 0 | 2.847 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.108 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 25.698 | 0 | 0.533 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 3 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.013 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 22.190 | 0 | 0 | 22.190 | 183.59 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.983 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 19.647 | 0 | 0 | 19.647 | 182.23 | 1.000 | OK | - |
| | 5 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.423 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 15.792 | 0 | 0 | 15.792 | 179.95 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.905 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 11.537 | 0 | 0 | 11.537 | 177.12 | 1.000 | OK | - |
| | 7 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.933 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.638 | 0 | 0 | 8.638 | 174.99 | 1.000 | OK | - |
| | 8 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.126 | 0.576 | 0.796 | 0.796 | 0.158 | 0.126 | 8.263 | 0 | 0 | 8.263 | 174.71 | 0.789 | OK | - |
| | 9 | Sep | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 9.571 | 0 | 0 | 9.571 | 175.69 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.573 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.965 | 0 | 0 | 8.965 | 175.24 | 1.000 | OK | - |
| | 11 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.688 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.867 | OK | - |
| | 12 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.641 | OK | - |
| | 13 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.694 | OK | - |
| | 14 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.509 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.952 | OK | - |
| | 15 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.329 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.954 | OK | - |
| | 16 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.158 | 0.576 | 0.796 | 0.796 | 0.199 | 0.158 | 11.711 | 0 | 0 | 11.711 | 177.24 | 0.800 | OK | - |
| | 17 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.043 | 0.576 | 0.746 | 0.746 | 0.058 | 0.043 | 12.112 | 0 | 0 | 12.112 | 177.52 | 0.764 | OK | - |
| | 18 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.180 | 0.576 | 0.796 | 0.796 | 0.226 | 0.180 | 14.078 | 0 | 0 | 14.078 | 178.85 | 0.807 | OK | - |
| | 19 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.776 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 18.005 | 0 | 0 | 18.005 | 181.29 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.005 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 21.957 | 0 | 0 | 21.957 | 183.47 | 1.000 | OK | - |
| | 21 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.394 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 20.624 | 0 | 0 | 20.624 | 182.77 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.110 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 19.223 | 0 | 0 | 19.223 | 182.00 | 1.000 | OK | - |
| | 23 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.182 | 0.576 | 0.746 | 0.746 | 0.244 | 0.182 | 22.663 | 0 | 0 | 22.663 | 183.83 | 0.811 | OK | - |
| | 24 | | II | 0.576 | 0.746 | 0.746 | 0.422 | 0.315 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 23.396 | 0 | 0 | 23.396 | 184.19 | 0.606 | OK | - |

# **Tabel E. 49** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Mei Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Mei | II | 16 | 25.165 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 27.602 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 2 | Jun | I | 15 | 25.165 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 25.949 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.430 | 1.853 | 1.853 | 1.000 | 1.853 | 1.906 |
| | 3 | | II | 15 | 24.043 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 25.230 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.860 | 3.707 | 3.707 | 1.000 | 3.707 | 3.759 |
| | 4 | Jul | I | 15 | 21.471 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 21.785 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.213 | 4.165 | 4.165 | 1.000 | 4.165 | 4.217 |
| | 5 | | II | 16 | 17.568 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 18.014 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.177 | 4.391 | 4.391 | 1.000 | 4.391 | 4.447 |
| | 6 | Agu | I | 15 | 13.567 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 13.348 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.496 | 5.827 | 5.827 | 0.892 | 5.201 | 5.253 |
| | 7 | | II | 16 | 8.095 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 8.642 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.027 | 2.803 | 2.803 | 0.175 | 0.491 | 0.547 |
| | 8 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.598 | 0.775 | 0.775 | 1.000 | 0.775 | 0.828 |
| | 9 | | II | 15 | 8.627 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 10.341 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | Okt | I | 15 | 10.289 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 11.853 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.959 | 2.538 | 2.538 | 1.000 | 2.538 | 2.591 |
| | 11 | | II | 16 | 9.262 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 10.400 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.917 | 5.415 | 5.415 | 0.415 | 2.249 | 2.305 |
| Mei Periode II | 12 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.473 | 5.797 | 5.797 | 0.185 | 1.073 | 1.125 |
| | 13 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.097 | 4.014 | 4.014 | 0.798 | 3.203 | 3.256 |
| | 14 | Des | I | 15 | 8.095 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.170 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.665 | 3.454 | 3.454 | 0.875 | 3.023 | 3.075 |
| | 15 | | II | 16 | 8.095 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 12.665 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.997 | 2.761 | 2.761 | 1.000 | 2.761 | 2.817 |
| | 16 | Jan | I | 15 | 9.848 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 11.039 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.124 | 1.457 | 1.457 | 1.000 | 1.457 | 1.509 |
| | 17 | | II | 16 | 9.530 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 12.472 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.419 | 0.579 | 0.579 | 1.000 | 0.579 | 0.635 |
| | 18 | Feb | I | 15 | 11.837 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 17.285 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.447 | 0.579 | 0.579 | 1.000 | 0.579 | 0.631 |
| | 19 | | II | 14 | 16.654 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 22.307 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.134 | 1.372 | 1.372 | 1.000 | 1.372 | 1.421 |
| | 20 | Mar | I | 15 | 20.887 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 21.695 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.577 | 2.043 | 2.043 | 1.000 | 2.043 | 2.095 |
| | 21 | | II | 16 | 19.599 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 20.105 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.611 | 2.227 | 2.227 | 1.000 | 2.227 | 2.283 |
| | 22 | Apr | I | 15 | 17.822 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 22.189 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.507 | 1.954 | 1.954 | 1.000 | 1.954 | 2.006 |
| | 23 | | II | 15 | 20.183 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 21.231 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.676 | 0.876 | 0.876 | 1.000 | 0.876 | 0.928 |
| | 24 | Mei | I | 15 | 20.304 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 23.202 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.256 | 0.332 | 0.332 | 1.000 | 0.332 | 0.385 |

**Tabel E. 51** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Mei Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Mei | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 27.546 | 0 | 2.381 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.159 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 24.043 | 0 | 0 | 24.043 | 184.50 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.013 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 21.471 | 0 | 0 | 21.471 | 183.22 | 1.000 | OK | - |
| | 4 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.471 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 17.568 | 0 | 0 | 17.568 | 181.04 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.651 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 13.567 | 0 | 0 | 13.567 | 178.51 | 1.000 | OK | - |
| | 6 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.507 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.973 | OK | - |
| | 7 | | II | 0.576 | 0.796 | 0.796 | 0.687 | 0.547 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.466 | OK | - |
| | 8 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.082 | 0.576 | 0.746 | 0.746 | 0.109 | 0.082 | 8.627 | 0 | 0 | 8.627 | 174.98 | 0.777 | OK | - |
| | 9 | | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 10.289 | 0 | 0 | 10.289 | 176.22 | 0.518 | OK | - |
| | 10 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.844 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 9.262 | 0 | 0 | 9.262 | 175.46 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.509 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.854 | OK | - |
| Mei Periode II | 12 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.673 | OK | - |
| | 13 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.509 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.950 | OK | - |
| | 14 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.329 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.969 | OK | - |
| | 15 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.021 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 9.848 | 0 | 0 | 9.848 | 175.90 | 1.000 | OK | - |
| | 16 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.763 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 9.530 | 0 | 0 | 9.530 | 175.66 | 1.000 | OK | - |
| | 17 | | II | 0.576 | 0.796 | 0.796 | 0.798 | 0.635 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 11.837 | 0 | 0 | 11.837 | 177.33 | 0.699 | OK | - |
| | 18 | Feb | I | 0.576 | 0.746 | 0.746 | 0.846 | 0.631 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 16.654 | 0 | 0 | 16.654 | 180.49 | 0.711 | OK | - |
| | 19 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 0.724 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 20.887 | 0 | 0 | 20.887 | 182.91 | 1.000 | OK | - |
| | 20 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.349 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 19.599 | 0 | 0 | 19.599 | 182.21 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.487 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 17.822 | 0 | 0 | 17.822 | 181.19 | 1.000 | OK | - |
| | 22 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.260 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 20.183 | 0 | 0 | 20.183 | 182.53 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.182 | 0.576 | 0.746 | 0.746 | 0.244 | 0.182 | 20.304 | 0 | 0 | 20.304 | 182.59 | 0.811 | OK | - |
| | 24 | Mei | I | 0.576 | 0.746 | 0.746 | 0.515 | 0.385 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 22.818 | 0 | 0 | 22.818 | 183.90 | 0.629 | OK | - |

**Tabel E. 53** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juni Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Jun | I | 15 | 25.165 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 25.949 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 15 | 25.165 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 26.352 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.430 | 1.853 | 1.853 | 1.000 | 1.853 | 1.906 |
| | 3 | Jul | I | 15 | 24.446 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 24.760 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.996 | 3.883 | 3.883 | 1.000 | 3.883 | 3.935 |
| | 4 | | II | 16 | 20.825 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 21.271 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.213 | 4.442 | 4.442 | 1.000 | 4.442 | 4.498 |
| | 5 | Agu | I | 15 | 16.773 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 16.554 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.369 | 5.662 | 5.662 | 1.000 | 5.662 | 5.714 |
| | 6 | | II | 16 | 10.840 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 11.386 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.496 | 6.216 | 6.216 | 0.521 | 3.236 | 3.291 |
| | 7 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.909 | 2.474 | 2.474 | 0.529 | 1.308 | 1.360 |
| | 8 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.598 | 0.775 | 0.775 | 1.000 | 0.775 | 0.828 |
| | 9 | Okt | I | 15 | 8.981 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 10.545 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 16 | 10.493 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 11.630 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.959 | 2.707 | 2.707 | 1.000 | 2.707 | 2.763 |
| | 11 | Nov | I | 15 | 8.867 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.992 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.982 | 3.865 | 3.865 | 0.477 | 1.845 | 1.897 |
| Juni Periode I | 12 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.473 | 5.797 | 5.797 | 0.553 | 3.203 | 3.256 |
| | 13 | Des | I | 15 | 8.095 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.170 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.700 | 3.499 | 3.499 | 0.864 | 3.023 | 3.075 |
| | 14 | | II | 16 | 8.095 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 12.665 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.808 | 2.499 | 2.499 | 1.000 | 2.499 | 2.554 |
| | 15 | Jan | I | 15 | 10.111 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 11.301 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.551 | 3.306 | 3.306 | 0.954 | 3.154 | 3.206 |
| | 16 | | II | 16 | 8.095 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 11.037 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.825 | 1.140 | 1.140 | 1.000 | 1.140 | 1.196 |
| | 17 | Feb | I | 15 | 9.841 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 15.290 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.052 | 0.067 | 0.067 | 1.000 | 0.067 | 0.119 |
| | 18 | | II | 14 | 15.170 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 20.823 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.447 | 0.540 | 0.540 | 1.000 | 0.540 | 0.589 |
| | 19 | Mar | I | 15 | 20.234 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 21.042 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.329 | 1.722 | 1.722 | 1.000 | 1.722 | 1.774 |
| | 20 | | II | 16 | 19.268 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 19.773 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.577 | 2.179 | 2.179 | 1.000 | 2.179 | 2.235 |
| | 21 | Apr | I | 15 | 17.538 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 21.905 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.779 | 2.306 | 2.306 | 1.000 | 2.306 | 2.358 |
| | 22 | | II | 15 | 19.547 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 20.596 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.507 | 1.954 | 1.954 | 1.000 | 1.954 | 2.006 |
| | 23 | Mei | I | 15 | 18.590 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 21.489 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.798 | 1.034 | 1.034 | 1.000 | 1.034 | 1.087 |
| | 24 | | II | 16 | 20.402 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 22.839 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.256 | 0.354 | 0.354 | 1.000 | 0.354 | 0.410 |

**Tabel E. 55** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juni Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| Juni Periode I | 1 | Jun | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 25.896 | 0 | 0.731 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.159 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 24.446 | 0 | 0 | 24.446 | 184.69 | 1.000 | OK | - |
| | 3 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.189 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 20.825 | 0 | 0 | 20.825 | 182.88 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.702 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 16.773 | 0 | 0 | 16.773 | 180.56 | 1.000 | OK | - |
| | 5 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.968 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 10.840 | 0 | 0 | 10.840 | 176.62 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.496 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.880 | OK | - |
| | 7 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.838 | OK | - |
| | 8 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.082 | 0.576 | 0.746 | 0.746 | 0.109 | 0.082 | 8.981 | 0 | 0 | 8.981 | 175.25 | 0.777 | OK | - |
| | 9 | Okt | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 10.493 | 0 | 0 | 10.493 | 176.37 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.967 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 8.867 | 0 | 0 | 8.867 | 175.17 | 1.000 | OK | - |
| | 11 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.151 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.869 | OK | - |
| | 12 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.509 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.888 | OK | - |
| | 13 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.329 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.966 | OK | - |
| | 14 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.759 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 10.111 | 0 | 0 | 10.111 | 176.09 | 1.000 | OK | - |
| | 15 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.460 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.989 | OK | - |
| | 16 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.400 | 0.576 | 0.796 | 0.796 | 0.503 | 0.400 | 9.841 | 0 | 0 | 9.841 | 175.89 | 0.876 | OK | - |
| | 17 | Feb | I | 0.576 | 0.746 | 0.746 | 0.160 | 0.119 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | 15.170 | 0 | 0 | 15.170 | 179.56 | 0.540 | OK | - |
| | 18 | | II | 0.576 | 0.696 | 0.696 | 0.846 | 0.589 | 0.000 | 0.576 | 0.696 | 0.696 | 0.000 | 0.000 | 20.234 | 0 | 0 | 20.234 | 182.56 | 0.711 | OK | - |
| | 19 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.028 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 19.268 | 0 | 0 | 19.268 | 182.02 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.439 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 17.538 | 0 | 0 | 17.538 | 181.02 | 1.000 | OK | - |
| | 21 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.612 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 19.547 | 0 | 0 | 19.547 | 182.18 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.260 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 18.590 | 0 | 0 | 18.590 | 181.63 | 1.000 | OK | - |
| | 23 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.340 | 0.576 | 0.746 | 0.746 | 0.456 | 0.340 | 20.402 | 0 | 0 | 20.402 | 182.65 | 0.864 | OK | - |
| | 24 | | II | 0.576 | 0.796 | 0.796 | 0.515 | 0.410 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | 22.429 | 0 | 0 | 22.429 | 183.71 | 0.629 | OK | - |

**Tabel E. 57** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juni Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Jun | II | 15 | 25.165 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 26.352 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | Jul | I | 15 | 25.165 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 25.479 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.498 | 1.942 | 1.942 | 1.000 | 1.942 | 1.994 |
| | 3 | | II | 16 | 23.485 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 23.931 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.996 | 4.142 | 4.142 | 1.000 | 4.142 | 4.198 |
| | 4 | Agu | I | 15 | 19.733 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 19.514 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.424 | 5.733 | 5.733 | 1.000 | 5.733 | 5.786 |
| | 5 | | II | 16 | 13.729 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 14.275 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.369 | 6.039 | 6.039 | 1.000 | 6.039 | 6.095 |
| | 6 | Sep | I | 15 | 8.180 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.540 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.226 | 5.477 | 5.477 | 0.254 | 1.393 | 1.445 |
| | 7 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.909 | 2.474 | 2.474 | 0.671 | 1.661 | 1.713 |
| | 8 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.681 | 0.882 | 0.882 | 1.000 | 0.882 | 0.935 |
| | 9 | | II | 16 | 8.724 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.862 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 10 | Nov | I | 15 | 9.806 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 10.932 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.491 | 1.932 | 1.932 | 1.000 | 1.932 | 1.985 |
| | 11 | | II | 15 | 8.947 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 12.203 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.982 | 3.865 | 3.865 | 1.000 | 3.865 | 3.917 |
| Juni Periode II | 12 | Des | I | 15 | 8.286 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 11.361 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.017 | 5.206 | 5.206 | 0.617 | 3.214 | 3.266 |
| | 13 | | II | 16 | 8.095 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 12.665 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.842 | 2.547 | 2.547 | 1.000 | 2.547 | 2.602 |
| | 14 | Jan | I | 15 | 10.063 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 11.253 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.338 | 3.031 | 3.031 | 1.000 | 3.031 | 3.083 |
| | 15 | | II | 16 | 8.170 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 11.112 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.102 | 2.906 | 2.906 | 1.000 | 2.906 | 2.962 |
| | 16 | Feb | I | 15 | 8.151 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 13.599 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.213 | 0.276 | 0.276 | 1.000 | 0.276 | 0.329 |
| | 17 | | II | 14 | 13.271 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 18.924 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.288 | 0.349 | 0.349 | 1.000 | 0.349 | 0.398 |
| | 18 | Mar | I | 15 | 18.526 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 19.334 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.556 | 0.720 | 0.720 | 1.000 | 0.720 | 0.772 |
| | 19 | | II | 16 | 18.562 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 19.067 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.329 | 1.837 | 1.837 | 1.000 | 1.837 | 1.893 |
| | 20 | Apr | I | 15 | 17.174 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 21.541 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.745 | 2.261 | 2.261 | 1.000 | 2.261 | 2.313 |
| | 21 | | II | 15 | 19.228 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 20.277 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.779 | 2.306 | 2.306 | 1.000 | 2.306 | 2.358 |
| | 22 | Mei | I | 15 | 17.919 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 20.818 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.719 | 2.228 | 2.228 | 1.000 | 2.228 | 2.280 |
| | 23 | | II | 16 | 18.537 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 20.974 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.798 | 1.103 | 1.103 | 1.000 | 1.103 | 1.159 |
| | 24 | Jun | I | 15 | 19.815 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 20.599 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.271 | 0.351 | 0.351 | 1.000 | 0.351 | 0.403 |

**Tabel E. 59** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juni Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Jun | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.300 | 0 | 1.134 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.248 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.485 | 0 | 0 | 23.485 | 184.23 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.402 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.733 | 0 | 0 | 19.733 | 182.28 | 1.000 | OK | - |
| | 4 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 5.040 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 13.729 | 0 | 0 | 13.729 | 178.62 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 5.299 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.180 | 0 | 0 | 8.180 | 174.64 | 1.000 | OK | - |
| | 6 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.699 | 0.576 | 0.746 | 0.746 | 0.937 | 0.699 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.798 | OK | - |
| | 7 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.967 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.918 | OK | - |
| | 8 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.188 | 0.576 | 0.746 | 0.746 | 0.253 | 0.188 | | 8.724 | 0 | 0 | 8.724 | 175.06 | 0.813 | OK | - |
| | 9 | | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 9.806 | 0 | 0 | 9.806 | 175.87 | 0.518 | OK | - |
| | 10 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.238 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.947 | 0 | 0 | 8.947 | 175.23 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.171 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.286 | 0 | 0 | 8.286 | 174.72 | 1.000 | OK | - |
| Juni Periode II | 12 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.520 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.904 | OK | - |
| | 13 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.806 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 10.063 | 0 | 0 | 10.063 | 176.06 | 1.000 | OK | - |
| | 14 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.337 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.170 | 0 | 0 | 8.170 | 174.64 | 1.000 | OK | - |
| | 15 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.166 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.151 | 0 | 0 | 8.151 | 174.62 | 1.000 | OK | - |
| | 16 | Feb | I | 0.576 | 0.746 | 0.746 | 0.440 | 0.329 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 13.271 | 0 | 0 | 13.271 | 178.31 | 0.610 | OK | - |
| | 17 | | II | 0.576 | 0.696 | 0.696 | 0.571 | 0.398 | 0.000 | 0.576 | 0.696 | 0.696 | 0.000 | 0.000 | | 18.526 | 0 | 0 | 18.526 | 181.60 | 0.643 | OK | - |
| | 18 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.026 | 0.576 | 0.746 | 0.746 | 0.035 | 0.026 | | 18.562 | 0 | 0 | 18.562 | 181.62 | 0.759 | OK | - |
| | 19 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.097 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 17.174 | 0 | 0 | 17.174 | 180.80 | 1.000 | OK | - |
| | 20 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.567 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.228 | 0 | 0 | 19.228 | 182.00 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.612 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.919 | 0 | 0 | 17.919 | 181.24 | 1.000 | OK | - |
| | 22 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.534 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.537 | 0 | 0 | 18.537 | 181.60 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.363 | 0.576 | 0.796 | 0.796 | 0.456 | 0.363 | | 19.815 | 0 | 0 | 19.815 | 182.33 | 0.864 | OK | - |
| | 24 | Jun | I | 0.576 | 0.746 | 0.746 | 0.540 | 0.403 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 20.195 | 0 | 0 | 20.195 | 182.54 | 0.635 | OK | - |

# **Tabel E. 61** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juli Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | | $EV_t$ | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Jul | I | 15 | 25.165 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 25.479 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 16 | 25.165 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 25.611 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.498 | 2.071 | 2.071 | 1.000 | 2.071 | 2.127 |
| | 3 | Agu | I | 15 | 23.485 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 23.265 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.613 | 4.683 | 4.683 | 1.000 | 4.683 | 4.735 |
| | 4 | | II | 16 | 18.531 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 19.077 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.424 | 6.116 | 6.116 | 1.000 | 6.116 | 6.171 |
| | 5 | Sep | I | 15 | 12.906 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 14.266 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.085 | 5.295 | 5.295 | 1.000 | 5.295 | 5.347 |
| | 6 | | II | 15 | 8.919 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 10.632 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.226 | 5.477 | 5.477 | 0.454 | 2.485 | 2.537 |
| | 7 | Okt | I | 15 | 8.095 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.659 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.257 | 2.925 | 2.925 | 0.517 | 1.512 | 1.564 |
| | 8 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.681 | 0.941 | 0.941 | 1.000 | 0.941 | 0.997 |
| | 9 | Nov | I | 15 | 8.236 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.361 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 15 | 9.309 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 12.564 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.491 | 1.932 | 1.932 | 1.000 | 1.932 | 1.985 |
| | 11 | Des | I | 15 | 10.580 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 13.655 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.678 | 3.471 | 3.471 | 1.000 | 3.471 | 3.523 |
| Juli Periode I | 12 | | II | 16 | 10.132 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 14.702 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.159 | 4.368 | 4.368 | 1.000 | 4.368 | 4.423 |
| | 13 | Jan | I | 15 | 10.279 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 11.469 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.366 | 3.066 | 3.066 | 1.000 | 3.066 | 3.118 |
| | 14 | | II | 16 | 8.351 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 11.293 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.890 | 2.612 | 2.612 | 1.000 | 2.612 | 2.668 |
| | 15 | Feb | I | 15 | 8.625 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 14.073 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.101 | 1.427 | 1.427 | 1.000 | 1.427 | 1.479 |
| | 16 | | II | 14 | 12.595 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 18.248 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.687 | 0.831 | 0.831 | 1.000 | 0.831 | 0.880 |
| | 17 | Mar | I | 15 | 17.368 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 18.176 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.381 | 0.493 | 0.493 | 1.000 | 0.493 | 0.546 |
| | 18 | | II | 16 | 17.630 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 18.136 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.556 | 0.768 | 0.768 | 1.000 | 0.768 | 0.824 |
| | 19 | Apr | I | 15 | 17.312 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 21.679 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.498 | 1.941 | 1.941 | 1.000 | 1.941 | 1.993 |
| | 20 | | II | 15 | 19.686 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 20.735 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.745 | 2.261 | 2.261 | 1.000 | 2.261 | 2.313 |
| | 21 | Mei | I | 15 | 18.422 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 21.320 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.006 | 2.600 | 2.600 | 1.000 | 2.600 | 2.652 |
| | 22 | | II | 16 | 18.668 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 21.105 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.719 | 2.377 | 2.377 | 1.000 | 2.377 | 2.432 |
| | 23 | Jun | I | 15 | 18.672 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 19.456 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.880 | 1.140 | 1.140 | 1.000 | 1.140 | 1.192 |
| | 24 | | II | 15 | 18.263 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 19.450 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.271 | 0.351 | 0.351 | 1.000 | 0.351 | 0.403 |

**Tabel E. 63** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juli Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Jul | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 25.427 | 0 | 0.262 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.331 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 23.485 | 0 | 0 | 23.485 | 184.23 | 1.000 | OK | - |
| | 3 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.989 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.531 | 0 | 0 | 18.531 | 181.60 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 5.376 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 12.906 | 0 | 0 | 12.906 | 178.06 | 1.000 | OK | - |
| | 5 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.601 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.919 | 0 | 0 | 8.919 | 175.20 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.791 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.863 | OK | - |
| | 7 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.818 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.879 | OK | - |
| | 8 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.201 | 0.576 | 0.796 | 0.796 | 0.253 | 0.201 | | 8.236 | 0 | 0 | 8.236 | 174.69 | 0.813 | OK | - |
| | 9 | Nov | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 9.309 | 0 | 0 | 9.309 | 175.50 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.238 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 10.580 | 0 | 0 | 10.580 | 176.43 | 1.000 | OK | - |
| | 11 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.777 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 10.132 | 0 | 0 | 10.132 | 176.11 | 1.000 | OK | - |
| Juli Periode I | 12 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.627 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 10.279 | 0 | 0 | 10.279 | 176.21 | 1.000 | OK | - |
| | 13 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.372 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.351 | 0 | 0 | 8.351 | 174.77 | 1.000 | OK | - |
| | 14 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.872 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.625 | 0 | 0 | 8.625 | 174.98 | 1.000 | OK | - |
| | 15 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.733 | 0.576 | 0.746 | 0.746 | 0.982 | 0.733 | | 12.595 | 0 | 0 | 12.595 | 177.85 | 0.995 | OK | - |
| | 16 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 0.183 | 0.576 | 0.696 | 0.696 | 0.263 | 0.183 | | 17.368 | 0 | 0 | 17.368 | 180.92 | 0.816 | OK | - |
| | 17 | Mar | I | 0.576 | 0.746 | 0.746 | 0.731 | 0.546 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 17.630 | 0 | 0 | 17.630 | 181.07 | 0.683 | OK | - |
| | 18 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.028 | 0.576 | 0.796 | 0.796 | 0.035 | 0.028 | | 17.312 | 0 | 0 | 17.312 | 180.88 | 0.759 | OK | - |
| | 19 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.247 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.686 | 0 | 0 | 19.686 | 182.25 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.567 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.422 | 0 | 0 | 18.422 | 181.54 | 1.000 | OK | - |
| | 21 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.906 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.668 | 0 | 0 | 18.668 | 181.68 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.636 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 18.672 | 0 | 0 | 18.672 | 181.68 | 1.000 | OK | - |
| | 23 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.446 | 0.576 | 0.746 | 0.746 | 0.598 | 0.446 | | 18.263 | 0 | 0 | 18.263 | 181.45 | 0.899 | OK | - |
| | 24 | | II | 0.576 | 0.746 | 0.746 | 0.540 | 0.403 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 19.047 | 0 | 0 | 19.047 | 181.90 | 0.635 | OK | - |

**Tabel E. 65** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juli Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Juli Periode II | 1 | Jul | II | 16 | 25.165 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 25.611 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 2 | Agu | I | 15 | 25.165 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 24.946 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.807 | 2.341 | 2.341 | 1.000 | 2.341 | 2.394 |
| | 3 | | II | 16 | 22.553 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 23.099 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.613 | 4.995 | 4.995 | 1.000 | 4.995 | 5.051 |
| | 4 | Sep | I | 15 | 18.049 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 19.409 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.136 | 5.361 | 5.361 | 1.000 | 5.361 | 5.413 |
| | 5 | | II | 15 | 13.996 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 15.710 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.085 | 5.295 | 5.295 | 1.000 | 5.295 | 5.347 |
| | 6 | Okt | I | 15 | 10.363 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 11.927 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 5.021 | 6.508 | 6.508 | 0.581 | 3.780 | 3.832 |
| | 7 | | II | 16 | 8.095 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 9.233 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.257 | 3.120 | 3.120 | 0.347 | 1.082 | 1.138 |
| | 8 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.497 | 0.644 | 0.644 | 1.000 | 0.644 | 0.696 |
| | 9 | | II | 15 | 8.524 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.779 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | Des | I | 15 | 11.727 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 14.802 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.339 | 1.735 | 1.735 | 1.000 | 1.735 | 1.788 |
| | 11 | | II | 16 | 13.015 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 17.585 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.106 | 2.912 | 2.912 | 1.000 | 2.912 | 2.967 |
| | 12 | Jan | I | 15 | 14.617 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 15.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.829 | 4.962 | 4.962 | 1.000 | 4.962 | 5.015 |
| | 13 | | II | 16 | 10.793 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 13.735 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.917 | 2.650 | 2.650 | 1.000 | 2.650 | 2.706 |
| | 14 | Feb | I | 15 | 11.029 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 16.478 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.877 | 1.136 | 1.136 | 1.000 | 1.136 | 1.188 |
| | 15 | | II | 14 | 15.290 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 20.943 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.811 | 2.191 | 2.191 | 1.000 | 2.191 | 2.240 |
| | 16 | Mar | I | 15 | 18.703 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 19.511 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.800 | 1.037 | 1.037 | 1.000 | 1.037 | 1.090 |
| | 17 | | II | 16 | 18.421 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 18.927 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.308 | 0.425 | 0.425 | 1.000 | 0.425 | 0.481 |
| | 18 | Apr | I | 15 | 18.446 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 22.813 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.669 | 0.867 | 0.867 | 1.000 | 0.867 | 0.919 |
| | 19 | | II | 15 | 21.894 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 22.942 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.498 | 1.941 | 1.941 | 1.000 | 1.941 | 1.993 |
| | 20 | Mei | I | 15 | 20.949 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 23.848 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.970 | 2.553 | 2.553 | 1.000 | 2.553 | 2.605 |
| | 21 | | II | 16 | 21.243 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 23.680 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.006 | 2.773 | 2.773 | 1.000 | 2.773 | 2.829 |
| | 22 | Jun | I | 15 | 20.850 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 21.634 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.937 | 2.511 | 2.511 | 1.000 | 2.511 | 2.563 |
| | 23 | | II | 15 | 19.070 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 20.257 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.880 | 1.140 | 1.140 | 1.000 | 1.140 | 1.192 |
| | 24 | Jul | I | 15 | 19.065 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 19.379 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.288 | 0.373 | 0.373 | 1.000 | 0.373 | 0.426 |

**Tabel E. 67** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Juli Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Jul | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 25.556 | 0 | 0.390 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.647 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 22.553 | 0 | 0 | 22.553 | 183.77 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 4.255 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 18.049 | 0 | 0 | 18.049 | 181.32 | 1.000 | OK | - |
| | 4 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.667 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 13.996 | 0 | 0 | 13.996 | 178.79 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.601 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 10.363 | 0 | 0 | 10.363 | 176.27 | 1.000 | OK | - |
| | 6 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.086 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.895 | OK | - |
| | 7 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.342 | 0.576 | 0.796 | 0.796 | 0.429 | 0.342 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.694 | OK | - |
| | 8 | Nov | I | 0.576 | 0.746 | 0.746 | 0.933 | 0.696 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 8.524 | 0 | 0 | 8.524 | 174.91 | 0.733 | OK | - |
| | 9 | | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 11.727 | 0 | 0 | 11.727 | 177.25 | 0.518 | OK | - |
| | 10 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.041 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 13.015 | 0 | 0 | 13.015 | 178.14 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.171 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 14.617 | 0 | 0 | 14.617 | 179.20 | 1.000 | OK | - |
| Juli Periode II | 12 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.268 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 10.793 | 0 | 0 | 10.793 | 176.59 | 1.000 | OK | - |
| | 13 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.910 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 11.029 | 0 | 0 | 11.029 | 176.75 | 1.000 | OK | - |
| | 14 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.442 | 0.576 | 0.746 | 0.746 | 0.592 | 0.442 | | 15.290 | 0 | 0 | 15.290 | 179.63 | 0.898 | OK | - |
| | 15 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.543 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 18.703 | 0 | 0 | 18.703 | 181.70 | 1.000 | OK | - |
| | 16 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.343 | 0.576 | 0.746 | 0.746 | 0.460 | 0.343 | | 18.421 | 0 | 0 | 18.421 | 181.54 | 0.865 | OK | - |
| | 17 | | II | 0.576 | 0.796 | 0.796 | 0.604 | 0.481 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 18.446 | 0 | 0 | 18.446 | 181.55 | 0.651 | OK | - |
| | 18 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.173 | 0.576 | 0.746 | 0.746 | 0.232 | 0.173 | | 21.894 | 0 | 0 | 21.894 | 183.44 | 0.808 | OK | - |
| | 19 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.247 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.949 | 0 | 0 | 20.949 | 182.94 | 1.000 | OK | - |
| | 20 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.859 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.243 | 0 | 0 | 21.243 | 183.10 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.033 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 20.850 | 0 | 0 | 20.850 | 182.89 | 1.000 | OK | - |
| | 22 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.817 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.070 | 0 | 0 | 19.070 | 181.91 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.446 | 0.576 | 0.746 | 0.746 | 0.598 | 0.446 | | 19.065 | 0 | 0 | 19.065 | 181.91 | 0.899 | OK | - |
| | 24 | Jul | I | 0.576 | 0.746 | 0.746 | 0.571 | 0.426 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 18.953 | 0 | 0 | 18.953 | 181.84 | 0.643 | OK | - |

**Tabel E. 69** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Agustus Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | Release AB + IR |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Agustus Periode I | 1 | Agu | I | 15 | 25.165 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 24.946 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 16 | 24.894 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 25.441 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.807 | 2.497 | 2.497 | 1.000 | 2.497 | 2.553 |
| | 3 | Sep | I | 15 | 22.887 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 24.248 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.498 | 4.534 | 4.534 | 1.000 | 4.534 | 4.586 |
| | 4 | | II | 15 | 19.662 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 21.375 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.136 | 5.361 | 5.361 | 1.000 | 5.361 | 5.413 |
| | 5 | Okt | I | 15 | 15.962 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 17.526 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.919 | 6.375 | 6.375 | 1.000 | 6.375 | 6.428 |
| | 6 | | II | 16 | 11.099 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 12.236 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 5.021 | 6.941 | 6.941 | 0.589 | 4.086 | 4.141 |
| | 7 | Nov | I | 15 | 8.095 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 9.220 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.483 | 1.922 | 1.922 | 0.558 | 1.073 | 1.125 |
| | 8 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.497 | 0.644 | 0.644 | 1.000 | 0.644 | 0.696 |
| | 9 | Des | I | 15 | 10.654 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 13.729 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 16 | 13.677 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 18.247 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.053 | 1.456 | 1.456 | 1.000 | 1.456 | 1.512 |
| | 11 | Jan | I | 15 | 16.736 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 17.926 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.553 | 3.308 | 3.308 | 1.000 | 3.308 | 3.361 |
| | 12 | | II | 16 | 14.565 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 17.507 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.380 | 4.673 | 4.673 | 1.000 | 4.673 | 4.729 |
| | 13 | Feb | I | 15 | 12.779 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 18.227 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.900 | 1.166 | 1.166 | 1.000 | 1.166 | 1.218 |
| | 14 | | II | 14 | 17.009 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 22.662 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.587 | 1.920 | 1.920 | 1.000 | 1.920 | 1.968 |
| | 15 | Mar | I | 15 | 20.694 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 21.502 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.015 | 2.611 | 2.611 | 1.000 | 2.611 | 2.663 |
| | 16 | | II | 16 | 18.838 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 19.344 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.654 | 0.904 | 0.904 | 1.000 | 0.904 | 0.960 |
| | 17 | Apr | I | 15 | 18.384 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 22.751 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.524 | 0.679 | 0.679 | 1.000 | 0.679 | 0.731 |
| | 18 | | II | 15 | 22.020 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 23.069 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.669 | 0.867 | 0.867 | 1.000 | 0.867 | 0.919 |
| | 19 | Mei | I | 15 | 22.149 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 25.048 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.709 | 2.215 | 2.215 | 1.000 | 2.215 | 2.267 |
| | 20 | | II | 16 | 22.781 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 25.218 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.970 | 2.723 | 2.723 | 1.000 | 2.723 | 2.779 |
| | 21 | Jun | I | 15 | 22.439 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 23.222 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.277 | 2.952 | 2.952 | 1.000 | 2.952 | 3.004 |
| | 22 | | II | 15 | 20.219 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 21.405 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.937 | 2.511 | 2.511 | 1.000 | 2.511 | 2.563 |
| | 23 | Jul | I | 15 | 18.842 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 19.156 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.978 | 1.267 | 1.267 | 1.000 | 1.267 | 1.319 |
| | 24 | | II | 16 | 17.837 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 18.283 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.288 | 0.398 | 0.398 | 1.000 | 0.398 | 0.454 |

**Tabel E. 71** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Agustus Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | Release AB + IR - PLTMH 1 | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| Agustus Periode I | 1 | Agu | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 24.894 | 0 | 0 | 24.894 | 184.90 | 0.518 | OK | - |
| | 2 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.757 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 22.887 | 0 | 0 | 22.887 | 183.94 | 1.000 | OK | - |
| | 3 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.840 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.662 | 0 | 0 | 19.662 | 182.24 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.667 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 15.962 | 0 | 0 | 15.962 | 180.06 | 1.000 | OK | - |
| | 5 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 5.681 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 11.099 | 0 | 0 | 11.099 | 176.80 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.345 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.897 | OK | - |
| | 7 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.379 | 0.576 | 0.746 | 0.746 | 0.508 | 0.379 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.767 | OK | - |
| | 8 | | II | 0.576 | 0.746 | 0.746 | 0.933 | 0.696 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 10.654 | 0 | 0 | 10.654 | 176.49 | 0.733 | OK | - |
| | 9 | Des | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 13.677 | 0 | 0 | 13.677 | 178.58 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.716 | 0.576 | 0.796 | 0.796 | 0.899 | 0.716 | | 16.736 | 0 | 0 | 16.736 | 180.53 | 0.975 | OK | - |
| | 11 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.614 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 14.565 | 0 | 0 | 14.565 | 179.17 | 1.000 | OK | - |
| | 12 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.933 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 12.779 | 0 | 0 | 12.779 | 177.98 | 1.000 | OK | - |
| | 13 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.472 | 0.576 | 0.746 | 0.746 | 0.633 | 0.472 | | 17.009 | 0 | 0 | 17.009 | 180.70 | 0.908 | OK | - |
| | 14 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.272 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 20.694 | 0 | 0 | 20.694 | 182.80 | 1.000 | OK | - |
| | 15 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.917 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.838 | 0 | 0 | 18.838 | 181.78 | 1.000 | OK | - |
| | 16 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.164 | 0.576 | 0.796 | 0.796 | 0.206 | 0.164 | | 18.384 | 0 | 0 | 18.384 | 181.52 | 0.802 | OK | - |
| | 17 | Apr | I | 0.576 | 0.746 | 0.746 | 0.980 | 0.731 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 22.020 | 0 | 0 | 22.020 | 183.50 | 0.745 | OK | - |
| | 18 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.173 | 0.576 | 0.746 | 0.746 | 0.232 | 0.173 | | 22.149 | 0 | 0 | 22.149 | 183.57 | 0.808 | OK | - |
| | 19 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.521 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 22.781 | 0 | 0 | 22.781 | 183.89 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.983 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 22.439 | 0 | 0 | 22.439 | 183.71 | 1.000 | OK | - |
| | 21 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.258 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.219 | 0 | 0 | 20.219 | 182.55 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.817 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.842 | 0 | 0 | 18.842 | 181.78 | 1.000 | OK | - |
| | 23 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.573 | 0.576 | 0.746 | 0.746 | 0.768 | 0.573 | | 17.837 | 0 | 0 | 17.837 | 181.20 | 0.942 | OK | - |
| | 24 | | II | 0.576 | 0.796 | 0.796 | 0.571 | 0.454 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 17.829 | 0 | 0 | 17.829 | 181.19 | 0.643 | OK | - |

# **Tabel E. 73** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Agustus Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Agu | II | 16 | 25.165 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 25.712 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 2 | Sep | I | 15 | 25.165 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 26.525 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.749 | 2.267 | 2.267 | 1.000 | 2.267 | 2.319 |
| | 3 | | II | 15 | 24.206 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 25.920 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.498 | 4.534 | 4.534 | 1.000 | 4.534 | 4.586 |
| | 4 | Okt | I | 15 | 21.334 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 22.898 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.983 | 6.458 | 6.458 | 1.000 | 6.458 | 6.511 |
| | 5 | | II | 16 | 16.387 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 17.525 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 4.919 | 6.800 | 6.800 | 1.000 | 6.800 | 6.856 |
| | 6 | Nov | I | 15 | 10.669 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 11.794 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.251 | 4.213 | 4.213 | 0.866 | 3.647 | 3.699 |
| | 7 | | II | 15 | 8.095 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 11.351 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.483 | 1.922 | 1.922 | 1.000 | 1.922 | 1.974 |
| | 8 | Des | I | 15 | 9.377 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 12.452 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.368 | 0.477 | 0.477 | 1.000 | 0.477 | 0.529 |
| | 9 | | II | 16 | 11.923 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 16.493 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 10 | Jan | I | 15 | 16.437 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 17.628 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.276 | 1.654 | 1.654 | 1.000 | 1.654 | 1.706 |
| | 11 | | II | 16 | 15.921 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 18.863 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.254 | 3.115 | 3.115 | 1.000 | 3.115 | 3.171 |
| Agustus Periode II | 12 | Feb | I | 15 | 15.692 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 21.141 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.586 | 3.351 | 3.351 | 1.000 | 3.351 | 3.404 |
| | 13 | | II | 14 | 17.737 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 23.390 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.610 | 1.948 | 1.948 | 1.000 | 1.948 | 1.997 |
| | 14 | Mar | I | 15 | 21.394 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 22.202 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.795 | 2.327 | 2.327 | 1.000 | 2.327 | 2.379 |
| | 15 | | II | 16 | 19.823 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 20.328 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.795 | 2.482 | 2.482 | 1.000 | 2.482 | 2.538 |
| | 16 | Apr | I | 15 | 17.791 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 22.158 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.971 | 1.259 | 1.259 | 1.000 | 1.259 | 1.311 |
| | 17 | | II | 15 | 20.847 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 21.896 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.550 | 0.713 | 0.713 | 1.000 | 0.713 | 0.766 |
| | 18 | Mei | I | 15 | 21.130 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 24.029 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.791 | 1.025 | 1.025 | 1.000 | 1.025 | 1.078 |
| | 19 | | II | 16 | 22.951 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 25.388 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.709 | 2.362 | 2.362 | 1.000 | 2.362 | 2.418 |
| | 20 | Jun | I | 15 | 22.970 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 23.753 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.234 | 2.896 | 2.896 | 1.000 | 2.896 | 2.948 |
| | 21 | | II | 15 | 20.806 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 21.992 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.277 | 2.952 | 2.952 | 1.000 | 2.952 | 3.004 |
| | 22 | Jul | I | 15 | 18.989 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 19.302 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.200 | 2.852 | 2.852 | 1.000 | 2.852 | 2.904 |
| | 23 | | II | 16 | 16.398 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 16.845 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.978 | 1.351 | 1.351 | 1.000 | 1.351 | 1.407 |
| | 24 | Agu | I | 15 | 15.437 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 15.218 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.344 | 0.446 | 0.446 | 1.000 | 0.446 | 0.498 |

**Tabel E. 75** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Agustus Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Agu | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 25.656 | 0 | 0.491 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.573 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.206 | 0 | 0 | 24.206 | 184.58 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.840 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.334 | 0 | 0 | 21.334 | 183.15 | 1.000 | OK | - |
| | 4 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 5.764 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.387 | 0 | 0 | 16.387 | 180.32 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 6.060 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 10.669 | 0 | 0 | 10.669 | 176.50 | 1.000 | OK | - |
| | 6 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.953 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.966 | OK | - |
| | 7 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.228 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 9.377 | 0 | 0 | 9.377 | 175.55 | 1.000 | OK | - |
| | 8 | Des | I | 0.576 | 0.746 | 0.746 | 0.709 | 0.529 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 11.923 | 0 | 0 | 11.923 | 177.39 | 0.677 | OK | - |
| | 9 | | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 16.437 | 0 | 0 | 16.437 | 180.35 | 0.518 | OK | - |
| | 10 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.960 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 15.921 | 0 | 0 | 15.921 | 180.03 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.375 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 15.692 | 0 | 0 | 15.692 | 179.89 | 1.000 | OK | - |
| Agustus Periode II | 12 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.657 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.737 | 0 | 0 | 17.737 | 181.14 | 1.000 | OK | - |
| | 13 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 1.300 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 21.394 | 0 | 0 | 21.394 | 183.18 | 1.000 | OK | - |
| | 14 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.633 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.823 | 0 | 0 | 19.823 | 182.33 | 1.000 | OK | - |
| | 15 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.742 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 17.791 | 0 | 0 | 17.791 | 181.17 | 1.000 | OK | - |
| | 16 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.565 | 0.576 | 0.746 | 0.746 | 0.757 | 0.565 | | 20.847 | 0 | 0 | 20.847 | 182.89 | 0.939 | OK | - |
| | 17 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.019 | 0.576 | 0.746 | 0.746 | 0.026 | 0.019 | | 21.130 | 0 | 0 | 21.130 | 183.04 | 0.756 | OK | - |
| | 18 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.331 | 0.576 | 0.746 | 0.746 | 0.444 | 0.331 | | 22.951 | 0 | 0 | 22.951 | 183.97 | 0.861 | OK | - |
| | 19 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.622 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 22.970 | 0 | 0 | 22.970 | 183.98 | 1.000 | OK | - |
| | 20 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.202 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.806 | 0 | 0 | 20.806 | 182.87 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.258 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.989 | 0 | 0 | 18.989 | 181.86 | 1.000 | OK | - |
| | 22 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.158 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.398 | 0 | 0 | 16.398 | 180.33 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.611 | 0.576 | 0.796 | 0.796 | 0.768 | 0.611 | | 15.437 | 0 | 0 | 15.437 | 179.73 | 0.942 | OK | - |
| | 24 | Agu | I | 0.576 | 0.746 | 0.746 | 0.668 | 0.498 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 14.720 | 0 | 0 | 14.720 | 179.27 | 0.667 | OK | - |

# **Tabel E. 77** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan September Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Sep | I | 15 | 25.165 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 26.525 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 15 | 25.165 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 26.879 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.749 | 2.267 | 2.267 | 1.000 | 2.267 | 2.319 |
| | 3 | Okt | I | 15 | 24.560 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 26.124 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.917 | 5.076 | 5.076 | 1.000 | 5.076 | 5.129 |
| | 4 | | II | 16 | 20.995 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 22.133 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 6.169 | 8.528 | 8.528 | 1.000 | 8.528 | 8.584 |
| | 5 | Nov | I | 15 | 13.549 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 14.674 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.062 | 3.968 | 3.968 | 1.000 | 3.968 | 4.021 |
| | 6 | | II | 15 | 10.653 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 13.909 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.251 | 4.213 | 4.213 | 1.000 | 4.213 | 4.266 |
| | 7 | Des | I | 15 | 9.643 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 12.718 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.221 | 1.583 | 1.583 | 1.000 | 1.583 | 1.635 |
| | 8 | | II | 16 | 11.083 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 15.653 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.082 | 0.113 | 0.113 | 1.000 | 0.113 | 0.169 |
| | 9 | Jan | I | 15 | 15.484 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 16.674 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 16 | 16.622 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 19.564 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.127 | 1.558 | 1.558 | 1.000 | 1.558 | 1.613 |
| | 11 | Feb | I | 15 | 17.951 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 23.399 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.724 | 2.234 | 2.234 | 1.000 | 2.234 | 2.286 |
| September | 12 | | II | 14 | 21.113 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 26.766 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 3.296 | 3.987 | 3.987 | 1.000 | 3.987 | 4.036 |
| Periode I | 13 | Mar | I | 15 | 22.730 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 23.538 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.820 | 2.359 | 2.359 | 1.000 | 2.359 | 2.411 |
| | 14 | | II | 16 | 21.127 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 21.633 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.576 | 2.178 | 2.178 | 1.000 | 2.178 | 2.234 |
| | 15 | Apr | I | 15 | 19.398 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 23.765 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.269 | 2.941 | 2.941 | 1.000 | 2.941 | 2.993 |
| | 16 | | II | 15 | 20.772 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 21.821 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.024 | 1.328 | 1.328 | 1.000 | 1.328 | 1.380 |
| | 17 | Mei | I | 15 | 20.441 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 23.340 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.690 | 0.894 | 0.894 | 1.000 | 0.894 | 0.946 |
| | 18 | | II | 16 | 22.394 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 24.830 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.791 | 1.094 | 1.094 | 1.000 | 1.094 | 1.149 |
| | 19 | Jun | I | 15 | 23.681 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 24.464 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.925 | 2.495 | 2.495 | 1.000 | 2.495 | 2.547 |
| | 20 | | II | 15 | 21.917 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 23.104 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.234 | 2.896 | 2.896 | 1.000 | 2.896 | 2.948 |
| | 21 | Jul | I | 15 | 20.156 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 20.470 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.604 | 3.375 | 3.375 | 1.000 | 3.375 | 3.427 |
| | 22 | | II | 16 | 17.043 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 17.489 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.200 | 3.042 | 3.042 | 1.000 | 3.042 | 3.097 |
| | 23 | Agu | I | 15 | 14.391 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 14.172 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.293 | 1.676 | 1.676 | 1.000 | 1.676 | 1.728 |
| | 24 | | II | 16 | 12.444 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 12.991 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.344 | 0.476 | 0.476 | 1.000 | 0.476 | 0.531 |

**Tabel E. 79** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan September Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | Release AB + IR - PLTMH 1 | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Sep | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.473 | 0 | 1.308 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.573 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.560 | 0 | 0 | 24.560 | 184.74 | 1.000 | OK | - |
| | 3 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.383 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.995 | 0 | 0 | 20.995 | 182.97 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 7.788 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 13.549 | 0 | 0 | 13.549 | 178.50 | 1.000 | OK | - |
| | 5 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.274 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 10.653 | 0 | 0 | 10.653 | 176.48 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.519 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 9.643 | 0 | 0 | 9.643 | 175.75 | 1.000 | OK | - |
| | 7 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.889 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 11.083 | 0 | 0 | 11.083 | 176.79 | 1.000 | OK | - |
| | 8 | | II | 0.576 | 0.796 | 0.796 | 0.212 | 0.169 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 15.484 | 0 | 0 | 15.484 | 179.76 | 0.553 | OK | - |
| | 9 | Jan | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 16.622 | 0 | 0 | 16.622 | 180.47 | 0.518 | OK | - |
| | 10 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.817 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 17.951 | 0 | 0 | 17.951 | 181.26 | 1.000 | OK | - |
| | 11 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.540 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.113 | 0 | 0 | 21.113 | 183.03 | 1.000 | OK | - |
| September Periode I | 12 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 3.340 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 22.730 | 0 | 0 | 22.730 | 183.86 | 1.000 | OK | - |
| | 13 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.665 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.127 | 0 | 0 | 21.127 | 183.04 | 1.000 | OK | - |
| | 14 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.438 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.398 | 0 | 0 | 19.398 | 182.09 | 1.000 | OK | - |
| | 15 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.247 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.772 | 0 | 0 | 20.772 | 182.85 | 1.000 | OK | - |
| | 16 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.634 | 0.576 | 0.746 | 0.746 | 0.849 | 0.634 | | 20.441 | 0 | 0 | 20.441 | 182.67 | 0.962 | OK | - |
| | 17 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.200 | 0.576 | 0.746 | 0.746 | 0.268 | 0.200 | | 22.394 | 0 | 0 | 22.394 | 183.69 | 0.817 | OK | - |
| | 18 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.353 | 0.576 | 0.796 | 0.796 | 0.444 | 0.353 | | 23.681 | 0 | 0 | 23.681 | 184.33 | 0.861 | OK | - |
| | 19 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.801 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.917 | 0 | 0 | 21.917 | 183.45 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.202 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.156 | 0 | 0 | 20.156 | 182.51 | 1.000 | OK | - |
| | 21 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.681 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.043 | 0 | 0 | 17.043 | 180.72 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.301 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 14.391 | 0 | 0 | 14.391 | 179.05 | 1.000 | OK | - |
| | 23 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.982 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 12.444 | 0 | 0 | 12.444 | 177.75 | 1.000 | OK | - |
| | 24 | | II | 0.576 | 0.796 | 0.796 | 0.668 | 0.531 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 12.460 | 0 | 0 | 12.460 | 177.76 | 0.667 | OK | - |

# **Tabel E. 81** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan September Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Sep | II | 15 | 25.165 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 26.879 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | Okt | I | 15 | 25.165 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 26.729 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.959 | 2.538 | 2.538 | 1.000 | 2.538 | 2.591 |
| | 3 | | II | 16 | 24.139 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 25.277 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.917 | 5.415 | 5.415 | 1.000 | 5.415 | 5.471 |
| | 4 | Nov | I | 15 | 19.806 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 20.931 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.097 | 4.014 | 4.014 | 1.000 | 4.014 | 4.066 |
| | 5 | | II | 15 | 16.865 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 20.121 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.062 | 3.968 | 3.968 | 1.000 | 3.968 | 4.021 |
| | 6 | Des | I | 15 | 16.100 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 19.175 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.855 | 3.700 | 3.700 | 1.000 | 3.700 | 3.752 |
| | 7 | | II | 16 | 15.423 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 19.994 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.650 | 0.898 | 0.898 | 1.000 | 0.898 | 0.954 |
| | 8 | Jan | I | 15 | 19.040 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 20.230 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.372 | 0.482 | 0.482 | 1.000 | 0.482 | 0.534 |
| | 9 | | II | 16 | 19.696 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 22.638 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 10 | Feb | I | 15 | 22.582 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 28.031 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.862 | 1.117 | 1.117 | 1.000 | 1.117 | 1.169 |
| | 11 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 2.198 | 2.658 | 2.658 | 1.000 | 2.658 | 2.707 |
| September Periode II | 12 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.334 | 4.321 | 4.321 | 1.000 | 4.321 | 4.373 |
| | 13 | | II | 16 | 21.601 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 22.106 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.601 | 2.213 | 2.213 | 1.000 | 2.213 | 2.268 |
| | 14 | Apr | I | 15 | 19.838 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 24.205 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.050 | 2.656 | 2.656 | 1.000 | 2.656 | 2.709 |
| | 15 | | II | 15 | 21.496 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 22.545 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.349 | 3.044 | 3.044 | 1.000 | 3.044 | 3.097 |
| | 16 | Mei | I | 15 | 19.448 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 22.347 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.215 | 1.574 | 1.574 | 1.000 | 1.574 | 1.627 |
| | 17 | | II | 16 | 20.720 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 23.157 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.706 | 0.976 | 0.976 | 1.000 | 0.976 | 1.032 |
| | 18 | Jun | I | 15 | 22.125 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 22.908 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.871 | 1.129 | 1.129 | 1.000 | 1.129 | 1.181 |
| | 19 | | II | 15 | 21.727 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 22.914 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.925 | 2.495 | 2.495 | 1.000 | 2.495 | 2.547 |
| | 20 | Jul | I | 15 | 20.366 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 20.680 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.553 | 3.308 | 3.308 | 1.000 | 3.308 | 3.360 |
| | 21 | | II | 16 | 17.320 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 17.766 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.604 | 3.600 | 3.600 | 1.000 | 3.600 | 3.655 |
| | 22 | Agu | I | 15 | 14.110 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 13.891 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.046 | 3.947 | 3.947 | 1.000 | 3.947 | 4.000 |
| | 23 | | II | 16 | 9.892 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 10.438 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.293 | 1.787 | 1.787 | 1.000 | 1.787 | 1.843 |
| | 24 | Sep | I | 15 | 8.595 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.955 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.331 | 0.429 | 0.429 | 1.000 | 0.429 | 0.481 |

**Tabel E. 83** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan September Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | Release AB + IR - PLTMH 1 | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_t \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Sep | II | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.826 | 0 | 1.661 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Okt | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.844 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.139 | 0 | 0 | 24.139 | 184.55 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 4.675 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.806 | 0 | 0 | 19.806 | 182.32 | 1.000 | OK | - |
| | 4 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.320 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.865 | 0 | 0 | 16.865 | 180.61 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.274 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.100 | 0 | 0 | 16.100 | 180.14 | 1.000 | OK | - |
| | 6 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.006 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 15.423 | 0 | 0 | 15.423 | 179.72 | 1.000 | OK | - |
| | 7 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.158 | 0.576 | 0.796 | 0.796 | 0.199 | 0.158 | | 19.040 | 0 | 0 | 19.040 | 181.89 | 0.800 | OK | - |
| | 8 | Jan | I | 0.576 | 0.746 | 0.746 | 0.716 | 0.534 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 19.696 | 0 | 0 | 19.696 | 182.26 | 0.679 | OK | - |
| | 9 | | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 22.582 | 0 | 0 | 22.582 | 183.79 | 0.518 | OK | - |
| | 10 | Feb | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.423 | 0.576 | 0.746 | 0.746 | 0.567 | 0.423 | | 26.861 | 0 | 1.696 | 25.165 | 185.02 | 0.892 | OK | MELIMPAS |
| | 11 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 2.010 | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | | 28.111 | 0 | 2.946 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| September Periode II | 12 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.627 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.601 | 0 | 0 | 21.601 | 183.28 | 1.000 | OK | - |
| | 13 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.472 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.838 | 0 | 0 | 19.838 | 182.34 | 1.000 | OK | - |
| | 14 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.962 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.496 | 0 | 0 | 21.496 | 183.23 | 1.000 | OK | - |
| | 15 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.350 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.448 | 0 | 0 | 19.448 | 182.12 | 1.000 | OK | - |
| | 16 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.880 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.720 | 0 | 0 | 20.720 | 182.82 | 1.000 | OK | - |
| | 17 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.236 | 0.576 | 0.796 | 0.796 | 0.297 | 0.236 | | 22.125 | 0 | 0 | 22.125 | 183.55 | 0.824 | OK | - |
| | 18 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.435 | 0.576 | 0.746 | 0.746 | 0.583 | 0.435 | | 21.727 | 0 | 0 | 21.727 | 183.35 | 0.896 | OK | - |
| | 19 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.801 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.366 | 0 | 0 | 20.366 | 182.63 | 1.000 | OK | - |
| | 20 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.614 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.320 | 0 | 0 | 17.320 | 180.89 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.860 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 14.110 | 0 | 0 | 14.110 | 178.87 | 1.000 | OK | - |
| | 22 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.253 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 9.892 | 0 | 0 | 9.892 | 175.93 | 1.000 | OK | - |
| | 23 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.047 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 8.595 | 0 | 0 | 8.595 | 174.96 | 1.000 | OK | - |
| | 24 | Sep | I | 0.576 | 0.746 | 0.746 | 0.644 | 0.481 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 9.474 | 0 | 0 | 9.474 | 175.62 | 0.661 | OK | - |

**Tabel E. 85** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Oktober Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Okt | I | 15 | 25.165 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 26.729 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 2 | | II | 16 | 25.165 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 26.303 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.959 | 2.707 | 2.707 | 1.000 | 2.707 | 2.763 |
| | 3 | Nov | I | 15 | 23.540 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 24.665 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.982 | 3.865 | 3.865 | 1.000 | 3.865 | 3.917 |
| | 4 | | II | 15 | 20.748 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 24.004 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 4.767 | 6.178 | 6.178 | 1.000 | 6.178 | 6.230 |
| | 5 | Des | I | 15 | 17.774 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 20.849 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.665 | 3.454 | 3.454 | 1.000 | 3.454 | 3.506 |
| | 6 | | II | 16 | 17.343 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 21.913 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.997 | 2.761 | 2.761 | 1.000 | 2.761 | 2.817 |
| | 7 | Jan | I | 15 | 19.096 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | 20.287 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.124 | 1.457 | 1.457 | 1.000 | 1.457 | 1.509 |
| | 8 | | II | 16 | 18.778 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 21.720 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.222 | 0.307 | 0.307 | 1.000 | 0.307 | 0.363 |
| | 9 | Feb | I | 15 | 21.357 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 26.805 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.052 |
| | 10 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 1.099 | 1.329 | 1.329 | 1.000 | 1.329 | 1.378 |
| | 11 | Mar | \ | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.222 | 2.880 | 2.880 | 1.000 | 2.880 | 2.933 |
| Oktober Periode I | 12 | | II | 16 | 23.041 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 23.546 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.114 | 4.305 | 4.305 | 1.000 | 4.305 | 4.361 |
| | 13 | Apr | I | 15 | 19.185 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 23.552 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.074 | 2.688 | 2.688 | 1.000 | 2.688 | 2.741 |
| | 14 | | II | 15 | 20.812 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 21.860 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.129 | 2.760 | 2.760 | 1.000 | 2.760 | 2.812 |
| | 15 | Mei | I | 15 | 19.049 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 21.947 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.664 | 3.453 | 3.453 | 1.000 | 3.453 | 3.505 |
| | 16 | | II | 16 | 18.442 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 20.879 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.248 | 1.725 | 1.725 | 1.000 | 1.725 | 1.781 |
| | 17 | Jun | I | 15 | 19.098 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 19.881 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.753 | 0.976 | 0.976 | 1.000 | 0.976 | 1.028 |
| | 18 | | II | 15 | 18.853 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 20.040 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.871 | 1.129 | 1.129 | 1.000 | 1.129 | 1.181 |
| | 19 | Jul | I | 15 | 18.859 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 19.173 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.186 | 2.833 | 2.833 | 1.000 | 2.833 | 2.885 |
| | 20 | | II | 16 | 16.288 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 16.734 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.553 | 3.529 | 3.529 | 1.000 | 3.529 | 3.584 |
| | 21 | Agu | I | 15 | 13.149 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 12.930 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.654 | 4.736 | 4.736 | 1.000 | 4.736 | 4.788 |
| | 22 | | II | 16 | 8.142 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 8.689 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.046 | 4.211 | 4.211 | 0.128 | 0.538 | 0.594 |
| | 23 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.218 | 1.578 | 1.578 | 0.829 | 1.308 | 1.360 |
| | 24 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.331 | 0.429 | 0.429 | 1.000 | 0.429 | 0.481 |

**Tabel E. 87** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Oktober Periode I

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | | PLTMH 2 | | | | | | | | | | | | | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | Release AB + IR - PLTMH 1 | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | $K_d \leq ST_t \leq K$ | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| Oktober Periode I | 1 | Okt | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.677 | 0 | 1.512 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.967 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 23.540 | 0 | 0 | 23.540 | 184.26 | 1.000 | OK | - |
| | 3 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.171 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.748 | 0 | 0 | 20.748 | 182.83 | 1.000 | OK | - |
| | 4 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 5.484 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.774 | 0 | 0 | 17.774 | 181.16 | 1.000 | OK | - |
| | 5 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.760 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.343 | 0 | 0 | 17.343 | 180.90 | 1.000 | OK | - |
| | 6 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.021 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.096 | 0 | 0 | 19.096 | 181.92 | 1.000 | OK | - |
| | 7 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.763 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.778 | 0 | 0 | 18.778 | 181.74 | 1.000 | OK | - |
| | 8 | | II | 0.576 | 0.796 | 0.796 | 0.456 | 0.363 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 21.357 | 0 | 0 | 21.357 | 183.16 | 0.614 | OK | - |
| | 9 | Feb | I | 0.576 | 0.746 | 0.746 | 0.070 | 0.052 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 26.753 | 0 | 1.588 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 10 | | II | 0.576 | 0.696 | 0.696 | 1.000 | 0.696 | 0.681 | 0.576 | 0.696 | 0.696 | 0.978 | 0.681 | | 29.440 | 0 | 4.275 | 25.165 | 185.02 | 0.995 | OK | MELIMPAS |
| | 11 | Mar | \ | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.186 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.041 | 0 | 0 | 23.041 | 184.02 | 1.000 | OK | - |
| | 12 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.565 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.185 | 0 | 0 | 19.185 | 181.97 | 1.000 | OK | - |
| | 13 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.994 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 20.812 | 0 | 0 | 20.812 | 182.87 | 1.000 | OK | - |
| | 14 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.066 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.049 | 0 | 0 | 19.049 | 181.90 | 1.000 | OK | - |
| | 15 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.759 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 18.442 | 0 | 0 | 18.442 | 181.55 | 1.000 | OK | - |
| | 16 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.985 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 19.098 | 0 | 0 | 19.098 | 181.92 | 1.000 | OK | - |
| | 17 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.282 | 0.576 | 0.746 | 0.746 | 0.378 | 0.282 | | 18.853 | 0 | 0 | 18.853 | 181.79 | 0.844 | OK | - |
| | 18 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.435 | 0.576 | 0.746 | 0.746 | 0.583 | 0.435 | | 18.859 | 0 | 0 | 18.859 | 181.79 | 0.896 | OK | - |
| | 19 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.139 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 16.288 | 0 | 0 | 16.288 | 180.26 | 1.000 | OK | - |
| | 20 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.788 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 13.149 | 0 | 0 | 13.149 | 178.23 | 1.000 | OK | - |
| | 21 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.042 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.142 | 0 | 0 | 8.142 | 174.61 | 1.000 | OK | - |
| | 22 | | II | 0.576 | 0.796 | 0.796 | 0.746 | 0.594 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.468 | OK | - |
| | 23 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.913 | OK | - |
| | 24 | | II | 0.576 | 0.746 | 0.746 | 0.644 | 0.481 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 9.328 | 0 | 0 | 9.328 | 175.51 | 0.661 | OK | - |

# **Tabel E. 89** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Oktober Periode II

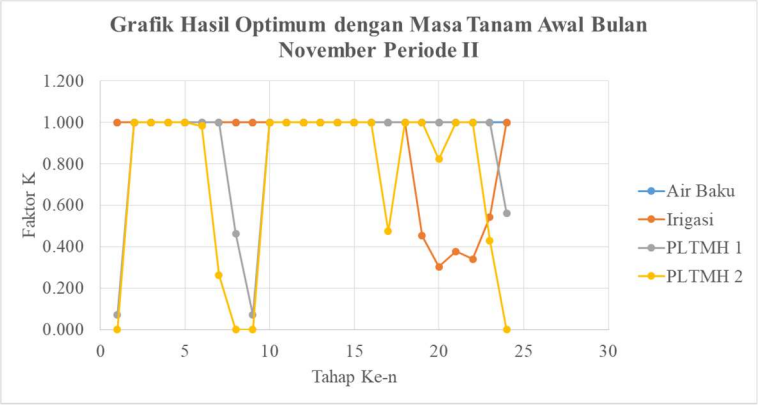
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Jumlah hari | STt | Qt | | PPt | $EV_t$ | | STt+Qt+PPt-Evt | Rt | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Air Baku | | | | | Irigasi | | | | | | Release AB + IR |
| | | | | | juta $m^3$ | $m^3$/dtk | juta $m^3$ | juta $m^3$ | mm/hari | juta $m^3$ | juta $m^3$ | juta $m^3$ | $m^3$/dtk | juta $m^3$ | Demand | k | Release AB | $m^3$/dtk | juta $m^3$ | Demand | k | Release IR | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 1 | Okt | II | 16 | 25.165 | 1.696 | 2.344 | 0.241 | 27.828 | 1.447 | 26.303 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.056 |
| | 2 | Nov | I | 15 | 25.165 | 1.302 | 1.688 | 0.009 | 11.719 | 0.571 | 26.290 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.491 | 1.932 | 1.932 | 1.000 | 1.932 | 1.985 |
| | 3 | | II | 15 | 24.306 | 2.549 | 3.303 | 0.524 | 11.719 | 0.571 | 27.561 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.982 | 3.865 | 3.865 | 1.000 | 3.865 | 3.917 |
| | 4 | Des | I | 15 | 23.645 | 2.489 | 3.225 | 0.400 | 11.290 | 0.550 | 26.720 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.700 | 3.499 | 3.499 | 1.000 | 3.499 | 3.551 |
| | 5 | | II | 16 | 23.169 | 3.273 | 4.525 | 0.632 | 11.290 | 0.587 | 27.739 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 1.808 | 2.499 | 2.499 | 1.000 | 2.499 | 2.554 |
| | 6 | Jan | I | 15 | 25.165 | 1.285 | 1.665 | 0.158 | 12.982 | 0.633 | **26.356** | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.551 | 3.306 | 3.306 | 1.000 | 3.306 | 3.358 |
| | 7 | | II | 16 | 22.998 | 2.295 | 3.172 | 0.445 | 12.982 | 0.675 | 25.940 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 0.825 | 1.140 | 1.140 | 1.000 | 1.140 | 1.196 |
| | 8 | Feb | I | 15 | 24.744 | 4.068 | 5.272 | 0.834 | 13.484 | 0.657 | 30.192 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | -0.056 | -0.072 | -0.072 | 1.000 | -0.072 | -0.020 |
| | 9 | | II | 14 | 25.165 | 4.478 | 5.417 | 0.850 | 13.484 | 0.614 | 30.818 | 0.040 | 0.049 | 0.049 | 1.000 | 0.049 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.049 |
| | 10 | Mar | I | 15 | 25.165 | 1.078 | 1.397 | 0.000 | 12.074 | 0.589 | 25.973 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.111 | 1.440 | 1.440 | 1.000 | 1.440 | 1.492 |
| | 11 | | II | 16 | 24.481 | 0.820 | 1.133 | 0.000 | 12.074 | 0.628 | 24.986 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.076 | 2.870 | 2.870 | 1.000 | 2.870 | 2.926 |
| Oktober Periode II | 12 | Apr | I | 15 | 22.060 | 3.384 | 4.386 | 0.648 | 13.668 | 0.666 | 26.428 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.656 | 4.738 | 4.738 | 1.000 | 4.738 | 4.790 |
| | 13 | | II | 15 | 21.637 | 1.304 | 1.690 | 0.025 | 13.668 | 0.666 | 22.686 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.154 | 2.792 | 2.792 | 1.000 | 2.792 | 2.844 |
| | 14 | Mei | I | 15 | 19.842 | 2.586 | 3.351 | 0.452 | 18.557 | 0.905 | 22.741 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.449 | 3.173 | 3.173 | 1.000 | 3.173 | 3.226 |
| | 15 | | II | 16 | 19.515 | 2.256 | 3.119 | 0.282 | 18.557 | 0.965 | 21.952 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.714 | 3.752 | 3.752 | 1.000 | 3.752 | 3.808 |
| | 16 | Jun | I | 15 | 18.144 | 1.095 | 1.419 | 0.029 | 13.647 | 0.665 | 18.928 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.376 | 1.784 | 1.784 | 1.000 | 1.784 | 1.836 |
| | 17 | | II | 15 | 17.092 | 1.288 | 1.669 | 0.183 | 13.647 | 0.665 | 18.278 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.753 | 0.976 | 0.976 | 1.000 | 0.976 | 1.028 |
| | 18 | Jul | I | 15 | 17.251 | 0.677 | 0.877 | 0.056 | 12.721 | 0.620 | 17.564 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.968 | 1.254 | 1.254 | 1.000 | 1.254 | 1.307 |
| | 19 | | II | 16 | 16.258 | 0.762 | 1.053 | 0.055 | 12.721 | 0.661 | 16.704 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 2.186 | 3.021 | 3.021 | 1.000 | 3.021 | 3.077 |
| | 20 | Agu | I | 15 | 13.627 | 0.385 | 0.499 | 0.023 | 15.200 | 0.741 | 13.408 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 3.577 | 4.636 | 4.636 | 1.000 | 4.636 | 4.688 |
| | 21 | | II | 16 | 8.720 | 0.942 | 1.302 | 0.036 | 15.200 | 0.790 | 9.266 | 0.040 | 0.056 | 0.056 | 1.000 | 0.056 | 3.654 | 5.052 | 5.052 | 0.221 | 1.116 | 1.171 |
| | 22 | Sep | I | 15 | 8.095 | 1.441 | 1.867 | 0.054 | 11.496 | 0.560 | 9.455 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 2.845 | 3.687 | 3.687 | 0.355 | 1.308 | 1.360 |
| | 23 | | II | 15 | 8.095 | 1.539 | 1.994 | 0.280 | 11.496 | 0.560 | 9.808 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 1.218 | 1.578 | 1.578 | 1.000 | 1.578 | 1.631 |
| | 24 | Okt | I | 15 | 8.178 | 2.007 | 2.602 | 0.319 | 27.828 | 1.357 | 9.742 | 0.040 | 0.052 | 0.052 | 1.000 | 0.052 | 0.370 | 0.479 | 0.479 | 1.000 | 0.479 | 0.532 |

**Tabel E. 91** Hasil Perhitungan Simulasi Teknik Optimasi untuk Waktu Awal Tanam Bulan Oktober Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Rt | | | | | | | | | | | | STt+1 | Defisit | Excess | STpakai | Elevasi muka air | k rata-rata | Constraint | Keterangan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PLTMH 1 | | | | | Release AB + IR - PLTMH 1 | PLTMH 2 | | | | | | | | | | | | $K_d \leq ST_1 \leq K$ | |
| | | | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 1 | | $m^3$/dtk | juta $m^3$ | Demand | k | Release PLTMH 2 | | juta $m^3$ | juta $m^3$ | juta $m^3$ | juta $m^3$ | | | | |
| 1 | 2 | 3 | 4 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 |
| | 1 | Okt | II | 0.576 | 0.796 | 0.796 | 0.070 | 0.056 | 0.000 | 0.576 | 0.796 | 0.796 | 0.000 | 0.000 | | 26.247 | 0 | 1.082 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 2 | Nov | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.238 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.306 | 0 | 0 | 24.306 | 184.63 | 1.000 | OK | - |
| | 3 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.171 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.645 | 0 | 0 | 23.645 | 184.31 | 1.000 | OK | - |
| | 4 | Des | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.805 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 23.169 | 0 | 0 | 23.169 | 184.08 | 1.000 | OK | - |
| | 5 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 1.759 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 25.184 | 0 | 0.019 | 25.165 | 185.02 | 1.000 | OK | MELIMPAS |
| | 6 | Jan | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.612 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 22.998 | 0 | 0 | 22.998 | 183.99 | 1.000 | OK | - |
| | 7 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.400 | 0.576 | 0.796 | 0.796 | 0.503 | 0.400 | | 24.744 | 0 | 0 | 24.744 | 184.83 | 0.876 | OK | - |
| | 8 | Feb | I | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | -0.020 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 30.212 | 0 | 5.047 | 25.165 | 185.02 | 0.500 | OK | MELIMPAS |
| | 9 | | II | 0.576 | 0.696 | 0.696 | 0.070 | 0.049 | 0.000 | 0.576 | 0.696 | 0.696 | 0.000 | 0.000 | | 30.769 | 0 | 5.604 | 25.165 | 185.02 | 0.518 | OK | MELIMPAS |
| | 10 | Mar | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.746 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 24.481 | 0 | 0 | 24.481 | 184.71 | 1.000 | OK | - |
| | 11 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.130 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 22.060 | 0 | 0 | 22.060 | 183.52 | 1.000 | OK | - |
| Oktober Periode II | 12 | Apr | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 4.044 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 21.637 | 0 | 0 | 21.637 | 183.30 | 1.000 | OK | - |
| | 13 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.098 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.842 | 0 | 0 | 19.842 | 182.34 | 1.000 | OK | - |
| | 14 | Mei | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 2.479 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 19.515 | 0 | 0 | 19.515 | 182.16 | 1.000 | OK | - |
| | 15 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 3.012 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 18.144 | 0 | 0 | 18.144 | 181.38 | 1.000 | OK | - |
| | 16 | Jun | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 1.090 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 17.092 | 0 | 0 | 17.092 | 180.75 | 1.000 | OK | - |
| | 17 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.282 | 0.576 | 0.746 | 0.746 | 0.378 | 0.282 | | 17.251 | 0 | 0 | 17.251 | 180.85 | 0.844 | OK | - |
| | 18 | Jul | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.560 | 0.576 | 0.746 | 0.746 | 0.751 | 0.560 | | 16.258 | 0 | 0 | 16.258 | 180.24 | 0.938 | OK | - |
| | 19 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 2.281 | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | | 13.627 | 0 | 0 | 13.627 | 178.55 | 1.000 | OK | - |
| | 20 | Agu | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 3.942 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.720 | 0 | 0 | 8.720 | 175.05 | 1.000 | OK | - |
| | 21 | | II | 0.576 | 0.796 | 0.796 | 1.000 | 0.796 | 0.375 | 0.576 | 0.796 | 0.796 | 0.472 | 0.375 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.673 | OK | - |
| | 22 | Sep | I | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.614 | 0.576 | 0.746 | 0.746 | 0.823 | 0.614 | | 8.095 | 0 | 0 | 8.095 | 174.58 | 0.794 | OK | - |
| | 23 | | II | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | 0.885 | 0.576 | 0.746 | 0.746 | 1.000 | 0.746 | | 8.178 | 0 | 0 | 8.178 | 174.64 | 1.000 | OK | - |
| | 24 | Okt | I | 0.576 | 0.746 | 0.746 | 0.712 | 0.532 | 0.000 | 0.576 | 0.746 | 0.746 | 0.000 | 0.000 | | 9.210 | 0 | 0 | 9.210 | 175.42 | 0.678 | OK | - |

**Tabel E. 93** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan November Periode II

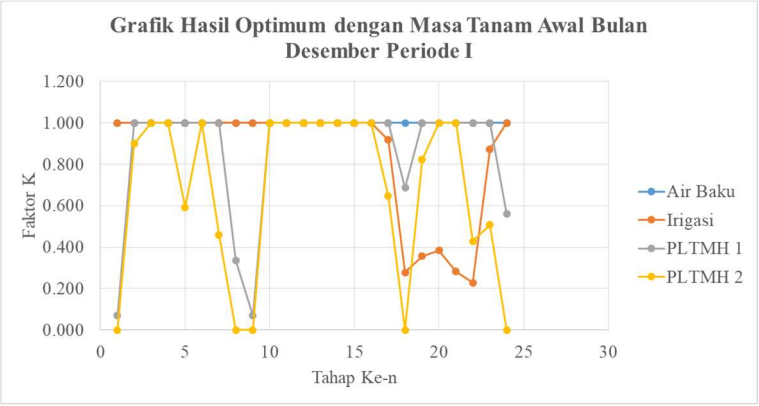
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| November Periode II | 1 | Nov | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | Des | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 4 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 6 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 0.982 | 16211.18 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 19725.57 | 0.263 | 4053.56 |
| | 8 | Mar | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.464 | 9806.04 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 10 | Apr | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 14 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | Jul | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.475 | 8361.59 |
| | 18 | Agu | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 19 | | II | 1.000 | 0.040 | 0.452 | 677.628 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 20 | Sep | I | 1.000 | 0.040 | 0.303 | 454.071 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 21 | | II | 1.000 | 0.040 | 0.376 | 564.708 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | Okt | I | 1.000 | 0.040 | 0.339 | 509.207 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 0.544 | 544.045 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 24 | Nov | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.561 | 11860.51 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.876** | | **0.882** | | **0.749** | |




**Gambar E. 1** Grafik Hasil Untuk Waktu Awal Tanam Bulan November Periode II

**Tabel E. 94** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Desember Periode I

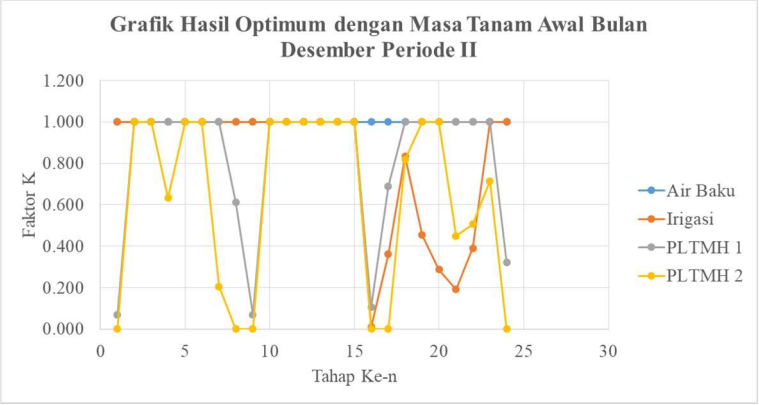
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Desember Periode I | 1 | Des | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 0.899 | 15834.59 |
| | 3 | Jan | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 5 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 0.592 | 9781.44 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 7 | Mar | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.460 | 7598.73 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.337 | 7596.78 | 0.000 | 0.00 |
| | 9 | Apr | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | Mei | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 13 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 17 | Agu | I | 1.000 | 0.040 | 0.918 | 917.683 | 1.000 | 21134.54 | 0.646 | 10667.68 |
| | 18 | | II | 1.000 | 0.040 | 0.278 | 277.844 | 0.687 | 15483.97 | 0.000 | 0.00 |
| | 19 | Sep | I | 1.000 | 0.040 | 0.357 | 535.892 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 20 | | II | 1.000 | 0.040 | 0.385 | 576.779 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | Okt | I | 1.000 | 0.040 | 0.282 | 422.709 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 0.228 | 341.633 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 23 | Nov | I | 1.000 | 0.040 | 0.874 | 874.003 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.561 | 11860.51 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.847** | | **0.864** | | **0.682** | |




**Gambar E. 2** Grafik Hasil Untuk Waktu Awal Tanam Bulan Desember Periode I

**Tabel E. 95** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Desember Periode II

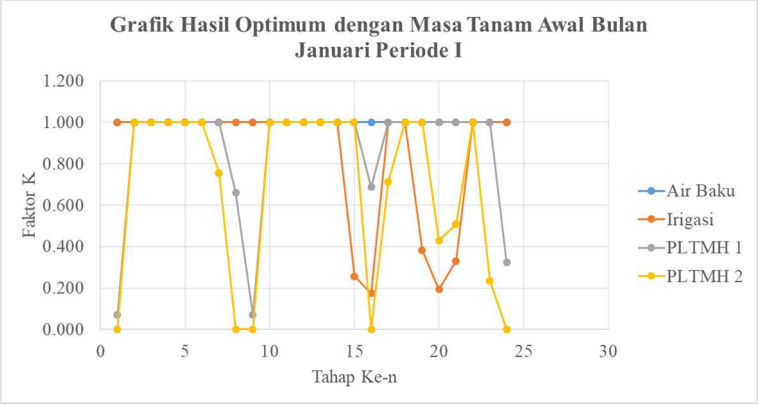
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Desember Periode II | 1 | Des | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | Jan | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 0.633 | 11143.01 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.206 | 3404.89 |
| | 8 | Apr | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.613 | 13824.57 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | Mei | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | Agu | I | 1.000 | 0.040 | 0.010 | 9.983 | 0.105 | 2372.05 | 0.000 | 0.00 |
| | 17 | | II | 1.000 | 0.040 | 0.361 | 360.873 | 0.690 | 14579.16 | 0.000 | 0.00 |
| | 18 | Sep | I | 1.000 | 0.040 | 0.836 | 835.695 | 1.000 | 22543.51 | 0.818 | 14408.55 |
| | 19 | | II | 1.000 | 0.040 | 0.454 | 680.711 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | Okt | I | 1.000 | 0.040 | 0.288 | 432.050 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 0.192 | 287.810 | 1.000 | 21134.54 | 0.450 | 7422.65 |
| | 22 | Nov | I | 1.000 | 0.040 | 0.390 | 585.744 | 1.000 | 22543.51 | 0.507 | 8931.33 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.715 | 11807.67 |
| | 24 | Des | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.323 | 6834.58 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.814** | | **0.828** | | **0.639** | |




**Gambar E. 3** Grafik Hasil Untuk Waktu Awal Tanam Bulan Desember Periode II

**Tabel E. 96** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Januari Periode I

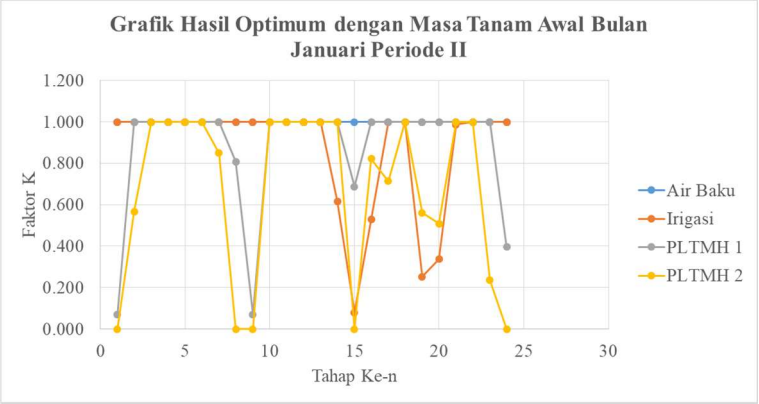
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Januari Periode I | 1 | Jan | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 3 | Feb | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 5 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 7 | Apr | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.757 | 12497.27 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.659 | 13936.55 | 0.000 | 0.00 |
| | 9 | Mei | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 11 | Jun | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 15 | Agu | I | 1.000 | 0.040 | 0.256 | 384.547 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 0.175 | 175.178 | 0.687 | 15483.97 | 0.000 | 0.00 |
| | 17 | Sep | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.713 | 11774.61 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 19 | Okt | I | 1.000 | 0.040 | 0.383 | 574.777 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 0.193 | 289.867 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 21 | Nov | I | 1.000 | 0.040 | 0.331 | 496.140 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | Des | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.236 | 3890.87 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.323 | 7290.21 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.847** | | **0.867** | | **0.693** | |




**Gambar E. 4** Grafik Hasil Untuk Waktu Awal Tanam Bulan Januari Periode I

**Tabel E. 97** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Januari Periode II

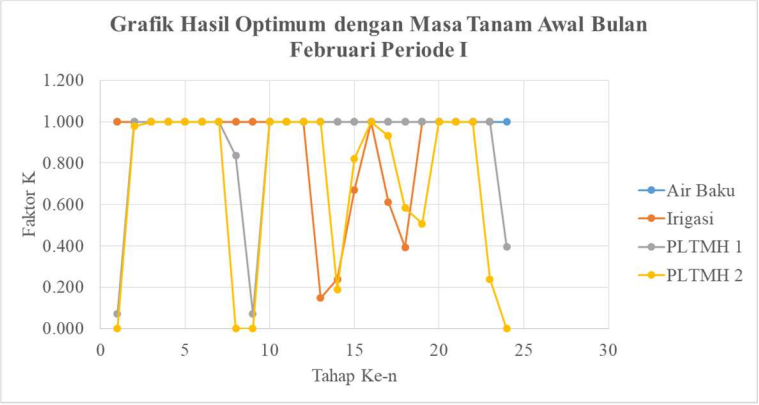
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Januari Periode II | 1 | Jan | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 2 | Feb | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 0.567 | 9363.08 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 4 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 6 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.849 | 14022.30 |
| | 8 | Mei | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.808 | 17069.12 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 10 | Jun | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 14 | Agu | I | 1.000 | 0.040 | 0.616 | 924.490 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 0.079 | 118.470 | 0.687 | 15483.97 | 0.000 | 0.00 |
| | 16 | Sep | I | 1.000 | 0.040 | 0.529 | 528.533 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.713 | 11774.61 |
| | 18 | Okt | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 19 | | II | 1.000 | 0.040 | 0.252 | 377.480 | 1.000 | 22543.51 | 0.561 | 9877.26 |
| | 20 | Nov | I | 1.000 | 0.040 | 0.337 | 506.020 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 21 | | II | 1.000 | 0.040 | 0.988 | 1481.271 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | Des | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.236 | 4150.26 |
| | 24 | Jan | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.396 | 8378.31 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.867** | | **0.876** | | **0.677** | |




**Gambar E. 5** Grafik Hasil Untuk Waktu Awal Tanam Bulan Januari Periode II

**Tabel E. 98** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Februari Periode I

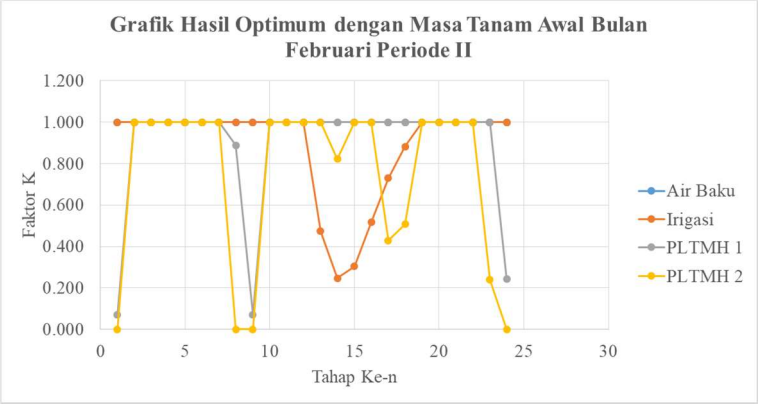
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Februari Periode I | 1 | Feb | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 19725.57 | 0.978 | 15077.29 |
| | 3 | Mar | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 5 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | Mei | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.837 | 18857.75 | 0.000 | 0.00 |
| | 9 | Jun | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | Jul | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 13 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 0.147 | 221.147 | 1.000 | 22543.51 | 0.189 | 3322.85 |
| | 15 | Sep | I | 1.000 | 0.040 | 0.239 | 358.133 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 16 | | II | 1.000 | 0.040 | 0.671 | 671.363 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | Okt | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.932 | 15386.77 |
| | 18 | | II | 1.000 | 0.040 | 0.613 | 612.930 | 1.000 | 22543.51 | 0.583 | 10273.76 |
| | 19 | Nov | I | 1.000 | 0.040 | 0.393 | 589.933 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | Des | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 23 | Jan | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.239 | 3945.98 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.396 | 8936.86 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.878** | | **0.891** | | **0.719** | |




**Gambar E. 6** Grafik Hasil Untuk Waktu Awal Tanam Bulan Februari Periode I

**Tabel E. 99** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Februari Periode II

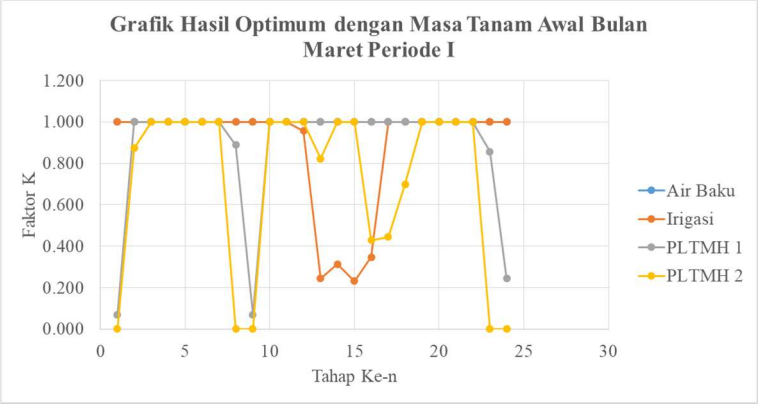
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Februari Periode II | 1 | Feb | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1382.20 | 0.000 | 0.00 |
| | 2 | Mar | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 4 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 8 | Jun | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.889 | 18796.85 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | Jul | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 12 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 0.474 | 710.369 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 14 | Sep | I | 1.000 | 0.040 | 0.247 | 370.504 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 15 | | II | 1.000 | 0.040 | 0.303 | 454.914 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | Okt | I | 1.000 | 0.040 | 0.517 | 516.939 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | | II | 1.000 | 0.040 | 0.730 | 730.092 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 18 | Nov | I | 1.000 | 0.040 | 0.883 | 882.678 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | Des | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 22 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.239 | 4209.05 |
| | 24 | Feb | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.243 | 5139.70 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.881** | | **0.886** | | **0.750** | |




**Gambar E. 7** Grafik Hasil Untuk Waktu Awal Tanam Bulan Februari Periode II

**Tabel E. 100** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Maret Periode I

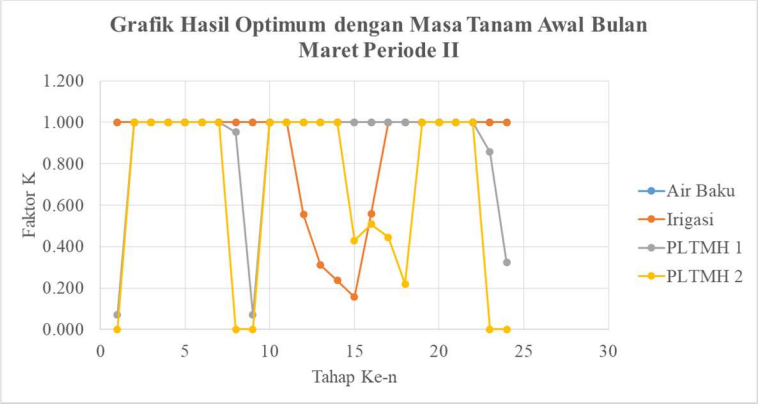
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Maret Periode I | 1 | Mar | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 0.873 | 15375.91 |
| | 3 | Apr | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 7 | Jun | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.889 | 18796.85 | 0.000 | 0.00 |
| | 9 | Jul | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 11 | Agu | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 0.956 | 1434.638 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 13 | Sep | I | 1.000 | 0.040 | 0.244 | 365.945 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 14 | | II | 1.000 | 0.040 | 0.314 | 470.628 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | Okt | I | 1.000 | 0.040 | 0.232 | 348.488 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 0.347 | 346.820 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 17 | Nov | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.445 | 7342.31 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.699 | 11540.75 |
| | 19 | Des | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 21 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 23 | Feb | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.857 | 18106.71 | 0.000 | 0.00 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.243 | 4797.05 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.879** | | **0.880** | | **0.720** | |




**Gambar E. 8** Grafik Hasil Untuk Waktu Awal Tanam Bulan Maret Periode I

**Tabel E. 101** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Maret Periode II

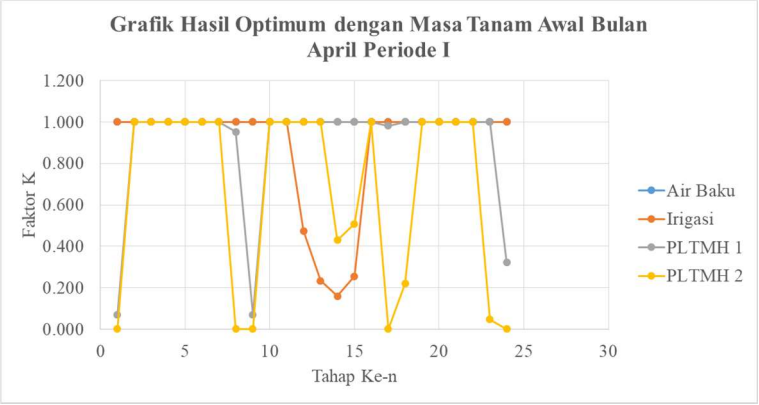
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Maret Periode II | 1 | Mar | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 2 | Apr | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 6 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | Jul | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.953 | 20142.57 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 10 | Agu | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 12 | Sep | I | 1.000 | 0.040 | 0.555 | 832.482 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 0.310 | 464.837 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | Okt | I | 1.000 | 0.040 | 0.237 | 355.715 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 0.156 | 233.804 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 16 | Nov | I | 1.000 | 0.040 | 0.558 | 558.298 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.445 | 7342.31 |
| | 18 | Des | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.220 | 3625.50 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 20 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 22 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 0.857 | 16899.59 | 0.000 | 0.00 |
| | 24 | Mar | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.323 | 6827.85 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.867** | | **0.886** | | **0.692** | |




**Gambar E. 9** Grafik Hasil Untuk Waktu Awal Tanam Bulan Maret Periode II

**Tabel E. 102** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan April Periode I

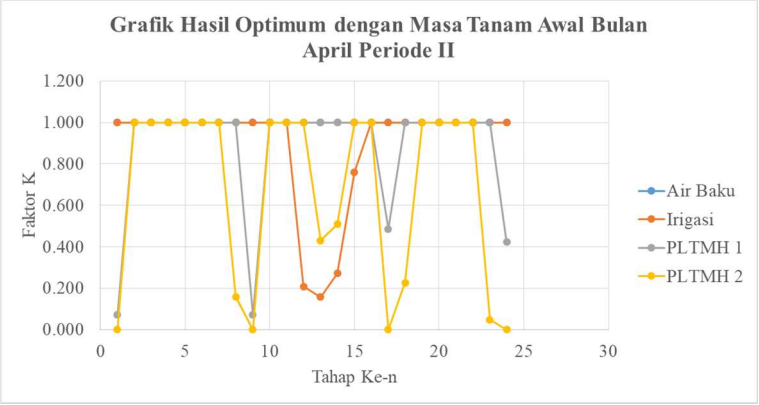
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| April Periode I | 1 | Apr | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | Mei | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 5 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | Jul | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.953 | 21485.41 | 0.000 | 0.00 |
| | 9 | Agu | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 11 | Sep | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 0.474 | 710.837 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | Okt | I | 1.000 | 0.040 | 0.234 | 351.152 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 0.159 | 238.654 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 15 | Nov | I | 1.000 | 0.040 | 0.255 | 381.963 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | Des | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.982 | 20759.89 | 0.000 | 0.00 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.220 | 3867.20 |
| | 19 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 21 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 23 | Mar | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.046 | 766.84 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.323 | 7283.04 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.880** | | **0.892** | | **0.675** | |




**Gambar E. 10** Grafik Hasil Untuk Waktu Awal Tanam Bulan April Periode I

**Tabel E. 103** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan April Periode II

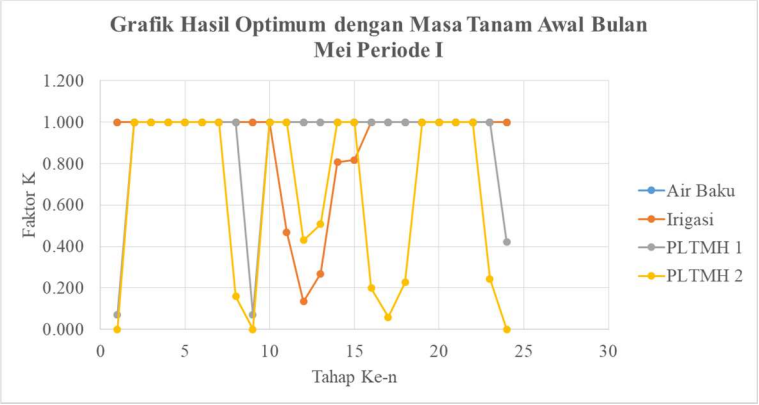
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| April Periode II | 1 | Apr | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | Mei | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 4 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 8 | Agu | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 0.158 | 2607.59 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 10 | Sep | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | Okt | I | 1.000 | 0.040 | 0.207 | 310.480 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 0.157 | 235.592 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 14 | Nov | I | 1.000 | 0.040 | 0.270 | 405.550 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 15 | | II | 1.000 | 0.040 | 0.760 | 1140.384 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | Des | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 0.486 | 10952.19 | 0.000 | 0.00 |
| | 18 | Jan | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.226 | 3738.10 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 20 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 22 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.046 | 817.97 |
| | 24 | Apr | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.422 | 8925.95 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.891** | | **0.877** | | **0.682** | |




**Gambar E. 11** Grafik Hasil Untuk Waktu Awal Tanam Bulan April Periode II

**Tabel E. 104** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Mei Periode I

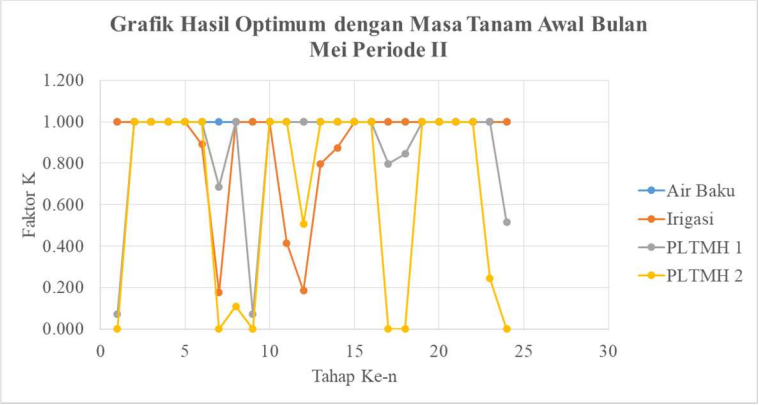
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Mei Periode I | 1 | Mei | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 3 | Jun | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 7 | Agu | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 0.158 | 2781.43 |
| | 9 | Sep | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | Okt | I | 1.000 | 0.040 | 0.469 | 469.270 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 0.133 | 199.814 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 13 | Nov | I | 1.000 | 0.040 | 0.267 | 400.979 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 14 | | II | 1.000 | 0.040 | 0.807 | 1210.805 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | Des | I | 1.000 | 0.040 | 0.817 | 1225.558 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.199 | 3496.91 |
| | 17 | Jan | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.058 | 953.54 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.226 | 3987.31 |
| | 19 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 21 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 23 | Apr | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.244 | 4021.43 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.422 | 8925.95 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.896** | | **0.898** | | **0.659** | |




**Gambar E. 12** Grafik Hasil Untuk Waktu Awal Tanam Bulan Mei Periode I

**Tabel E. 105** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Mei Periode II

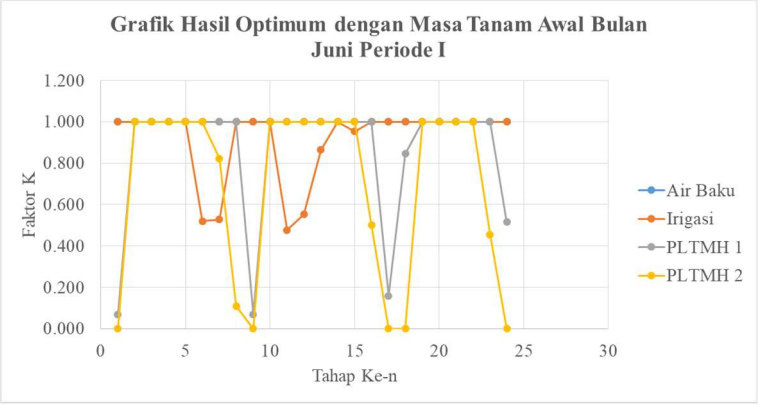
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Mei Periode II | 1 | Mei | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 2 | Jun | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 6 | Agu | I | 1.000 | 0.040 | 0.892 | 1338.625 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 0.175 | 175.178 | 0.687 | 15483.97 | 0.000 | 0.00 |
| | 8 | Sep | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 0.109 | 1803.53 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | Okt | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 0.415 | 415.364 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 12 | Nov | I | 1.000 | 0.040 | 0.185 | 277.628 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 13 | | II | 1.000 | 0.040 | 0.798 | 1197.158 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | Des | I | 1.000 | 0.040 | 0.875 | 1312.791 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 16 | Jan | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 0.798 | 17989.30 | 0.000 | 0.00 |
| | 18 | Feb | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.846 | 17879.68 | 0.000 | 0.00 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 20 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 22 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.244 | 4021.43 |
| | 24 | Mei | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.515 | 10890.92 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.889** | | **0.874** | | **0.661** | |




**Gambar E. 13** Grafik Hasil Untuk Waktu Awal Tanam Bulan Mei Periode II

**Tabel E. 106** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Juni Periode I

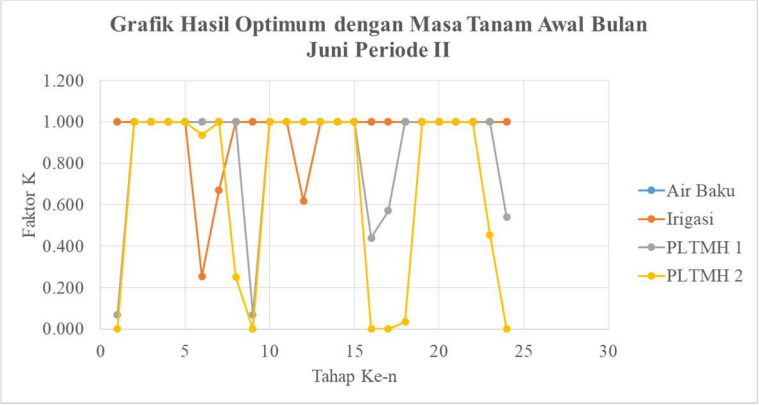
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Juni Periode I | 1 | Jun | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | Jul | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 5 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 0.521 | 780.824 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 7 | Sep | I | 1.000 | 0.040 | 0.529 | 528.533 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 0.109 | 1803.53 |
| | 9 | Okt | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 11 | Nov | I | 1.000 | 0.040 | 0.477 | 477.432 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 0.553 | 828.883 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | Des | I | 1.000 | 0.040 | 0.864 | 1295.917 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 15 | Jan | I | 1.000 | 0.040 | 0.954 | 1431.071 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.503 | 8853.54 |
| | 17 | Feb | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.160 | 3377.66 | 0.000 | 0.00 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 0.846 | 16687.70 | 0.000 | 0.00 |
| | 19 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 21 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | Mei | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.456 | 7532.07 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.515 | 11616.98 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.912** | | **0.861** | | **0.704** | |




**Gambar E. 14** Grafik Hasil Untuk Waktu Awal Tanam Bulan Juni Periode I

**Tabel E. 107** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Juni Periode II

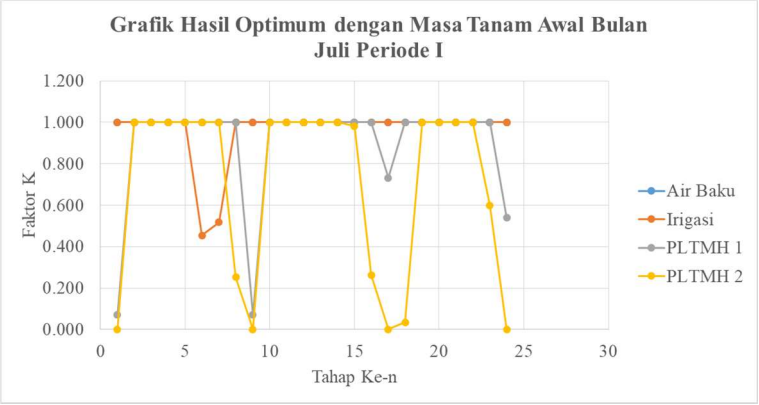
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Juni Periode II | 1 | Jun | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | Jul | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 4 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 6 | Sep | I | 1.000 | 0.040 | 0.254 | 381.486 | 1.000 | 21134.54 | 0.937 | 15468.99 |
| | 7 | | II | 1.000 | 0.040 | 0.671 | 671.363 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | Okt | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 0.253 | 4170.12 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 10 | Nov | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | Des | I | 1.000 | 0.040 | 0.617 | 925.959 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 14 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 16 | Feb | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.440 | 9308.36 | 0.000 | 0.00 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 0.571 | 11265.65 | 0.000 | 0.00 |
| | 18 | Mar | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.035 | 577.41 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 20 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.456 | 8034.21 |
| | 24 | Jun | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.540 | 11420.37 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.939** | | **0.862** | | **0.695** | |




**Gambar E. 15** Grafik Hasil Untuk Waktu Awal Tanam Bulan Juni Periode II

**Tabel E. 108** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Juli Periode I

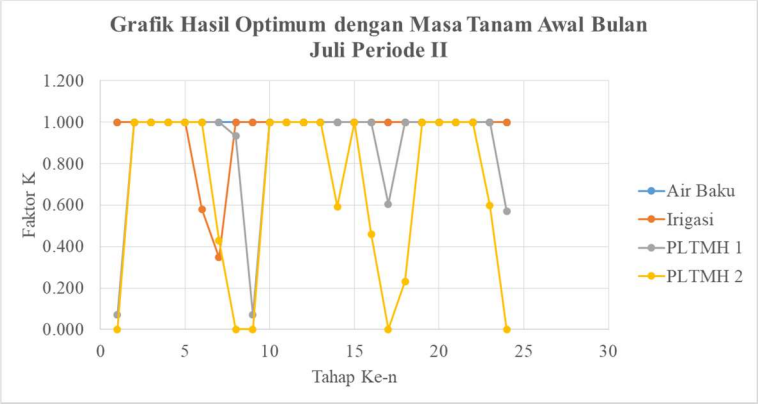
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Juli Periode I | 1 | Jul | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 3 | Agu | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 5 | Sep | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 0.454 | 680.568 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | Okt | I | 1.000 | 0.040 | 0.517 | 516.939 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 0.253 | 4448.12 |
| | 9 | Nov | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | Des | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 13 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 15 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 0.982 | 16211.18 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 19725.57 | 0.263 | 4053.56 |
| | 17 | Mar | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.731 | 15456.05 | 0.000 | 0.00 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.035 | 615.91 |
| | 19 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 23 | Jun | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.598 | 9866.77 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.540 | 11420.37 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.957** | | **0.892** | | **0.714** | |




**Gambar E. 16** Grafik Hasil Untuk Waktu Awal Tanam Bulan Juli Periode I

**Tabel E. 109** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Juli Periode II

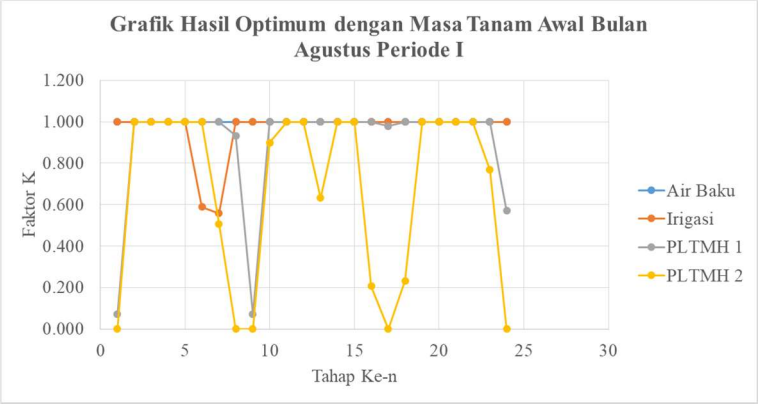
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Juli Periode II | 1 | Jul | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 2 | Agu | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 4 | Sep | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | Okt | I | 1.000 | 0.040 | 0.581 | 871.178 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 0.347 | 346.820 | 1.000 | 22543.51 | 0.429 | 7562.12 |
| | 8 | Nov | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.933 | 19726.04 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | Des | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 12 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 14 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 0.592 | 9781.44 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 16 | Mar | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.460 | 7598.73 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 0.604 | 13623.46 | 0.000 | 0.00 |
| | 18 | Apr | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.232 | 3832.58 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 22 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.598 | 9866.77 |
| | 24 | Jul | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.571 | 12057.81 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.955** | | **0.885** | | **0.680** | |




**Gambar E. 17** Grafik Hasil Untuk Waktu Awal Tanam Bulan Juli Periode II

**Tabel E. 110** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Agustus Periode I

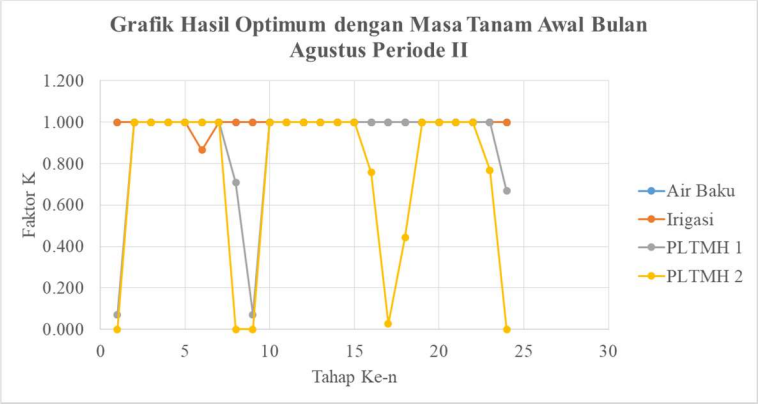
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Agustus Periode I | 1 | Agu | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 3 | Sep | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | Okt | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 0.589 | 882.886 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 7 | Nov | I | 1.000 | 0.040 | 0.558 | 558.298 | 1.000 | 21134.54 | 0.508 | 8385.34 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.933 | 19726.04 | 0.000 | 0.00 |
| | 9 | Des | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 0.899 | 15834.59 |
| | 11 | Jan | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 13 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 0.633 | 10446.57 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 15 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.206 | 3631.88 |
| | 17 | Apr | I | 1.000 | 0.040 | 1.000 | 1000.000 | 0.980 | 20707.72 | 0.000 | 0.00 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.232 | 3832.58 |
| | 19 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 21 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | Jul | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.768 | 12677.72 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.571 | 12861.67 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.964** | | **0.901** | | **0.677** | |




**Gambar E. 18** Grafik Hasil Untuk Waktu Awal Tanam Bulan Agustus Periode I

**Tabel E. 111** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Agustus Periode II

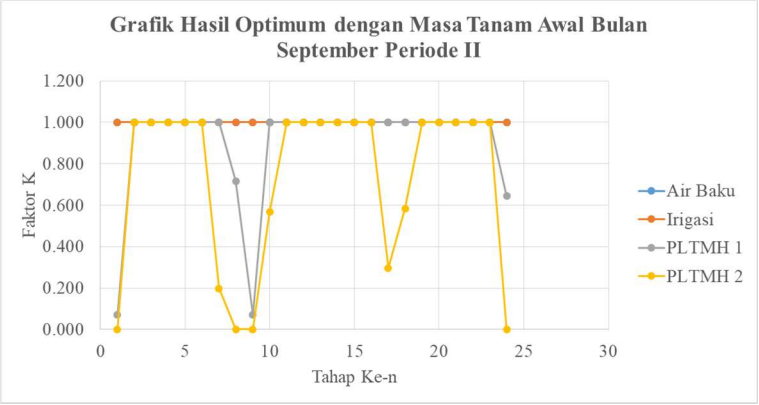
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Agustus Periode II | 1 | Agu | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 2 | Sep | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | Okt | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 6 | Nov | I | 1.000 | 0.040 | 0.866 | 1298.274 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | Des | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.709 | 14981.65 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 10 | Jan | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 12 | Feb | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 14 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 16 | Apr | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.757 | 12497.27 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.026 | 429.06 |
| | 18 | Mei | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.444 | 7332.47 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 20 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.768 | 13522.91 |
| | 24 | Agu | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.668 | 14108.72 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **0.994** | | **0.897** | | **0.750** | |




**Gambar E. 19** Grafik Hasil Untuk Waktu Awal Tanam Bulan Agustus Periode II

**Tabel E. 112** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan September Periode I

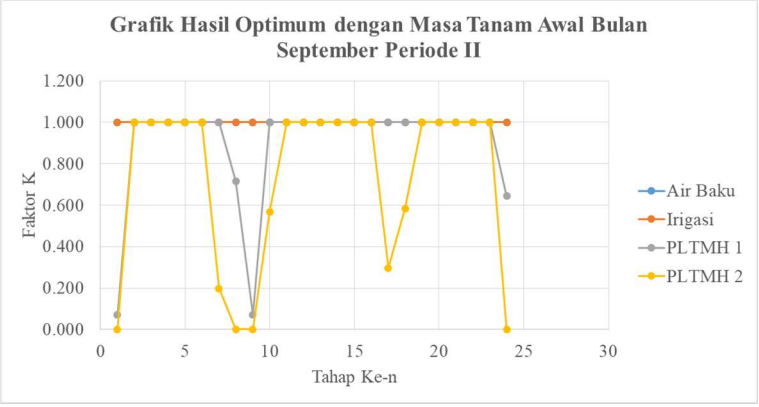
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| September Periode I | 1 | Sep | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | Okt | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 5 | Nov | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | Des | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.212 | 4788.74 | 0.000 | 0.00 |
| | 9 | Jan | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 11 | Feb | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 13 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 15 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.849 | 14022.30 |
| | 17 | Mei | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.268 | 4424.94 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.444 | 7821.31 |
| | 19 | Jun | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 23 | Agu | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.668 | 15049.30 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **1.000** | | **0.876** | | **0.773** | |




**Gambar E. 20** Grafik Hasil Untuk Waktu Awal Tanam Bulan September Periode I

**Tabel E. 113** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan September Periode II

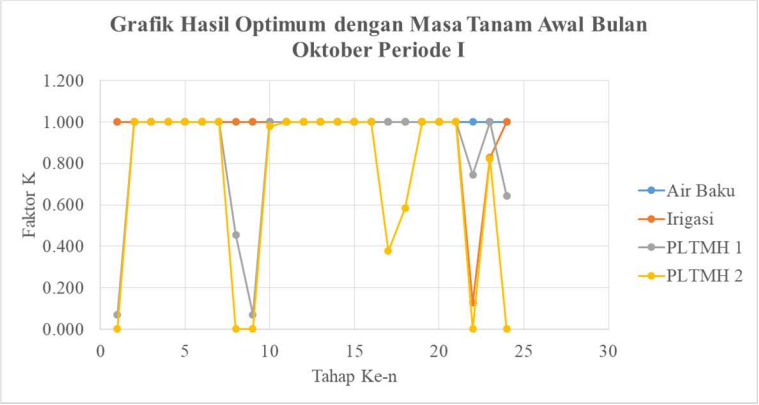
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| September Periode II | 1 | Sep | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | Okt | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 4 | Nov | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | Des | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.199 | 3496.91 |
| | 8 | Jan | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.716 | 15125.09 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 10 | Feb | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 0.567 | 9363.08 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 19725.57 | 1.000 | 15410.61 |
| | 12 | Mar | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 14 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | Mei | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.297 | 5228.28 |
| | 18 | Jun | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.583 | 9630.41 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 22 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 24 | Sep | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.644 | 13621.20 | 0.000 | 0.00 |
| Rerata Faktor K | | | | **1.000** | | **1.000** | | **0.896** | | **0.735** | |




**Gambar E. 21** Grafik Hasil Untuk Waktu Awal Tanam Bulan September Periode II

**Tabel E. 114** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Oktober Periode I

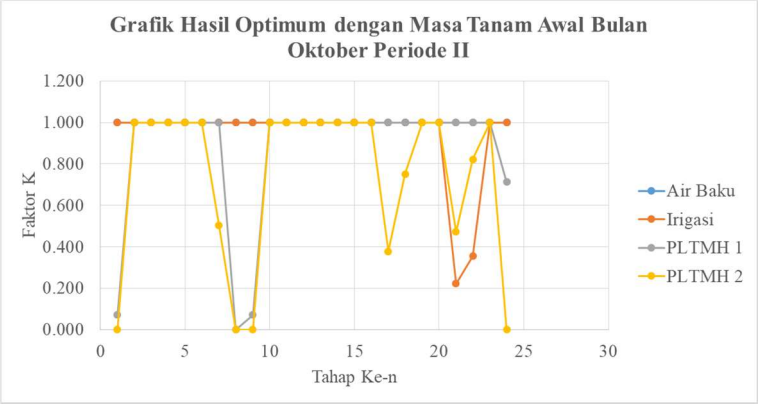
| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3/dtk$ | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Oktober Periode I | 1 | Okt | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 2 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 3 | Nov | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | Des | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 6 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 7 | Jan | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 8 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.456 | 10277.31 | 0.000 | 0.00 |
| | 9 | Feb | I | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1480.93 | 0.000 | 0.00 |
| | 10 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 19725.57 | 0.978 | 15077.29 |
| | 11 | Mar | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 12 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 13 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 16 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 17 | Jun | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.378 | 6234.32 |
| | 18 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.583 | 9630.41 |
| | 19 | Jul | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 20 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 21 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 22 | | II | 1.000 | 0.040 | 0.128 | 191.587 | 0.746 | 16811.15 | 0.000 | 0.00 |
| | 23 | Sep | I | 1.000 | 0.040 | 0.829 | 828.503 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 24 | | II | 1.000 | 0.040 | 1.000 | 500.000 | 0.644 | 13621.20 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.957** | | **0.874** | | **0.740** | |




**Gambar E. 22** Grafik Hasil Untuk Waktu Awal Tanam Bulan Oktober Periode I

**Tabel E. 115** Hasil Optimum Simulasi Teknik Optimasi Waktu Awal Tanam Bulan Oktober Periode II

| Waktu Tanam Awal | *Stage* (Tahap) | Bulan | Periode | Hasil Optimum | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Air Baku | | Irigasi | | PLTMH 1 | | PLTMH 2 | |
| | | | | Faktor k | $m^3$/dtk | Faktor k | ha | Faktor k | kWh | Faktor k | kWh |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Oktober Periode II | 1 | Okt | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1579.66 | 0.000 | 0.00 |
| | 2 | Nov | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 3 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 4 | Des | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 5 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 6 | Jan | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 7 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 0.503 | 8853.54 |
| | 8 | Feb | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.000 | 0.00 | 0.000 | 0.00 |
| | 9 | | II | 1.000 | 0.040 | 1.000 | 0 | 0.070 | 1382.20 | 0.000 | 0.00 |
| | 10 | Mar | I | 1.000 | 0.040 | 1.000 | 500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 11 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 12 | Apr | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 13 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 14 | Mei | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 15 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 16 | Jun | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 17 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.378 | 6234.32 |
| | 18 | Jul | I | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 0.751 | 12397.10 |
| | 19 | | II | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 22543.51 | 1.000 | 17612.12 |
| | 20 | Agu | I | 1.000 | 0.040 | 1.000 | 1500.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 21 | | II | 1.000 | 0.040 | 0.221 | 331.249 | 1.000 | 22543.51 | 0.472 | 8306.69 |
| | 22 | Sep | I | 1.000 | 0.040 | 0.355 | 532.057 | 1.000 | 21134.54 | 0.823 | 13582.10 |
| | 23 | | II | 1.000 | 0.040 | 1.000 | 1000.000 | 1.000 | 21134.54 | 1.000 | 16511.36 |
| | 24 | Okt | I | 1.000 | 0.040 | 1.000 | 500.000 | 0.712 | 15056.10 | 0.000 | 0.00 |
| **Rerata Faktor K** | | | | **1.000** | | **0.941** | | **0.869** | | **0.747** | |




**Gambar E. 23** Grafik Hasil Untuk Waktu Awal Tanam Bulan Oktober Periode II

Meika Victoria, Penulis dilahirkan di Gresik, 14 Mei 1998, merupakan anak tunggal. Penulis telah menempuh pendidikan formal di SD Katolik Santo Yusup Tropodo pada tahun 2004-2010; SMP Katolik Santo Yusup Tropodo pada tahun 2010-2013; SMA Katolik Untung Suropati Sidoarjo pada tahun 2013-2016. Setelah lulus dari SMA Katolik Untung Suropati Sidoarjo, penulis mengikuti SPMB dan diterima di Departemen Teknik Infrastruktur Sipil FV-ITS pada tahun 2016 dan terdaftar dengan NRP 3116041001. Penulis selama menempuh pendidikan khususnya pada masa kuliah telah aktif di organisasi Mahasiswa ITS, yaitu Himpunan Mahasiswa Diploma Sipil FV-ITS, dimana penulis diamanahi sebagai Bendahara Umum Himpunan Mahasiswa Diploma Sipil (LE-HMDS) FV-ITS periode 2018/2019 dan 2017/2018. Selain itu penulis juga aktif di berbagai kepanitiaan, beberapa diantaranya adalah D'village 7$^{th}$ dan 8$^{th}$ Sub Event BCC 2017 dan 2018 dan Gerigi ITS 2017 dan 2018. Penulis juga mengikuti beberapa pelatihan termasuk LKMM Pra-TD, LKMM TD dan aktif sebagai pemandu ITS. Untuk informasi maupun saran lebih lanjut terkait Tugas Akhir Terapan ini, pembaca dapat menghubungi penulis di alamat email *meika.victoria@gmail.com.*